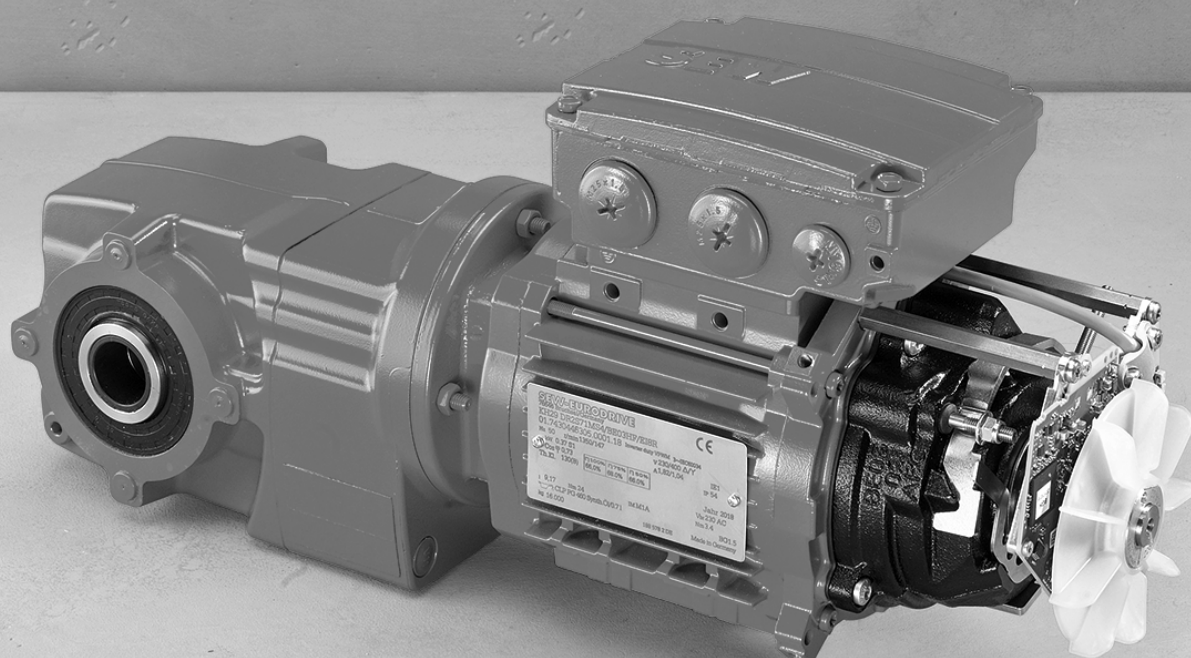




SEW
EURODRIVE

Operating Instructions



Built-In Encoders, Add-On Encoders and Safety Encoders

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



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1 General information

1.1 Structure of the safety notes

1.1.1 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.	

1.1.2 Meaning of the hazard symbols

The hazard symbols in the safety notes have the following meaning:

Hazard symbol	Meaning
	General hazard

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 Safety encoders

2.2.1 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, starting the designated operation is prohibited until you have 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 and during the entire operation, make sure that the system complies with the specifications of this documentation, and in particular the technical data.
- Safety encoders can also be operated outside functional safety (FS) without safety-relevant monitoring/evaluation by evaluation electronics. Also in this case, the specifications of the documentation, especially the technical data, must be adhered to. If the safety encoder is operated outside the permitted operating limits, future use as part of a safety function is no longer permitted.
- In order to determine the achieved safety integrity level (SIL) or performance level (PL) 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 in an idle state (brake application speed < 20 min⁻¹). Emergency stop braking operations from higher motor speeds are permitted. SEW-EURODRIVE recommends stopping the drive with stop category 1 in accordance with EN 60204-1.
- Operation of the safety encoders is permitted at ambient temperatures of -40 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, EK8W, AK8W, AK8Y: 4000 m above sea level
 - AK8H: 2000 m above sea level
 - EK8Z, EK9Z, AK8Z: 3800 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.

- For AS7W, AG7W, AS7Y, AG7Y, AK8Y, EK8W, AK8W, AK8H, EK9Z, and AK8Z safety encoders, only the incremental interface is certified in accordance with 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).

Note that in case of emergency stop braking from speeds $> 20 \text{ min}^{-1}$, the encoders can output warnings or errors if the negative acceleration exceeds certain limit values. Before switching the device on again, warnings or errors must be checked and acknowledged if necessary.

2.2.2 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.

2.3 Functional safety technology

The product is not permitted to perform any safety function without higher-level safety systems.

Functionally safe motor options that enable the implementation of safety sub-functions can optionally be installed on the product.

To use the safety sub-functions, refer to the corresponding documentation and the product manual for this product.

2.4 Target group

Specialist for mechanical work	Any mechanical work may be performed only by adequately qualified specialists. Specialists in the context of this documentation are persons who are familiar with the design, mechanical installation, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of mechanics in accordance with the national regulations • Familiarity with this documentation
Specialist for electrotechnical work	Any electrotechnical work may be performed only by electrically skilled persons with a suitable education. Electrically skilled persons in the context of this documentation are persons who are familiar with electrical installation, startup, troubleshooting, and maintenance of the product, and who possess the following qualifications: • Qualifications in the field of electrical engineering in accordance with the national regulations • Familiarity with this documentation
Additional qualifications	In addition to that, these persons must be familiar with the valid safety regulations and laws, as well as with the requirements of the standards, directives, and laws specified in this documentation. The persons must have the express authorization of the company to operate, program, parameterize, label, and ground devices, systems, and circuits in accordance with the standards of safety technology.
Instructed persons	All work in the areas of transport, storage, installation, operation and waste disposal may only be carried out by persons who are trained and instructed appropriately. These instructions must enable the persons to carry out the required activities and work steps safely and in accordance with regulations.

2.5 Performing work on the product safely

2.5.1 Defective or damaged product

Never install defective or damaged products. Observe the following information to avoid injuries or damage:

- Before installation, check the product for external damage and replace a damaged product.

2.6 Performing electrical work safely

Observe the following information to perform electrical work safely:

Electrical work may only be performed by an electrically skilled person or an electronically instructed person under the supervision of an electrically skilled person.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

2.6.1 Live parts

Always adhere to the 5 safety rules for all work on electrical components:

1. Disconnect.
2. Secure the device against a restart.

3. Check that no voltage is applied.
4. Ground and short-circuit.
5. Cover or isolate neighboring live parts.

Depending on the situation, it is possible to deviate from rules 4 and 5. Observe standard EN 50110-1.

2.7 Transport

Inspect the shipment for damage as soon as you receive the delivery. Inform the shipping company immediately about any damage. If the product or the packaging is damaged, do not assemble, install, connect, or start up the product. If the packaging is damaged, the product itself may also be damaged.

Observe the following notes when transporting the device:

- Ensure that the product is not subject to mechanical impact.

If necessary, use suitable, adequately dimensioned transport aids.

Observe the notes on the climatic conditions in accordance with chapter "Technical data" in the corresponding product manual.

2.8 Installation/assembly

Ensure that the product is installed and cooled in accordance with the regulations in the documentation.

Protect the product from excessive mechanical strain. The product and its mounted components must not protrude into the path of persons or vehicles. Ensure that no components are deformed or no insulation spaces are modified, particularly during transportation. Electrical components must not be mechanically damaged or destroyed.

2.9 Electrical connection

Make sure that preventive measures and protection devices comply with the applicable regulations (e.g. EN 60204-1 or EN 61800-5-1).

You will find notes on EMC-compliant installation (shielding, grounding, arrangement of filters and routing of lines) in chapter "Measures for electromagnetic compatibility". The manufacturer of the system or machine is responsible for maintaining the limits established by EMC legislation.

2.10 Startup/operation

Make sure the connection boxes are closed and screwed before connecting the supply voltage.

Depending on the degree of protection, products may have live, uninsulated, and sometimes moving or rotating parts as well as hot surfaces during operation.

Additional preventive measures may be required for applications with increased hazard potential. Be sure to check the effectiveness of the protection devices after every modification.

In the event of deviations from normal operation, switch off the product. Possible deviations are increased temperatures, noise, or vibration, for example. Determine the cause. Contact SEW-EURODRIVE if necessary.

Risk of burns due to arcing: Do not disconnect power connections during operation. Do not connect power connections during operation.

When the system is switched on, dangerous voltages are present on all voltage-controlled product parts as well as any cables and terminals that are connected. This also applies even when the product is inhibited and the motor is in an idle state. Do not touch the components during operation.

If you disconnect the product from the voltage supply, do not touch any live components or power connections because capacitors might still be charged. Observe the following minimum switch-off time:

10 minutes.

Observe the corresponding information signs on the product.

The fact that the operation or display elements are no longer illuminated does not indicate that the product has been disconnected from the supply system and no longer carries any voltage.

Mechanical blocking or internal protective functions of the product can cause a motor standstill. Removing the cause of this problem or performing a reset can result in the machine or the system re-starting on its own. First, disconnect the product from the supply system before you start troubleshooting.

Risk of burns: The surface temperature of the product can exceed 60 °C during operation. Do not touch the product during operation. Let the product cool down before touching it.

2.10.1 Energy storage unit

Products with a connected energy storage unit are not necessarily de-energized when they have been disconnected from the supply system. Usually, the energy storage unit stores sufficient energy to continue operation of the connected motors for a limited period of time. It is not sufficient to observe a minimum switch-off time.

Perform a shutdown as described in the documentation in the chapter "Service" > "Shutdown".

3 Device structure

3.1 Nameplates and type designations of encoders

3.1.1 Type designation for safety encoders

INFORMATION



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

3.1.2 Structure of the type designation

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

3.1.3 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 digit: 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 digit: 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)

3rd digit: 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 digit: 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 $V_B = 9 - 30 \text{ V}$
H	sin/cos + RS485 HIPERFACE® (multi-turn)
L	Resolver signal
M	Resolver signal
R	TTL (RS422) at typically $V_B = 9 - 30 \text{ V}$
S	Sin/cos + RS485 (optional)
T	TTL (RS422) at $V_B = 5 \text{ V}$
W	Sin/cos + RS485 (single-turn or multi-turn)
Y	Sin/cos or TTL(RS422) + SSI (multi-turn)
Z	MOVILINK® DDI

3.1.4 Part number

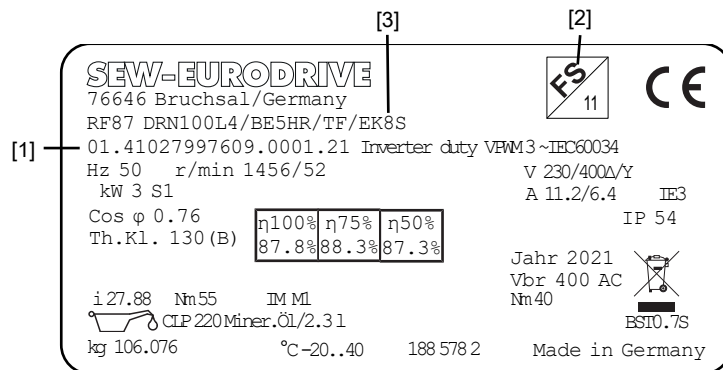
Two part numbers can be specified on the nameplate for the encoders.

The assignment of the part numbers and the position on the nameplate can be found in chapters ".K8./.K9. nameplate - Baumer" (→ 14) and ".K8./.K9. nameplate – Kübler" (→ 15).

Additional information can be found in chapters "Manufacturer information about conical encoders" and "Spare parts".

3.1.5 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 present, 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 chapter "FS marking".



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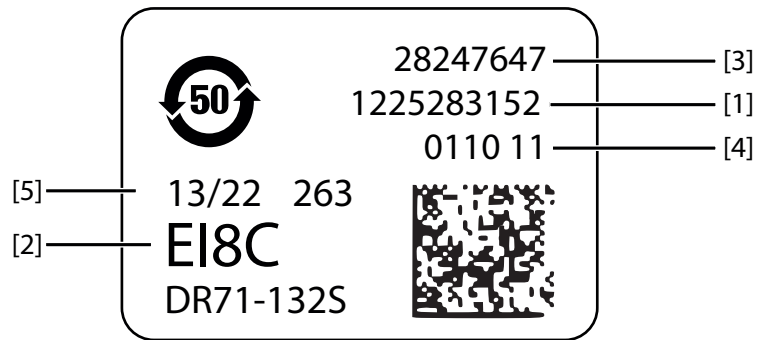
- [1] Motor serial number
- [2] FS logo for functional safety
- [3] Type designation

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

3.1.6 EI7., EI8. built-in encoder

The following figures show examples of the nameplates of the EI7. and EI8. encoders. For the structure of the type designation, refer to chapter "Type designation for encoders from SEW-EURODRIVE".

Design 1



9007234990439179

Design 2



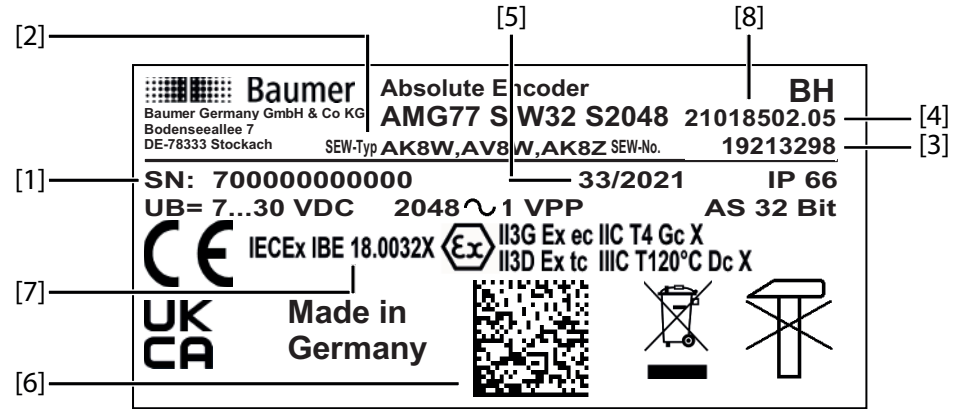
42411732491

- [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

3.1.7 .K8./.K9./.V8. conical encoder

.K8./.K9. nameplate - Baumer

The following figure shows an example of a nameplate for a Baumer encoder. For the structure of the type designation, refer to chapter "Type designation for encoders from SEW-EURODRIVE".



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 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.

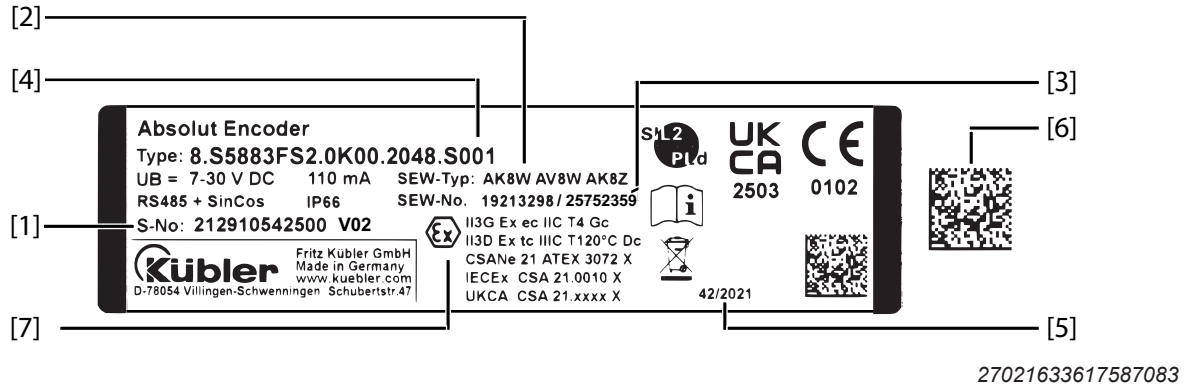
2nd part number [3] (listed below):

- 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" and chapter "Spare parts".

.K8./.K9. nameplate – Kübler

The following figure shows an example of a nameplate for a Kübler encoder. For the structure of the type designation, refer to chapter "Type designation for encoders from SEW-EURODRIVE".



- [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

The last two digits of the serial number denote the version of the encoder.

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 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):

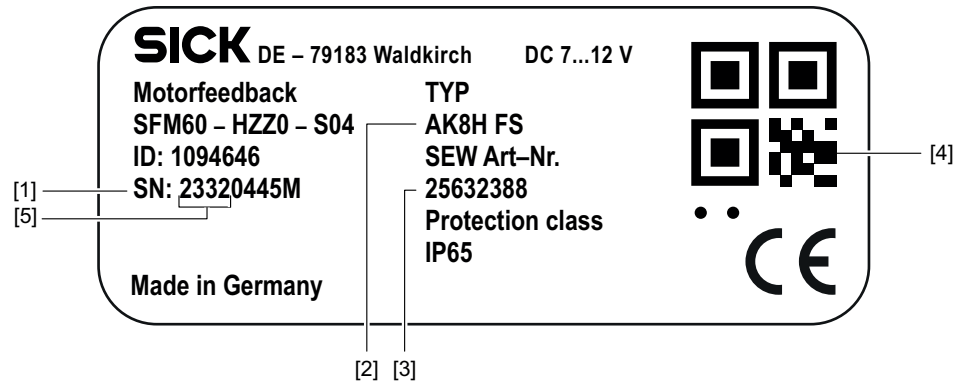
- Manufacturer-specific part number of the encoder.

For additional information, see chapter "Manufacturer information about conical encoders" and chapter "Spare parts".

.K8./.K9. nameplate – Sick

The following figure shows an example of a nameplate for a Sick encoder. For the structure of the type designation, refer to chapter "Type designation for encoders from SEW-EURODRIVE".

Sick encoders with functional safety have a yellow nameplate.



- [1] Serial number
- [2] Type designation
- [3] Part number from SEW-EURODRIVE
- [4] QR code
- [5] Manufacturing date in yyww format

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 connector.

Design 2

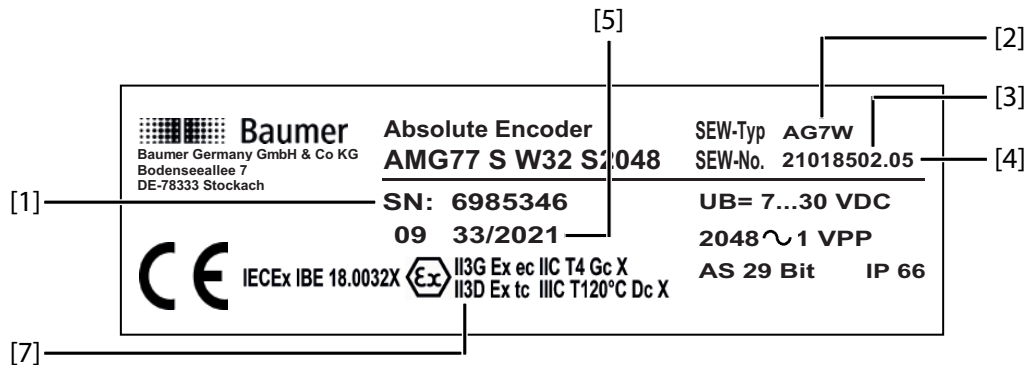
Manufacturing date as of CW32/2023 (date code 2332): Part number of encoders from SEW-EURODRIVE.

For additional information, see chapter "Manufacturer information about conical encoders" and chapter "Spare parts".

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

.S7./G7. nameplate - Baumer

The following figure shows an example of a nameplate for a Baumer encoder. For the structure of the type designation, refer to chapter "Type designation for encoders from SEW-EURODRIVE".



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 connector)

For additional information, see chapter "Manufacturer information about conical encoders" and chapter "Spare parts".

4 Mechanical installation

4.1 Required tools



⚠ WARNING

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

Severe or fatal injuries.

- ✓ To ensure the exclusion of any faults in the mechanical connection between the motor and the safety encoder, comply with the following points in accordance with EN 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. / .K9. / .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. MOLYCOTE®

For encoders .S7. / .G7.

- NOCO-Paste

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, EK8W, AK8W, AK8Y, AK8H, EK8Z, EK9Z, AK8Z safety encoders: LOCTITE® 241

4.2 Tightening torques

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

4.3 Safety encoders

4.3.1 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 EK8Z, EK9Z, AK8Z safety encoders, work on the MOVILINK® DDI communication unit is not permitted. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed.
- 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. Note that greases and oils must not be allowed on the mechanical connections of the safety encoders during assembly or operation.

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 EN 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.

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
Replacing the safety encoder	✓	Replacement with a structurally identical safety encoder (same encoder type). EI7C FS: Replacing the safety encoder is not permitted. EK8Z, EK9Z, AK8Z: Replacing the MOVILINK® DDI communication unit is not permitted.
Replacing the existing encoder with a safety encoder	–	Contact SEW-EURODRIVE.
Changes made to the safety encoder	–	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]	✓	In case of service, loosen only the central retaining screw. If other screws are loosened, the insulation coupling is damaged [1891].

✓ Yes

– No

4.3.2 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.

Severe or fatal injuries.

- To ensure the exclusion of any faults in the mechanical connection between the motor and the safety encoder, comply with the following points in accordance with EN 61800-5-2:
 - Perform a proper disassembly/assembly 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).

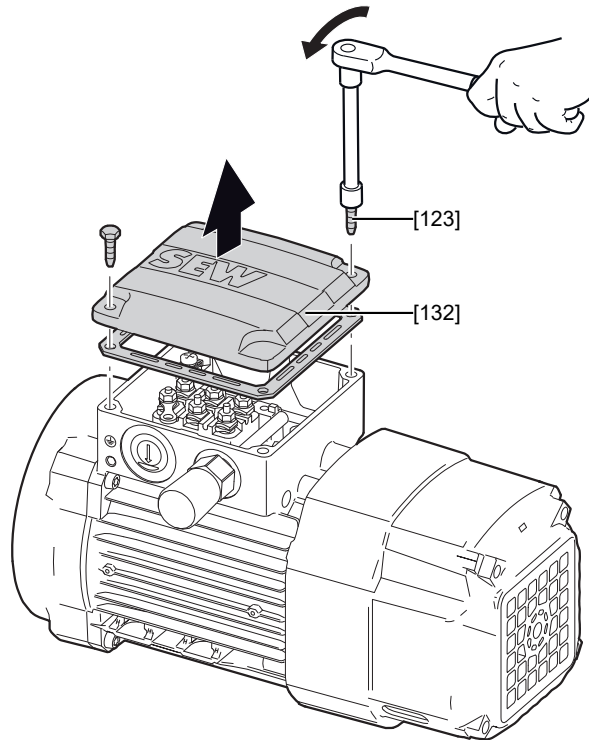
First, check the FS logo on the motor nameplate to ascertain whether a safety encoder is installed (see chapter "FS mark").

4.4 Removing/installing built-in encoders and encoder mounting adapters for built-in encoders

4.4.1 EI7. built-in encoders and EI7A encoder mounting adapters – DRN63 motors

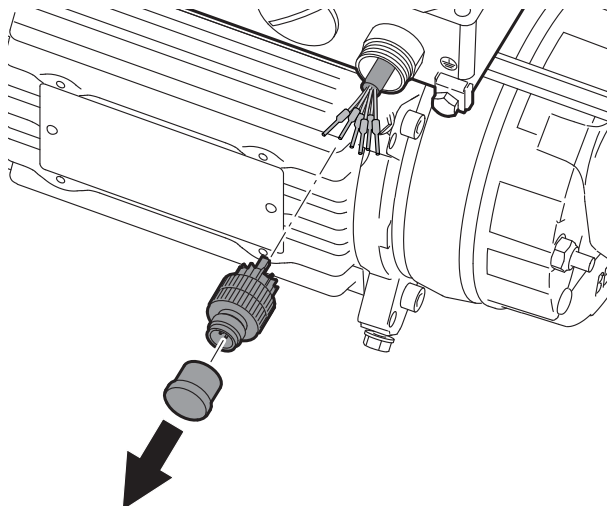
Removing EI7. – DRN63 motors

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



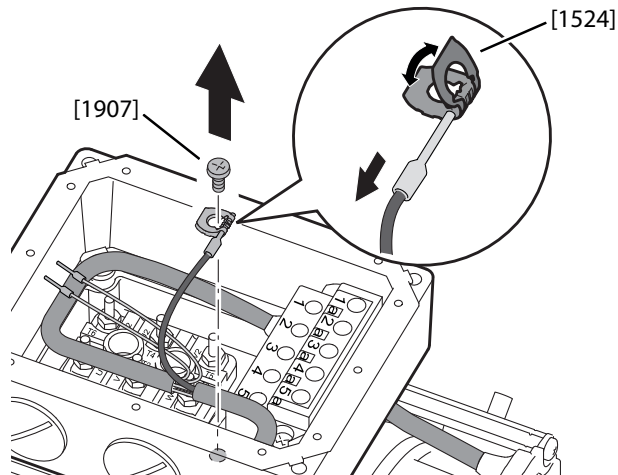
29491623563

2. Unscrew the M12 connector and disconnect the cores.



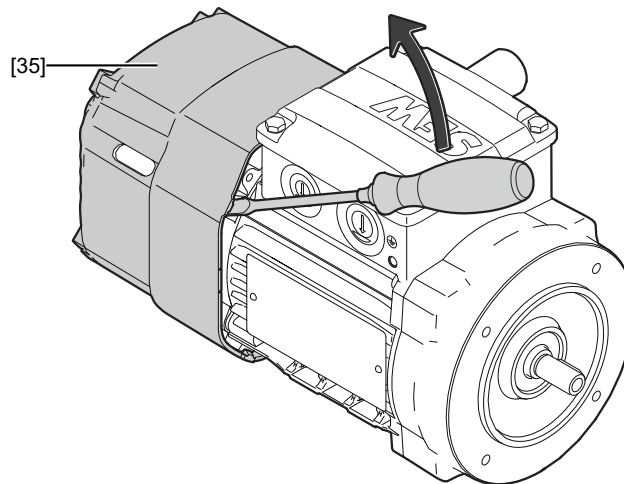
18014408102446347

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



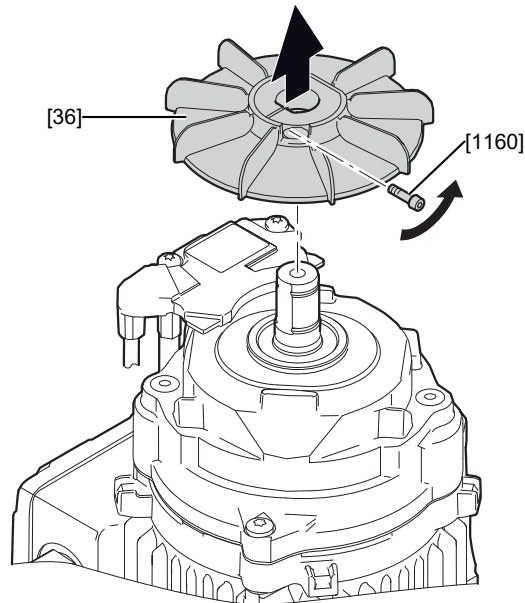
9007229317055755

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.



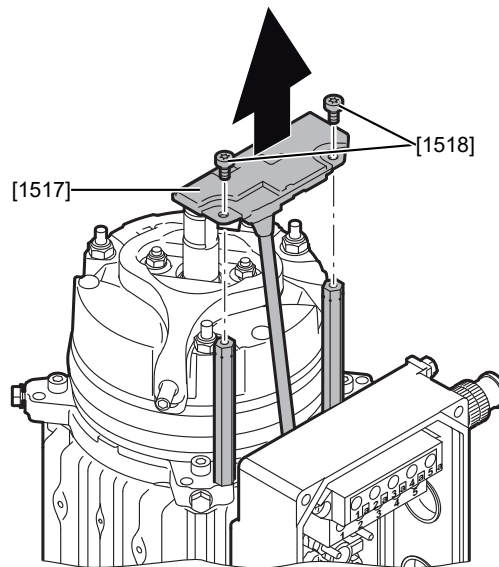
30062320139

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.



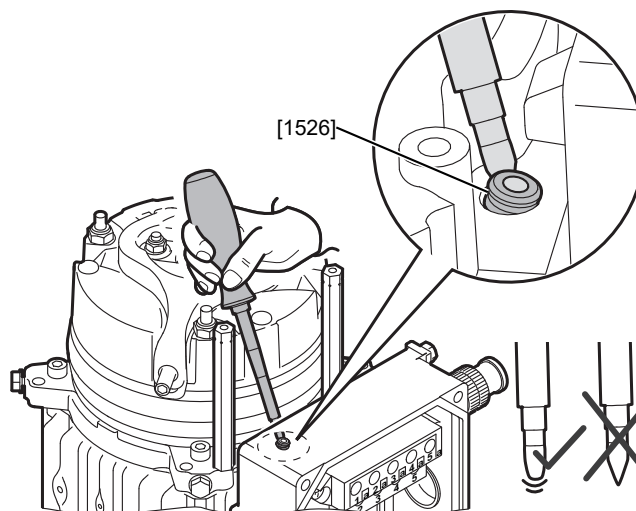
30064499851

⇒ Dispose of the screws.

4 Mechanical installation

Removing/installing built-in encoders and encoder mounting adapters for built-in encoders

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



30064502539

⇒ Dispose of the grommet.

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.

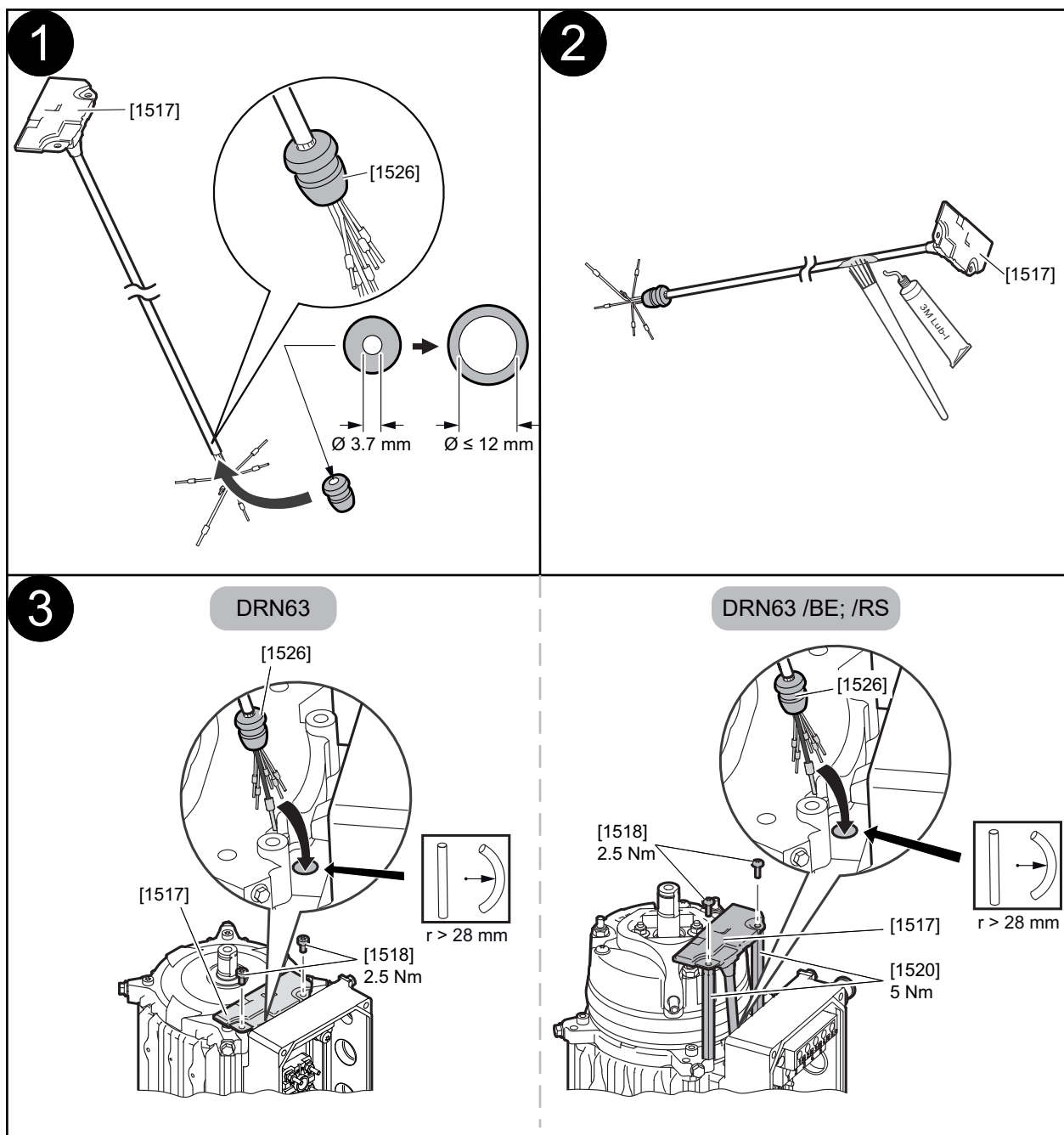
The screws [1518] are also included in the respective retrofit sets and service kits.

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

4 Mechanical installation

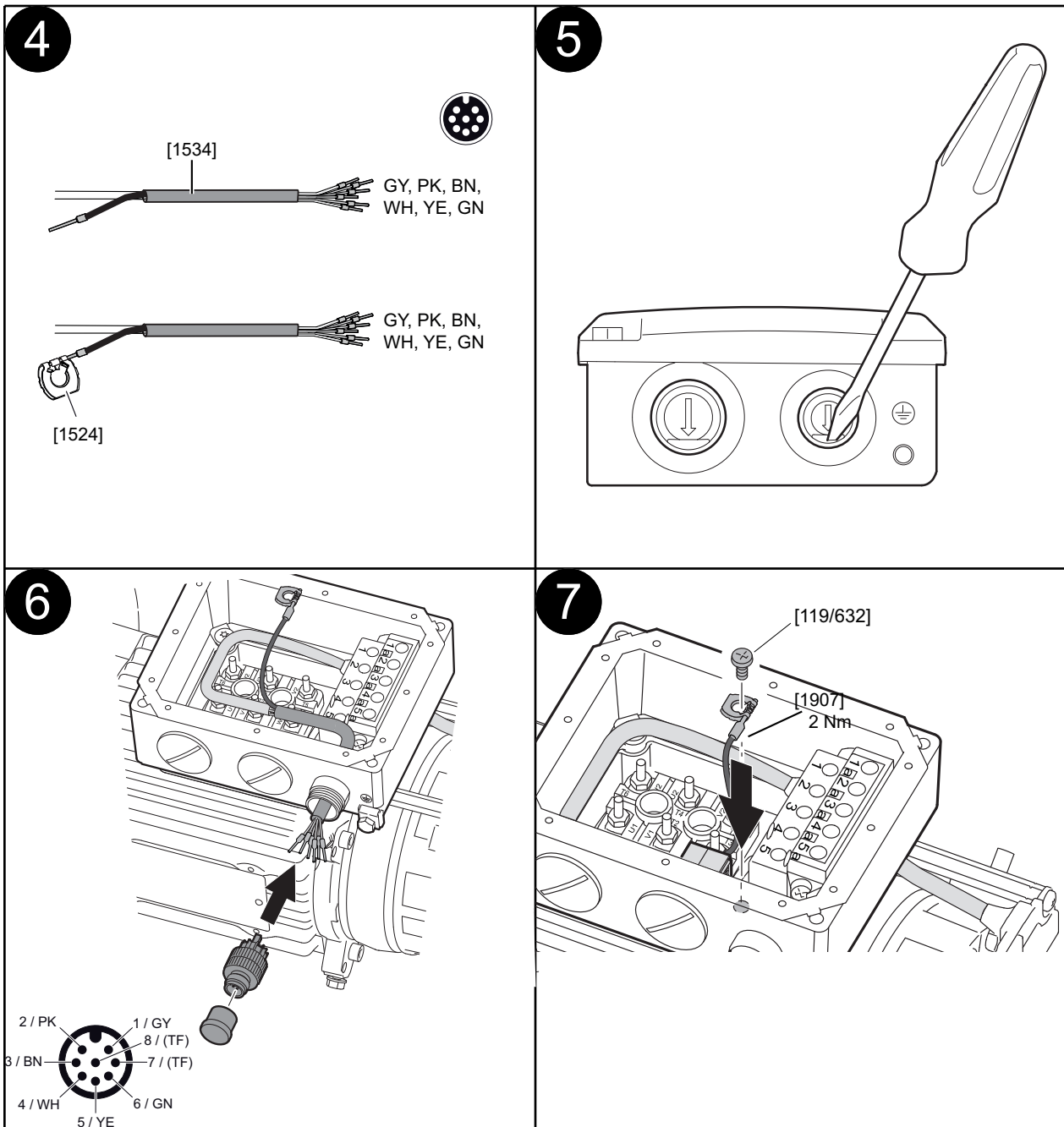
Removing/installing built-in encoders and encoder mounting adapters for built-in encoders

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



9007235746432011

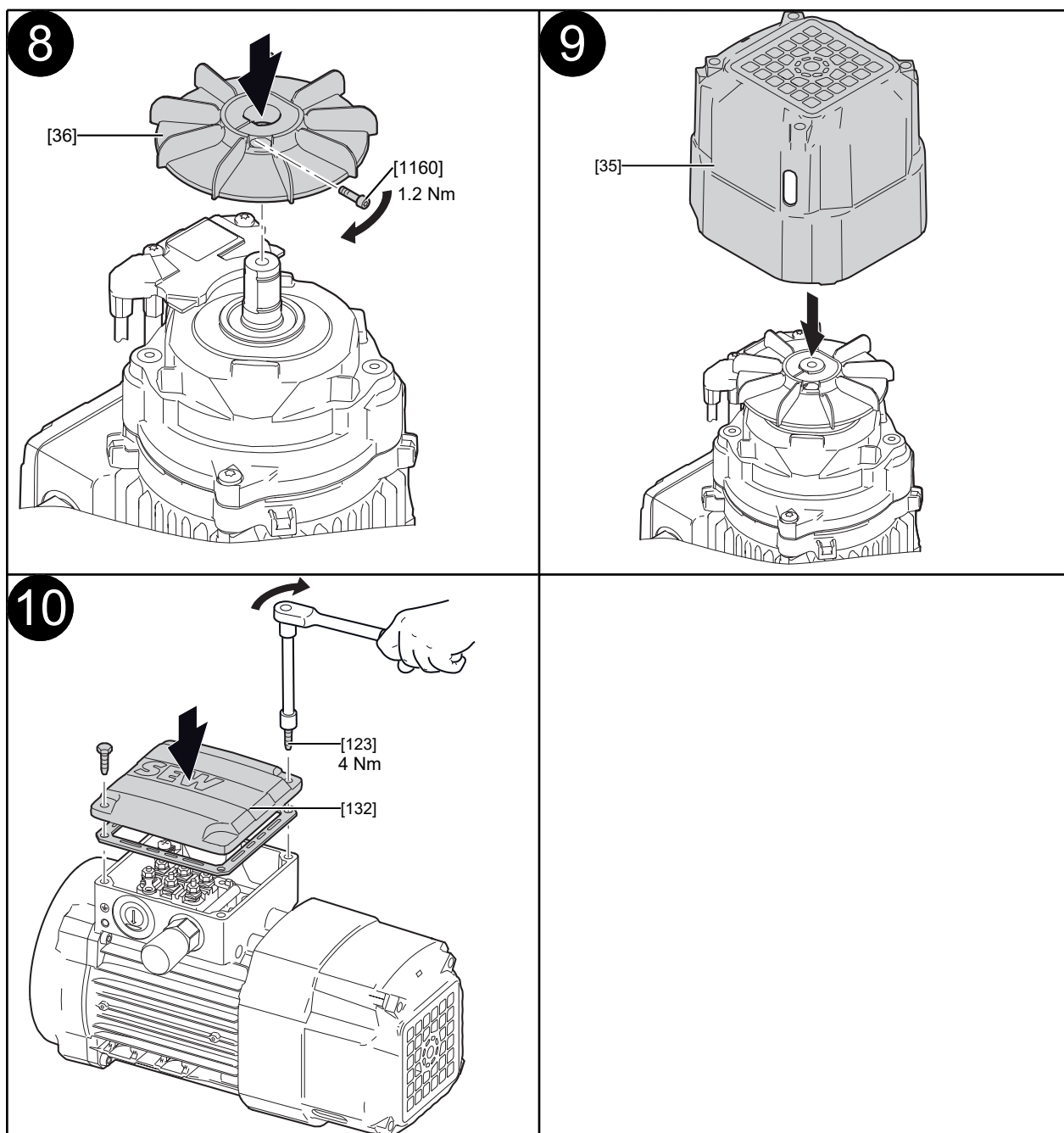
31976646/EN – 03/2025



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4 Mechanical installation

Removing/installing built-in encoders and encoder mounting adapters for built-in encoders



18014435001862411

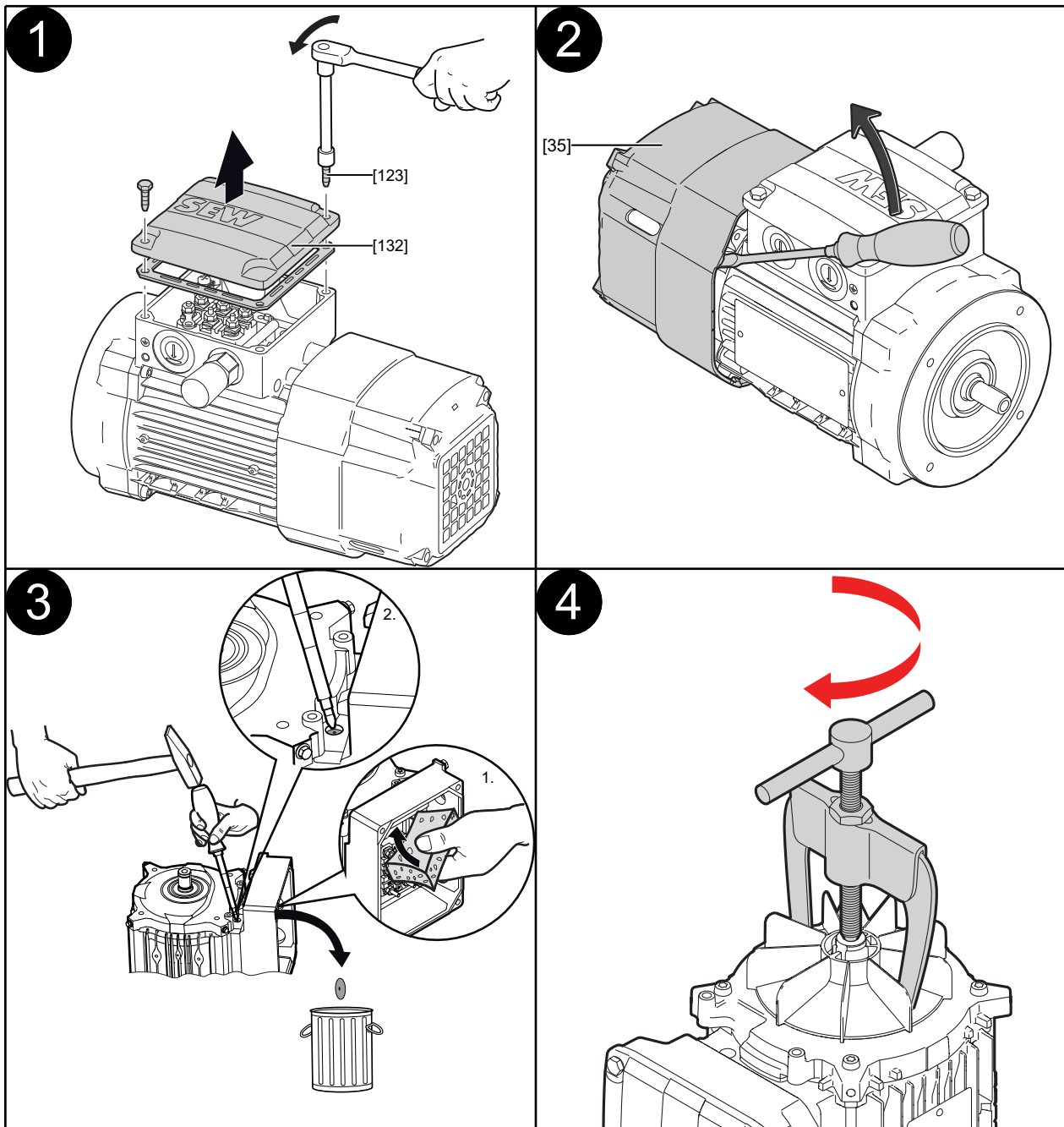
31976646/EN – 03/2025

Retrofitting EI7. – DRN63 motors

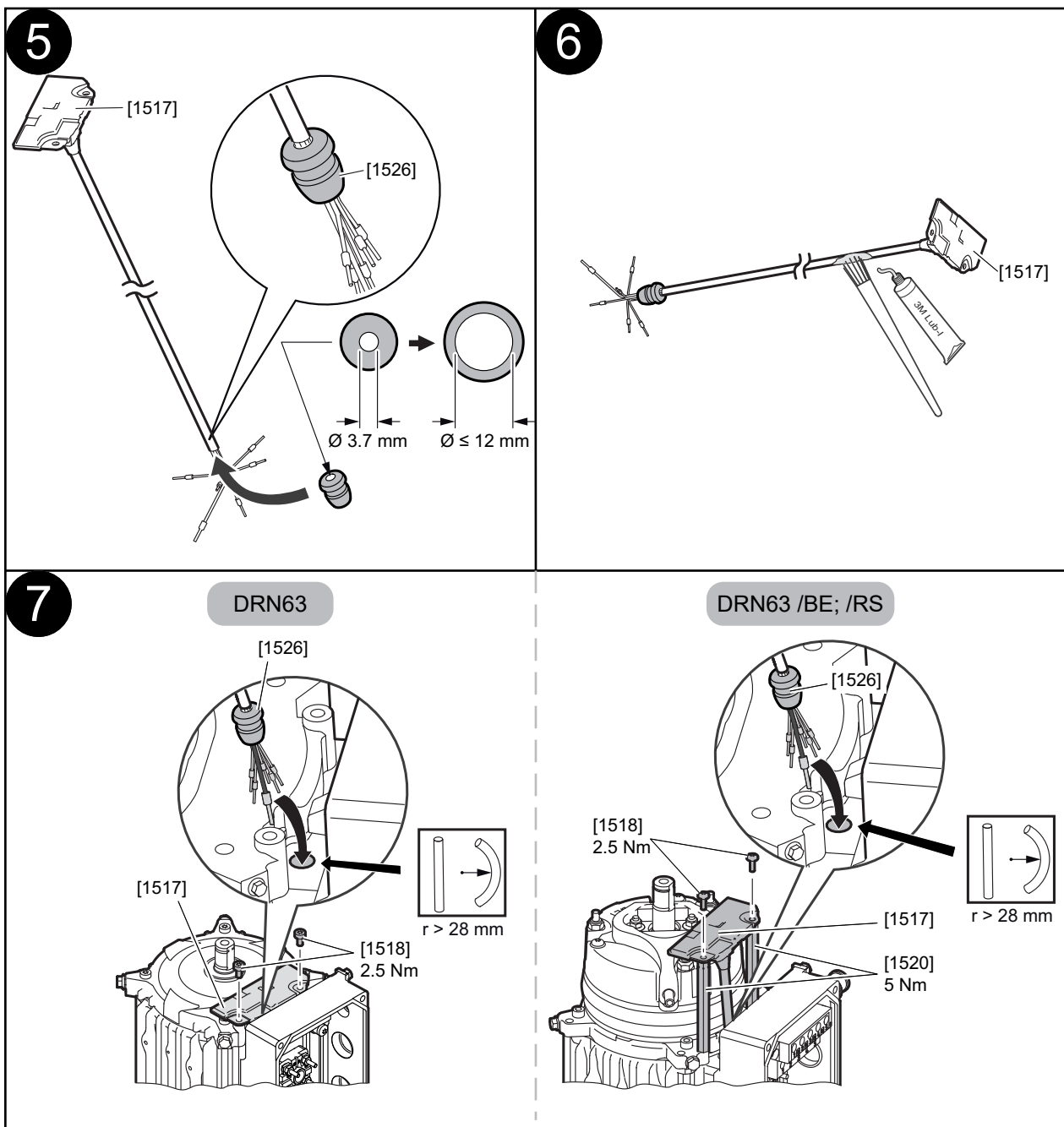
INFORMATION



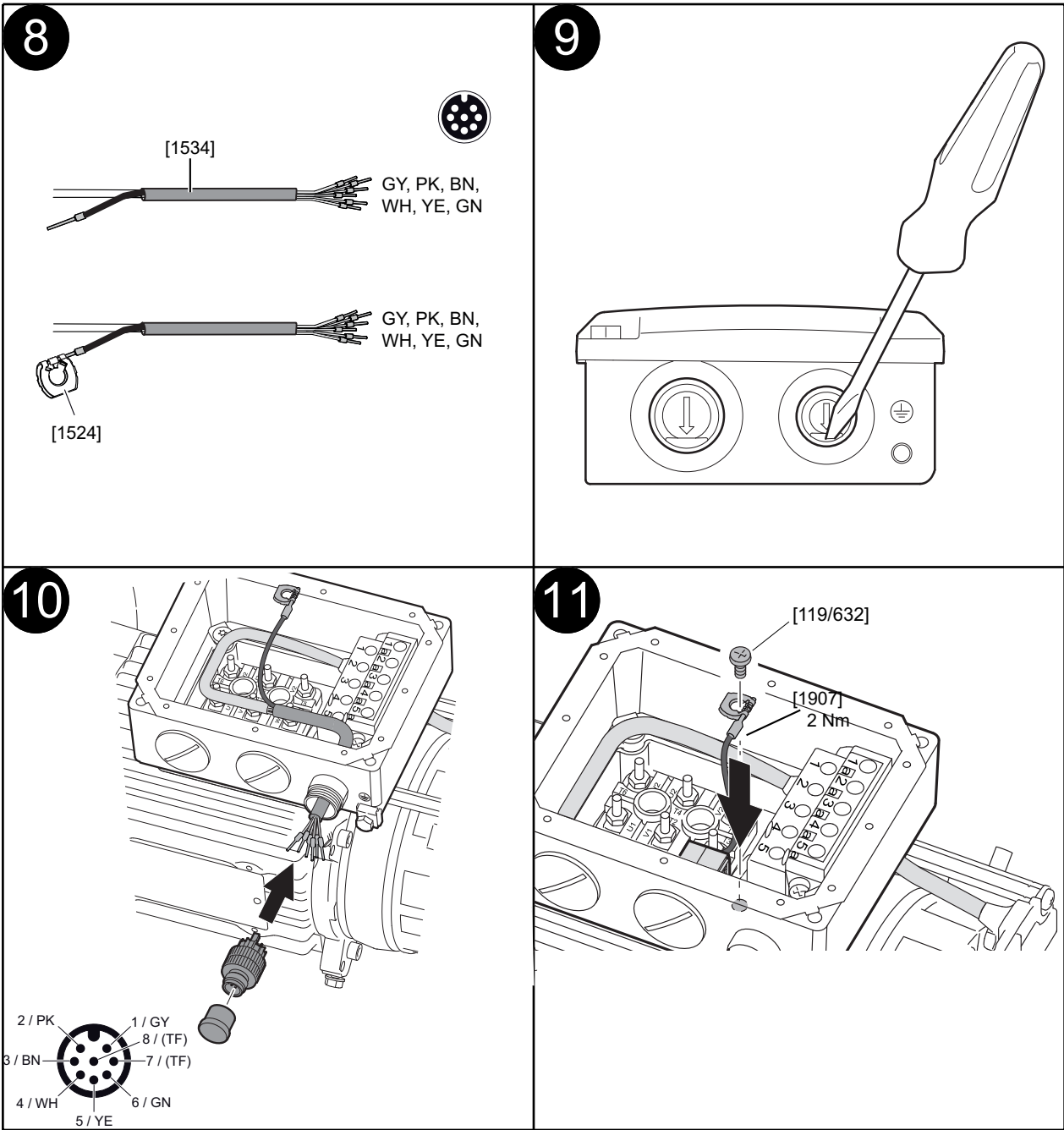
The required small parts are included in the retrofit set.



9007228161643019



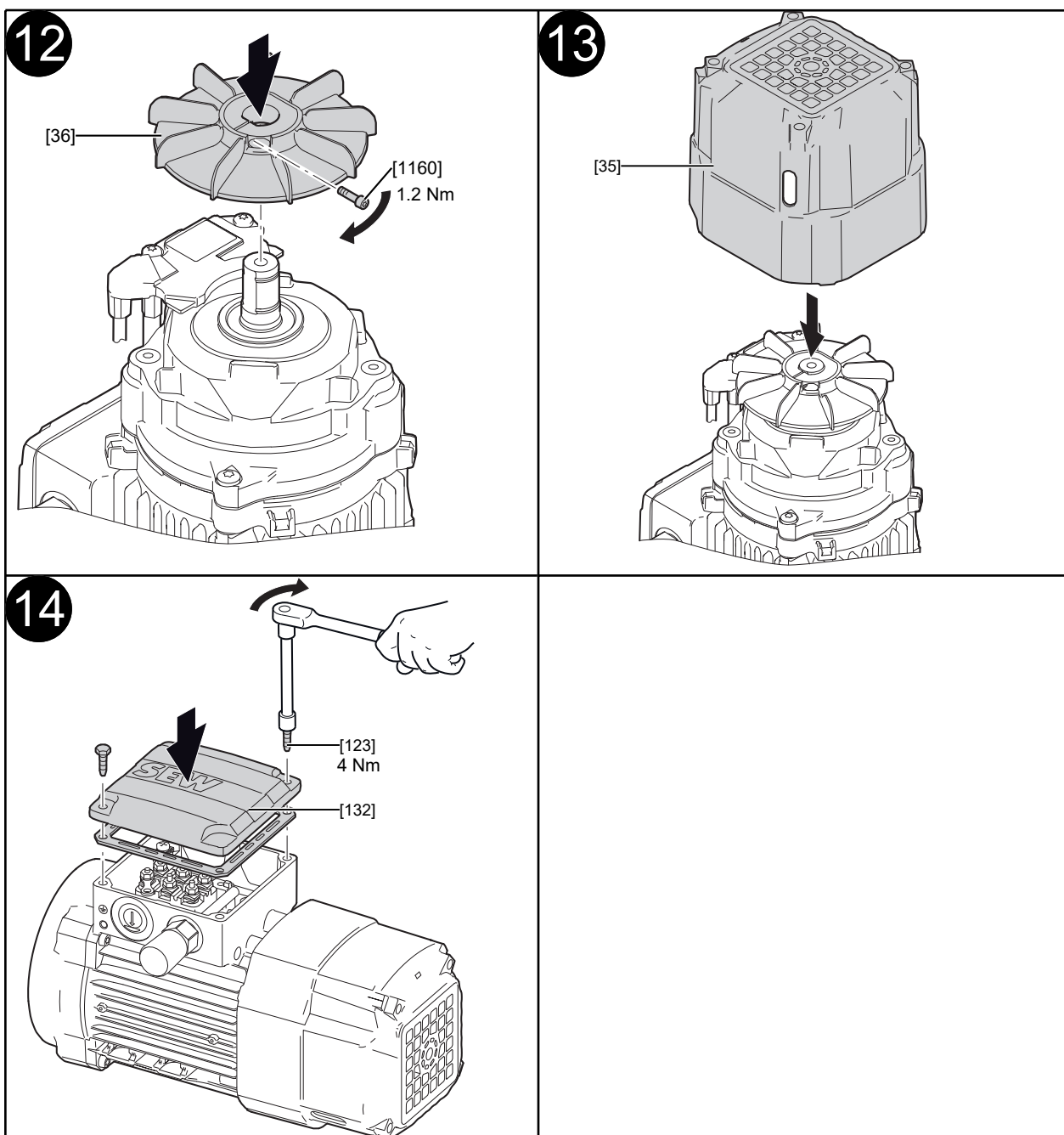
9007228162827275



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4 Mechanical installation

Removing/installing built-in encoders and encoder mounting adapters for built-in encoders

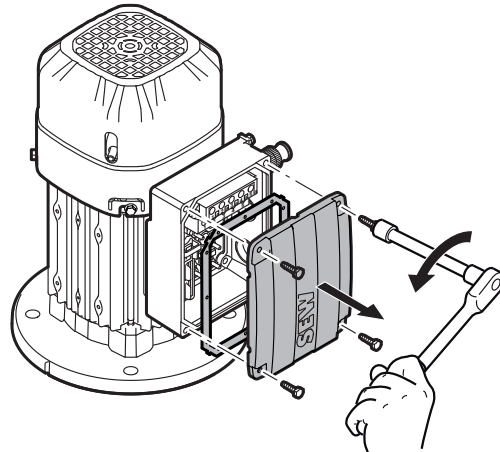


36028827140702347

31976646/EN – 03/2025

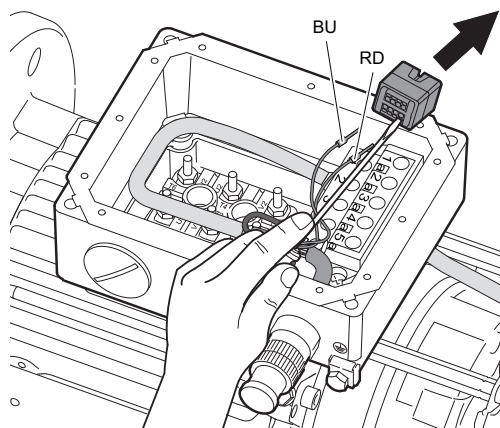
4.4.2 EI7. built-in encoders and EI7A encoder mounting adapters – DRN../DRU../DR2..71 – 132S motors

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



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

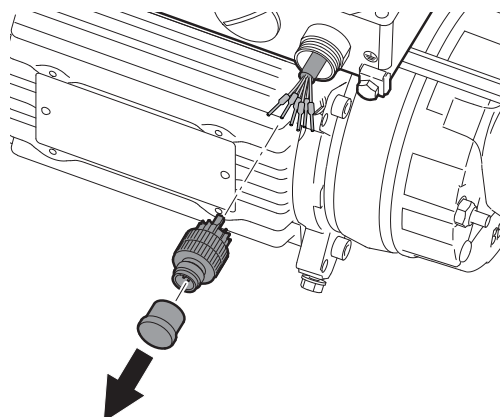


9592952843

If a connection unit with M12 connector is used:

- Disconnect the cores from the connection unit.

SEW-EURODRIVE recommends using the screwdriver 1205202 from Phoenix

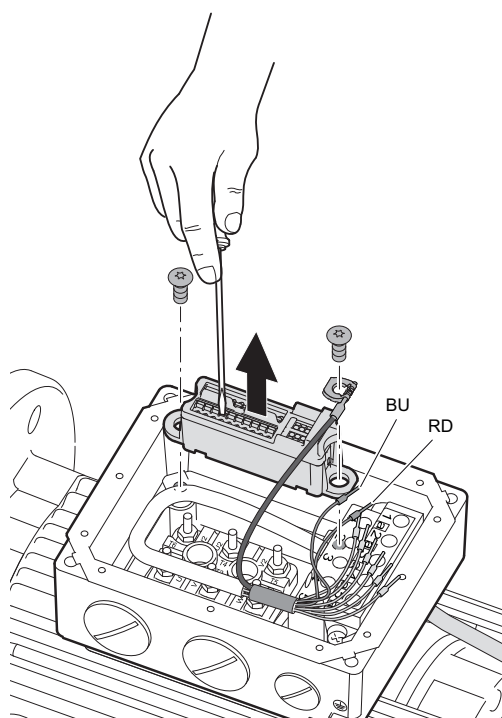


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- Unscrew the M12 connector.
- Disconnect the cores of the encoder cable from the M12 connector.

4 Mechanical installation

Removing/installing built-in encoders and encoder mounting adapters for built-in encoders

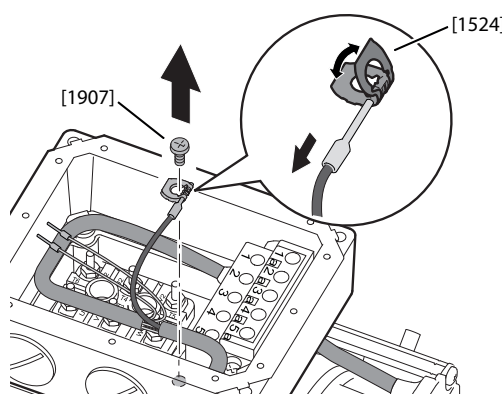


If a connection unit without M12 connector is used:

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

SEW-EURODRIVE recommends using the screwdriver 1205202 from Phoenix

9592970123

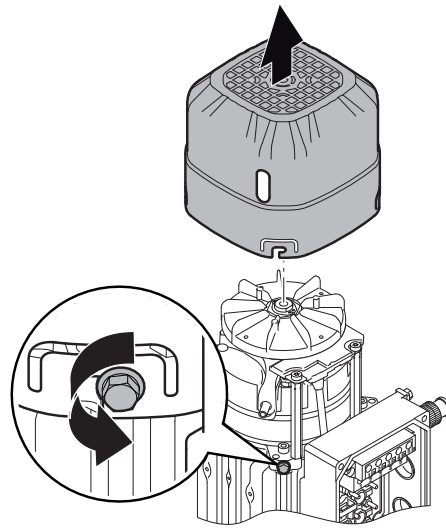


- Loosen the screw for fastening the shielding to the terminal box.
- Bend the terminal washer open and remove the encoder cable shielding together with the core end sleeve.
- Dispose of the terminal washer [1524].

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31976646/EN – 03/2025

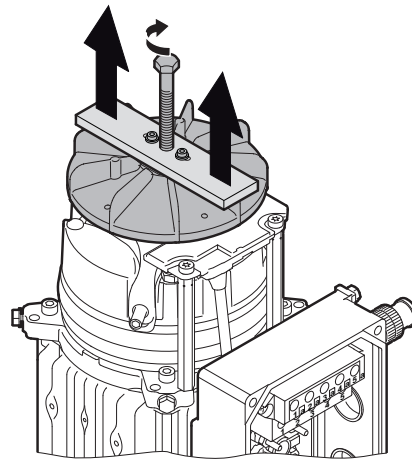
- Loosen the screws on the fan guard and remove the fan guard.



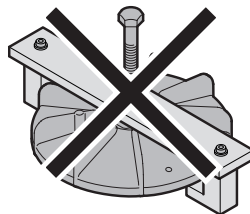
9683088139

- 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!



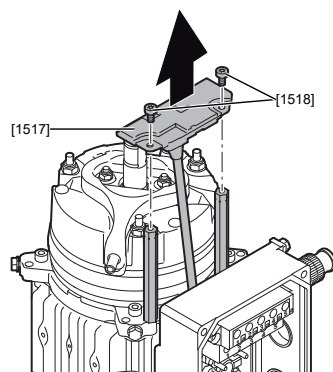
9656067723



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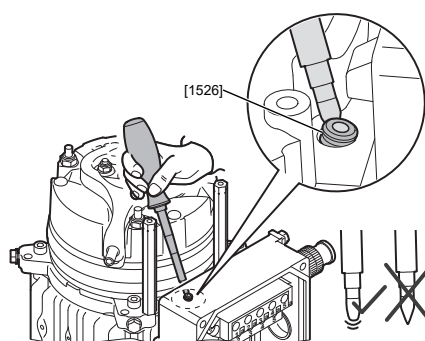
4 Mechanical installation

Removing/installing built-in encoders and encoder mounting adapters for built-in encoders



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

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

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31976646/EN – 03/2025

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

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

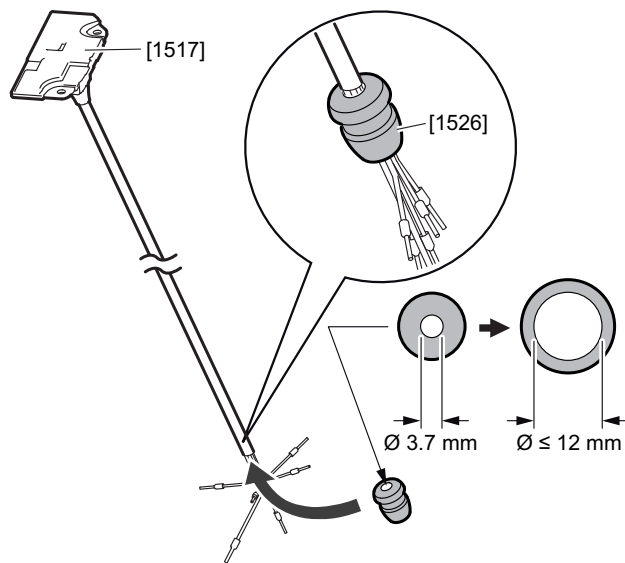
The grommet [1526] is also included in the respective retrofit sets and service kits.

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.

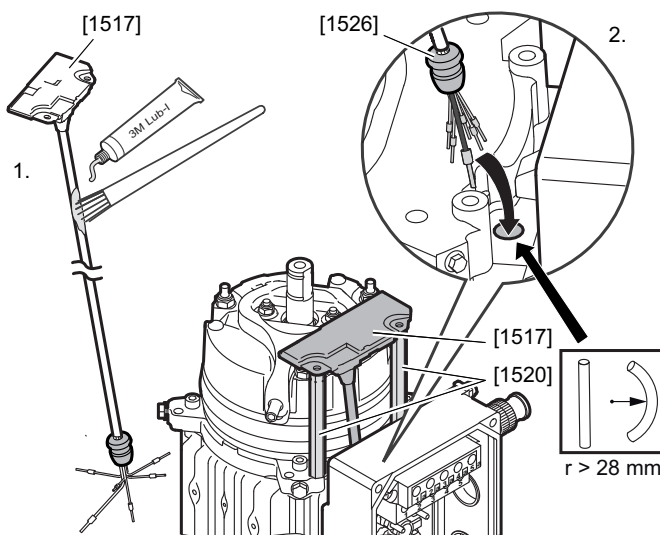
Before installation, a terminal washer [1524] with part number 13262130 must be obtained from SEW-EURODRIVE.

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



- 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.

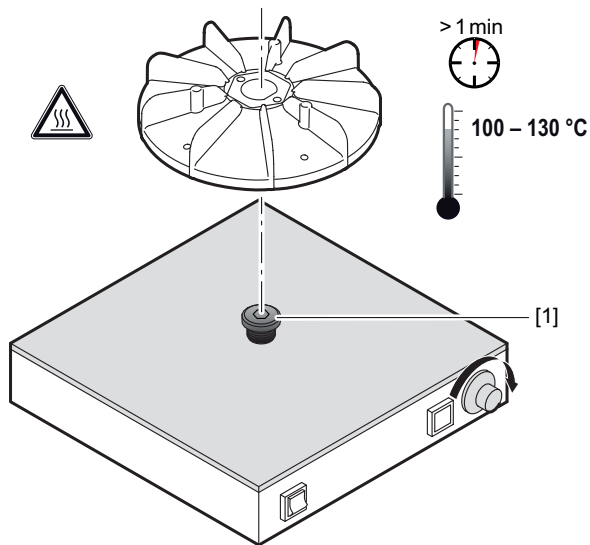
9446005259



- Cable jacket with cable lubricant, for example: Coat with 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.

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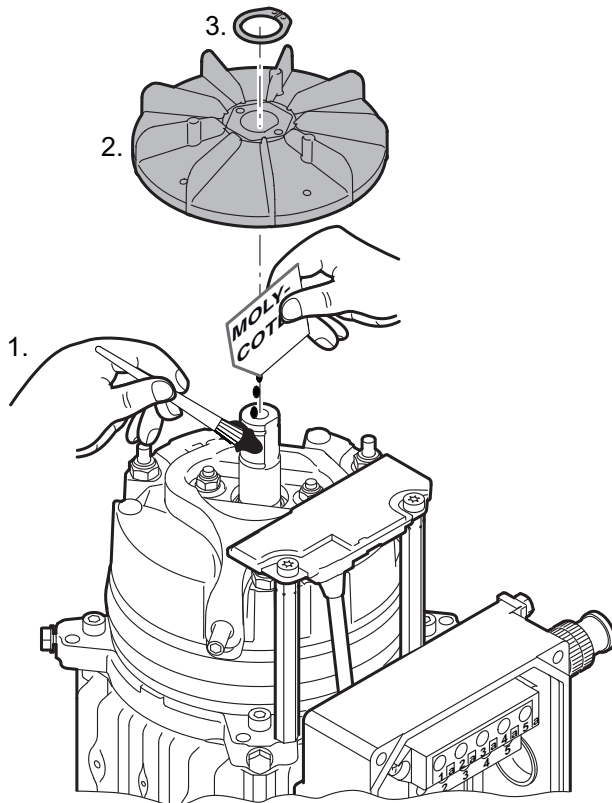


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- Prepare a warming plate.
- Place the bushing of the plastic fan on a warming plate and heat it up to a temperature of 100 to 130 °C.

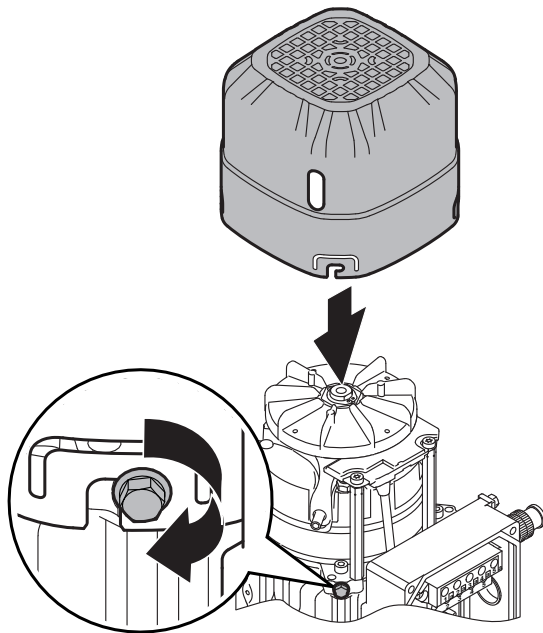
While doing so, ensure that the plastic fan does not come into direct contact with the warming plate.

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



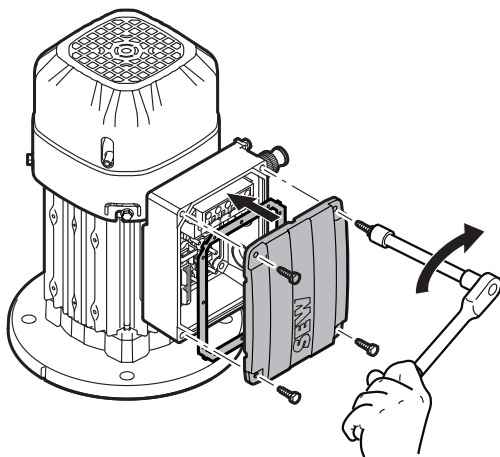
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- Apply assembly paste to the shaft/fan seat e.g.: MOLYCOTE®.
- Install the warmed fan.
- Fasten the fan using a retaining ring.



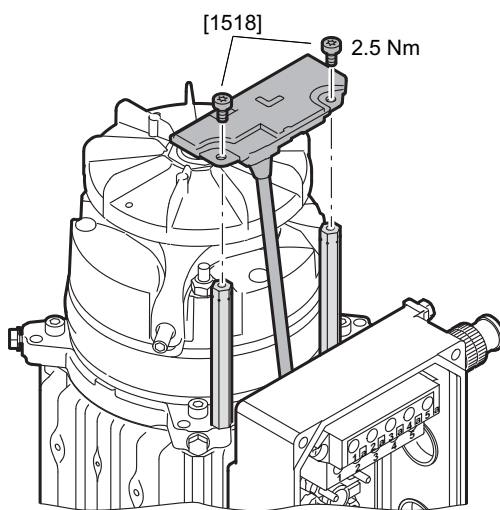
9592956683

- 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

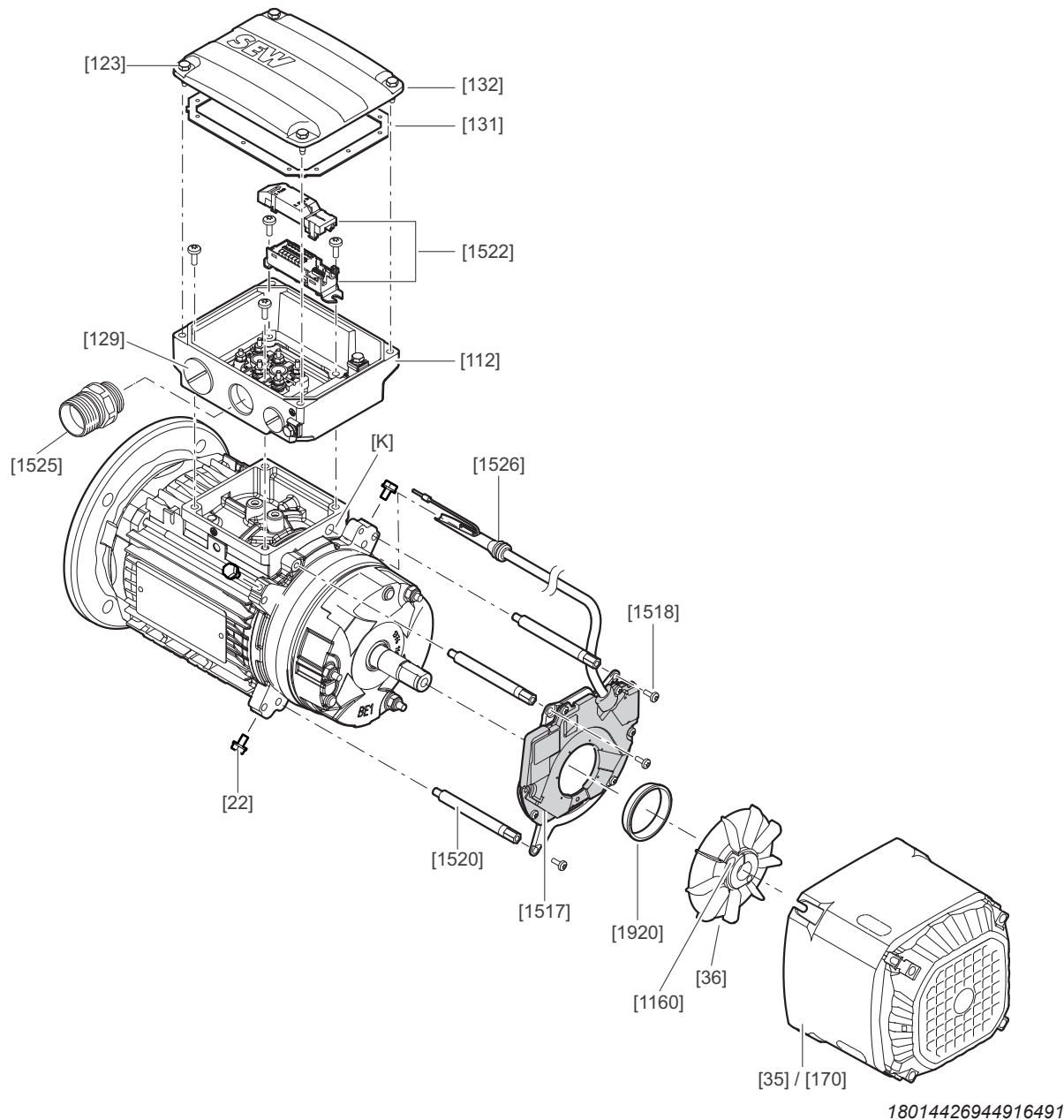
- Mount the terminal box cover and fasten it with screws.
 - Tightening torque: 4 Nm



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

4.4.3 EI8. built-in encoders and EI8A encoder mounting adapters – DRN../DRU../DR2..71 – 132S motors, with connection unit



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[22]	Screw	[131]	Gasket for cover	[1522]	Connection unit
[35]	Fan guard	[132]	Terminal box cover	[1525]	M23 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		

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

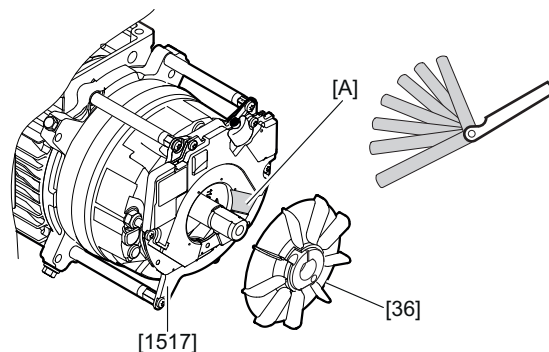
- ✓ Required resources: Screwdrivers (SW7, SW8, TX20, TX25)
- 1. Disassemble the forced cooling fan [170] if applicable.
- 2. Remove the screws [22] to disassemble the fan guard [35].
- 3. Loosen the radial clamping screw [1160]:
 - ⇒ DR..71 – 100: M3 with cylinder head
 - ⇒ DR..112/132S: M4 with cylinder 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. Damage to property. 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].

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.

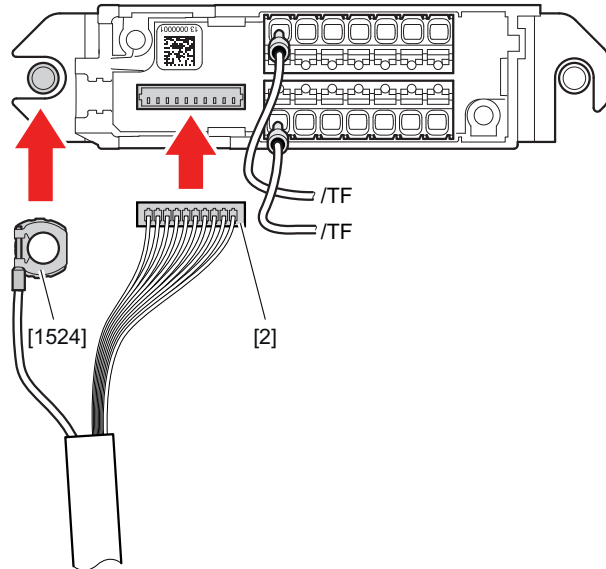
- ✓ Required resources: Feeler gauge (0.9 mm), screwdriver, centering ring [1920]
- 1. Unscrew the screws [123] to remove the terminal box cover [132].
- 2. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible damage to property. Carefully break the knockout open.
Break open the knock-out [K] by using a chisel or screwdriver.
- 3. **NOTICE!** Damage to the connector. Possible damage to property. Do not subject the connector to excessive tension.
Pull the grommet [1526] with encoder cable through the knockout [K].
⇒ The grommet must engage into the opening of the knockout [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].



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- 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.

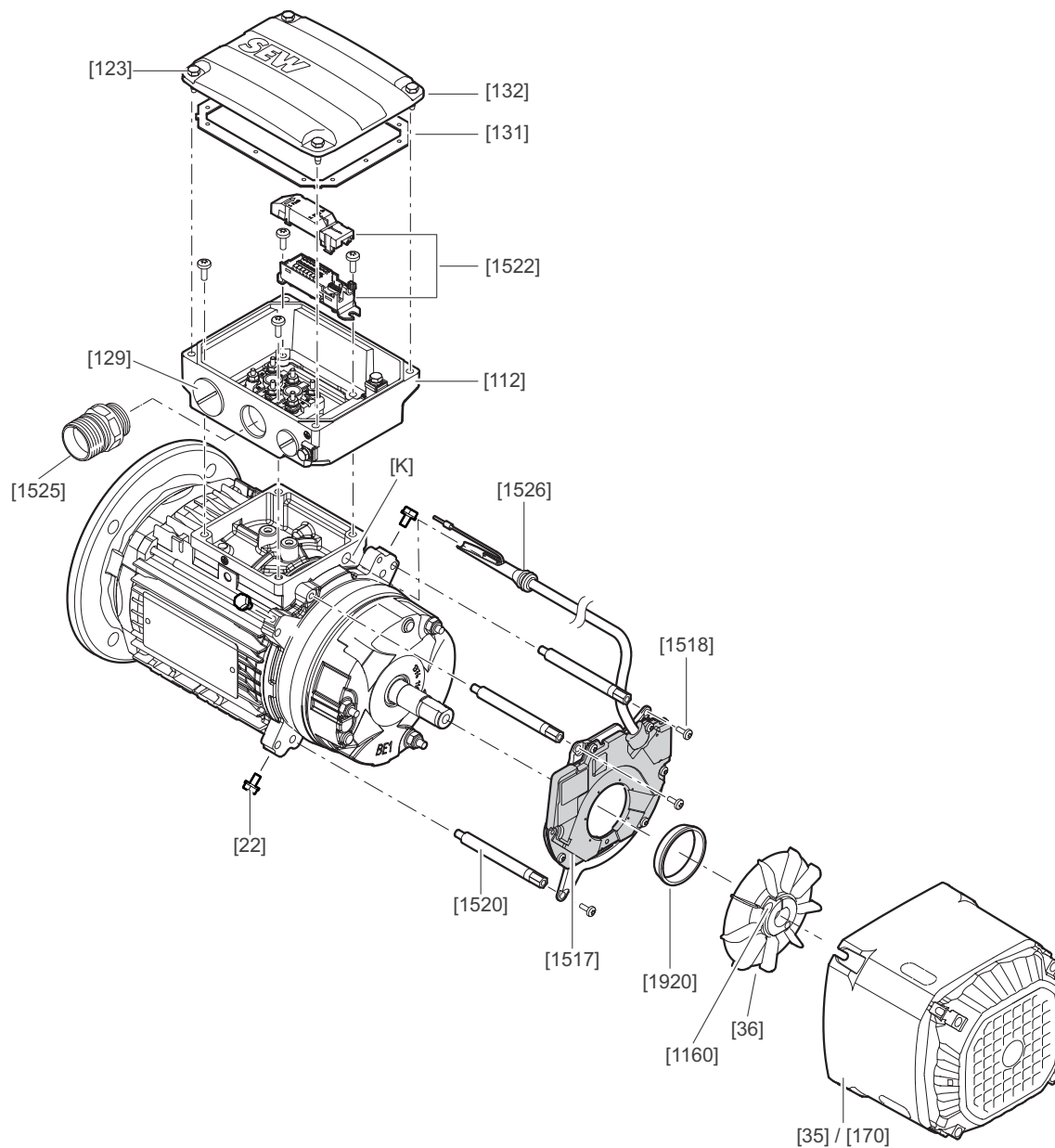
15. Remove the cover of the connection unit [1522] by pressing the cover on both sides behind the cable bushing.
16. Apply the shielding of the encoder cable onto the terminal washer.
17. Place the connection unit [1522] in the terminal box.
18. To secure the connection unit [1522] in place, screw the 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



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19. Insert the socket contact of the encoder cable [2] onto 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 probe /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.

4.4.4 EI8. built-in encoders and EI8A encoder mounting adapters – DRN../DRU../DR2..71 – 132S motors, with M23 connector



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[22]	Screw	[131]	Gasket for cover	[1522]	Connection unit
[35]	Fan guard	[132]	Terminal box cover	[1525]	M23 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		

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

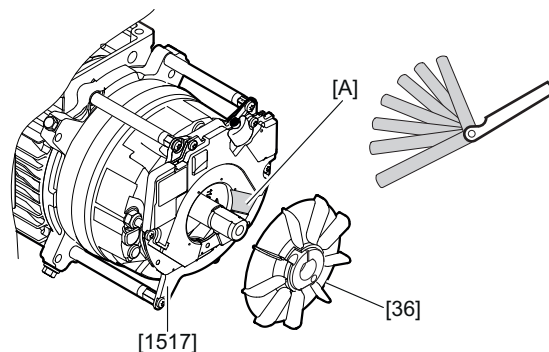
- ✓ Required resources: Screwdriver
- 1. Disassemble the forced cooling fan [170] if applicable.
- 2. Remove the screws [22] to disassemble the fan guard [35].
- 3. Loosen the radial clamping screw [1160]:
 - ⇒ DR..71 – 100: M3 with cylinder head
 - ⇒ DR..112/132S: M4 with cylinder head
- 4. Remove the 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 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. Damage to property. 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].

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

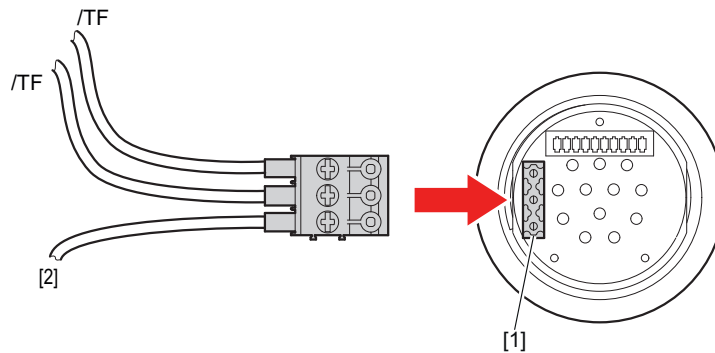
- ✓ Required resources: Feeler gauge (0.9 mm), screwdriver, centering ring [1920]
- 1. Unscrew the screws [123] to remove the terminal box cover [132].
- 2. **NOTICE!** Damage to the terminal box or fragments inside the motor. Possible damage to property. Carefully break the knockout open.
Break open the knock-out [K] by using a chisel or screwdriver.
- 3. **NOTICE!** Damage to the connector. Possible damage to property. Do not subject the connector to excessive tension.
Pull the grommet [1526] with encoder cable through the knockout [K].
⇒ The grommet must engage into the opening of the knockout [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].



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- 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.

15. Remove the protective cover of the M23 connector [1525] on the inside of the terminal box.
16. Plug the socket contact of the encoder cable onto the connector on the board.
17. Connect the shielding of the encoder cable [2] and, if applicable, the temperature probe /TF to the screw terminal.



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18. Insert the screw terminal with the connection side facing outwards into the connector [1] on the printed circuit board.
19. Install the protective cover of the M23 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.

4.5 Removing/installing conical encoders and encoder mounting adapters for conical encoders

INFORMATION



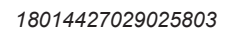
For EK8Z, EK9Z, AK8Z encoders, work on the MOVILINK® DDI communication unit is not permitted. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed.

The integrated encoder 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 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:

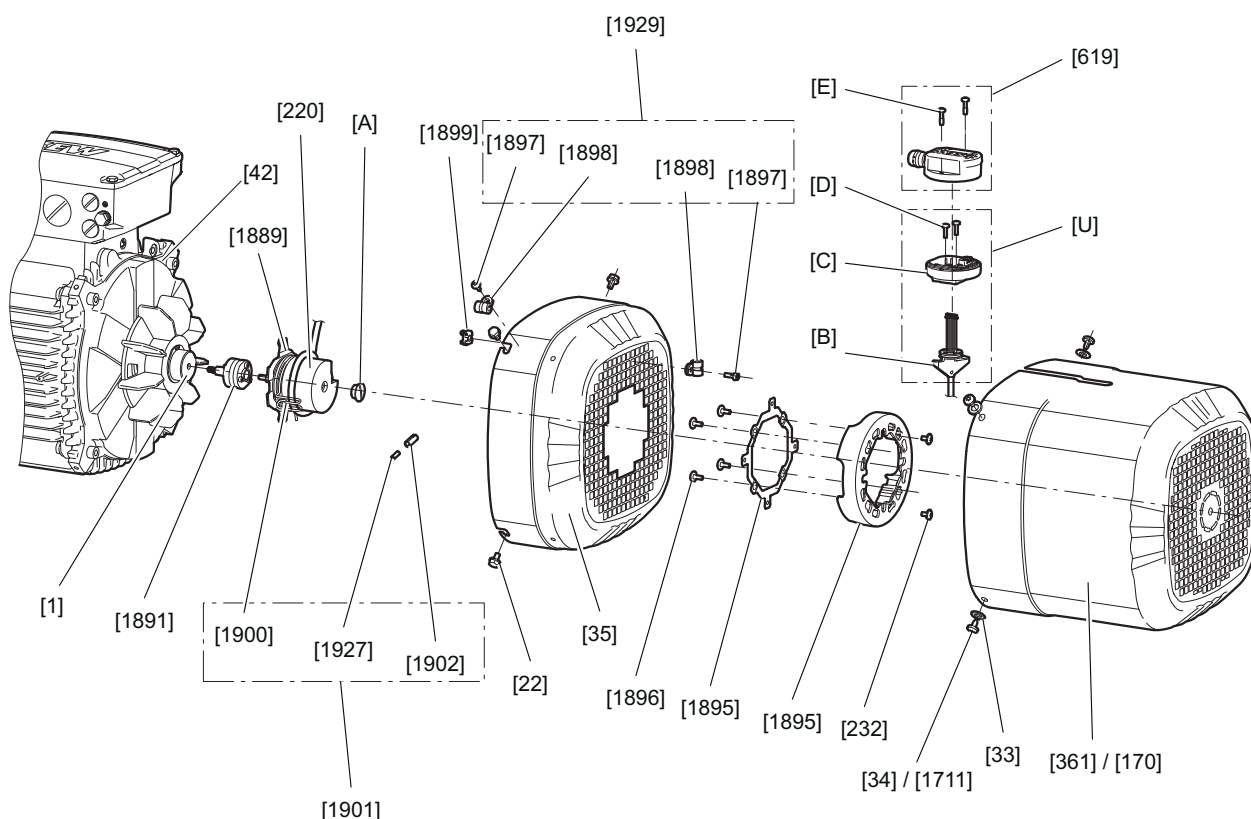
- Size
- Position of the manual brake release
- Certain gear unit combinations
- Dimensions of the feet of the motor
- Connection technology of the motor (e.g. connectors)
- Combination with a forced cooling fan
- Applicative limits of the system

Structure of .K8../.K9. conical encoder – (E)DRN../DRU../DR2..63 – 132S motors with integrated A1GA encoder connector with connection cover or A2GA without connection cover



[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./.K9. conical encoder – (E)DRN../DRU../DR2..132M – 315 motors with integrated A1GA encoder connector with connection cover or A2GA without connection cover



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[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	[A]	Screw plug
[619]	Connection cover	[B]	T-slot nut
[U]	Connection adapter	[C]	Lower part
[1711]	Screw (hexagonal)	[D]	Screw
[1889]	Torque bracket	[E]	Screw
[1891]	Insulation coupling		
[1895]	Support ring/spacer ring		

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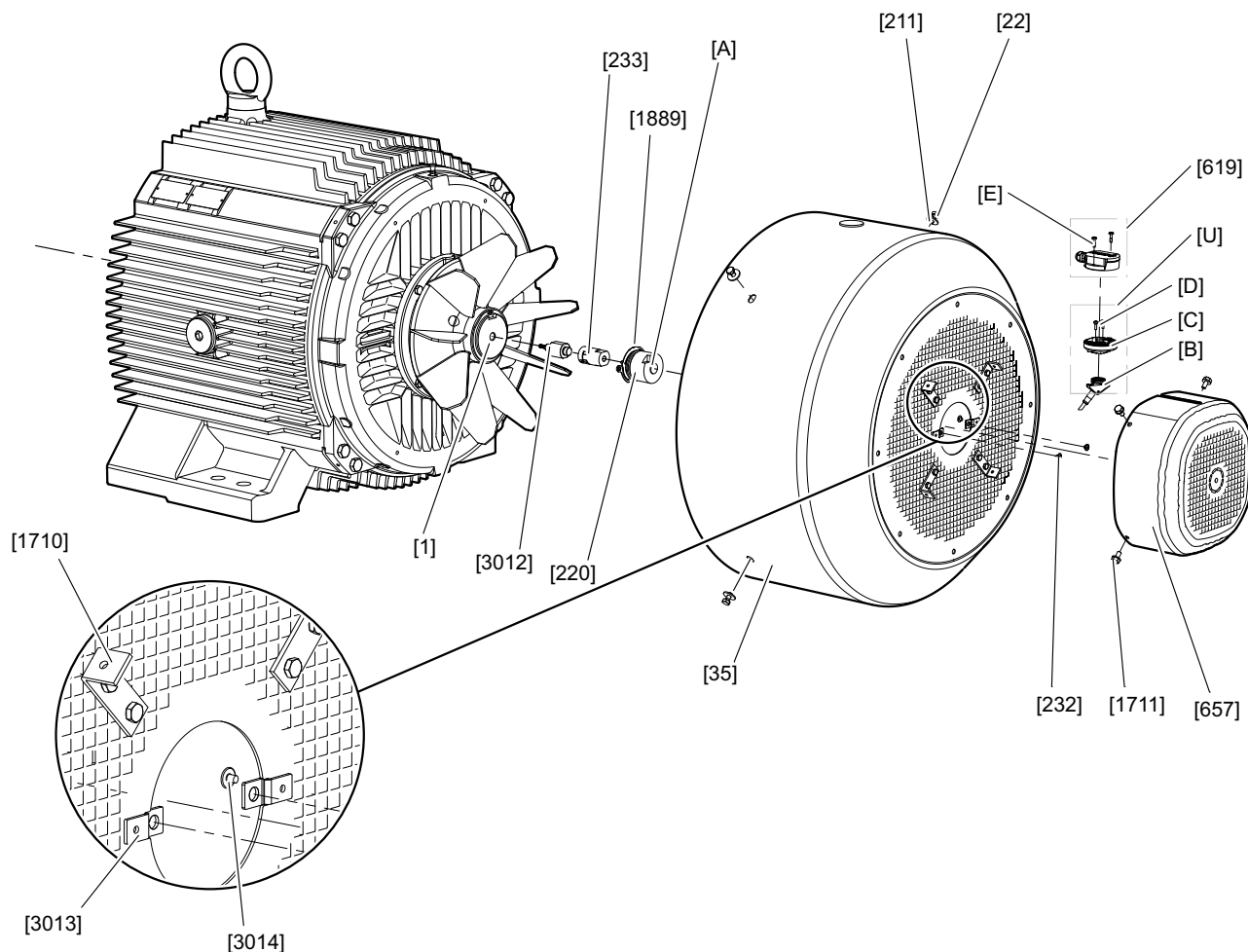
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4

4 Mechanical installation

Removing/installing conical encoders and encoder mounting adapters for conical encoders

Structure of .K8./.K9. conical encoder – DRN355 motors with integrated A1GA encoder connector with connection cover or A2GA without connection cover



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[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

Removing EK8./EK9./AK8./AK9./RK8M – Add-on encoder set with integrated A1GA encoder 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, AK8W, EK8Z, EK9Z, and AK8Z 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].

Installing EK8./EK9./AK8./AK9./RK8M – Add-on encoder set with integrated A1GA encoder 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 63 – 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. Retrofitting insulation coupling on the encoder mounting adapter: Insert the insulation coupling [1891] into the conical bore of the rotor [1] and tighten the central retaining screw.
 - ⇒ Tightening torque 2.25 Nm
7. Use solvent to remove the residual adhesive from the central retaining screw.
8. For AK8H safety encoders: Wet the central retaining screw that is required in the following step with LOCTITE® 241.
9. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/[1891].
10. 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, AK8H, AK8W, EK9Z and AK8Z on DR2C.. motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 72) and "Additional work for EK8W, AK8H, AK8W, EK9Z, and AK8Z encoders on the DR2C.. motor" (→ 76).

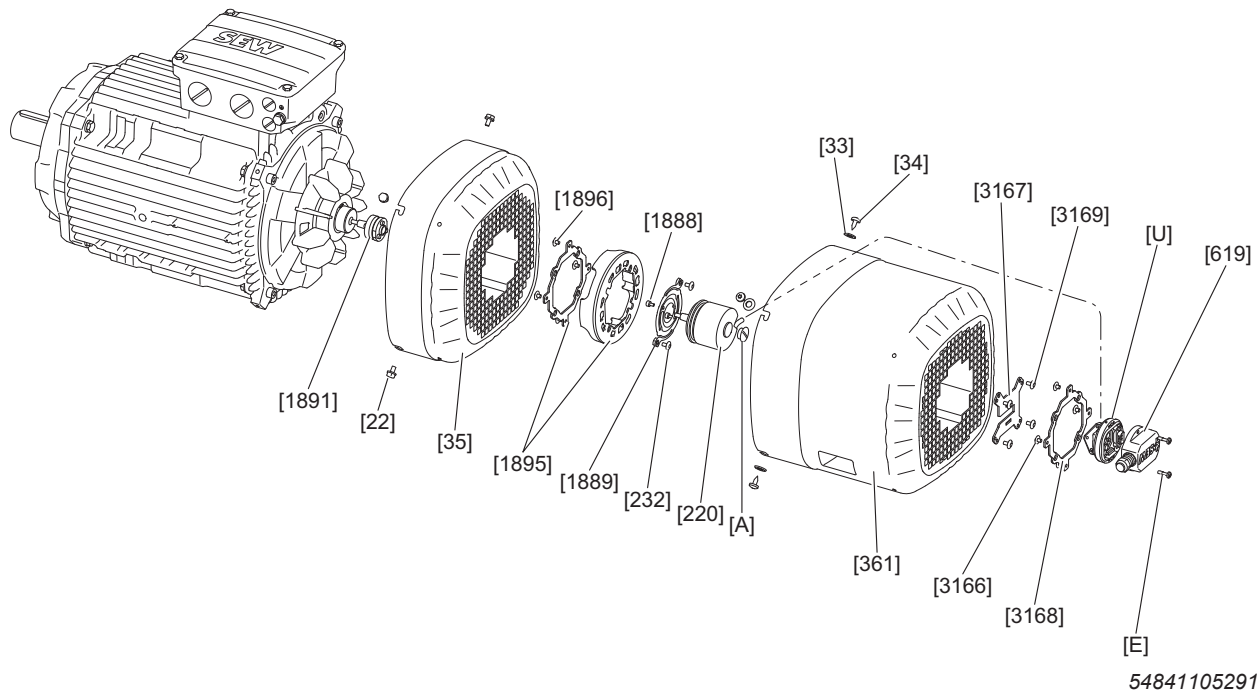
Failure to calibrate results in greater motor losses and reduced torque. In the worst-case scenario, the motor will not run.

11. To seal the encoder [220], screw in the screw plug [A].
 - ⇒ Tightening torque 1.8 Nm
12. For size 355 with forced cooling fan: Mount the spacer bolts [934].
13. For size 132M – 355 with forced cooling fan: Guide the torque bracket [935] over the connection adapter [U] and the encoder [220].
14. 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
15. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.

16. Retrofitting insulation coupling on the encoder mounting adapter: Replace the support ring [1895] with the spacer ring [1895] and screw it securely in place with the new M5×10 screws [1896].
 - ⇒ Tightening torque 7 Nm
17. 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
18. For size 63 – 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 63 – 132S: Tightening torque 3.3 Nm
 - ⇒ For size 132M/L: Tightening torque 11 Nm
 - ⇒ For size 160 – 355: Tightening torque 27 Nm
19. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
20. For size 63 – 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
21. 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%
22. 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 bracket, 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%
23. Before you install the safety cover [361]/[657] or the forced cooling fan [170], slide the connection adapter [U] into the recess.
24. For size 63 – 280 without forced cooling fan: Place the safety cover [361] onto the fan guard [35].
25. For size 315 – 355: Place the safety cover [657] onto the metal brackets [1710].
26. For size 315 – 355: Secure the safety cover [657] in place by using the screws [1711].
 - ⇒ Tightening torque 12 Nm
27. With forced cooling fan: Place the forced cooling fan [170] onto the screws [22].
28. 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.
- 29. 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
- 30. 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
- 31. Without forced cooling fan: Secure the safety cover [361] in place by using the screws [34] and washers [33].
 - ⇒ For size 63 – 132S: Tightening torque 2 Nm
 - ⇒ For size 132M – 280: Tightening torque 3.5 Nm
- 32. Turn the connection adapter [U] clockwise up to the stop.
- 33. Secure the connection adapter [U] in place by tightening the screws [D].
 - ⇒ Tightening torque 2 Nm
 - ⇒ For safety encoders: Tightening torque 2 Nm $\pm$ 10%
- 34. Place the connection cover [619] onto the connection adapter [U].
- 35. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
- 36. 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

Removing EK8./EK9./AK8./AK9./RK8M – A1GA/A2GA axial add-on encoder set (installation on rear of fan guard)



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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, AK8W, EK8Z, EK9Z, and AK8Z 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].

Installing EK8./EK9./AK8./AK9./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 63 – 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. Retrofitting insulation coupling on the encoder mounting adapter: Insert the insulation coupling [1891] into the conical bore of the rotor [1] and tighten the central retaining screw.
 - ⇒ Tightening torque 2.25 Nm
7. Use solvent to remove the residual adhesive from the central retaining screw.
8. For AK8H safety encoders: Wet the central retaining screw that is required in the following step with LOCTITE® 241.
9. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/[1891].
10. 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

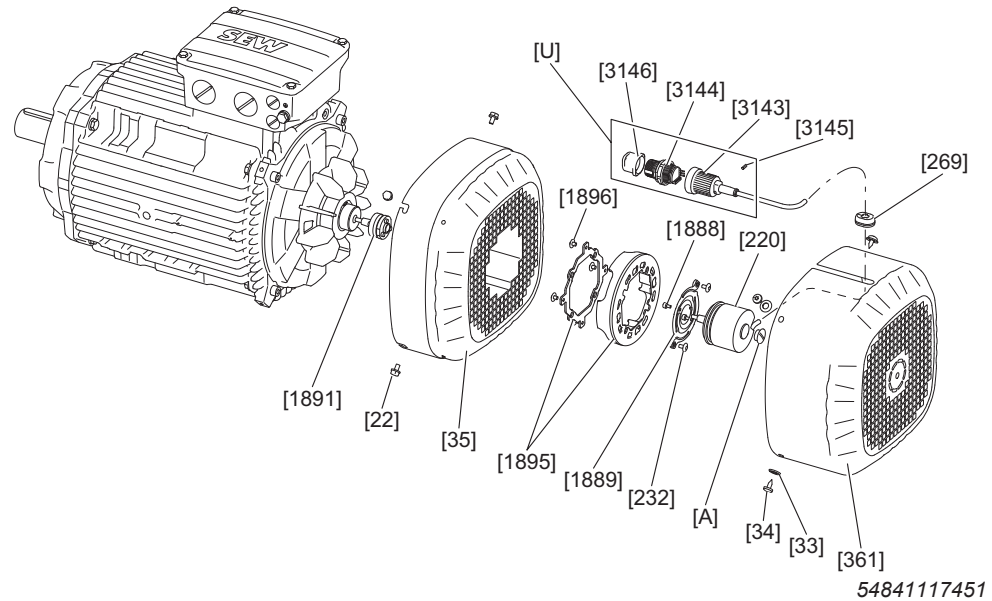
For encoders RK8M, EK8W, AK8H, AK8W, EK9Z and AK8Z on DR2C.. motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 72) and "Additional work for EK8W, AK8H, AK8W, EK9Z, and AK8Z encoders on the DR2C.. motor" (→ 76).

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

11. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
12. Retrofitting insulation coupling on the encoder mounting adapter: Replace the support ring [1895] with the spacer ring [1895] and screw it securely in place with the new M5×10 screws [1896].
 - ⇒ Tightening torque 7 Nm
13. To seal the encoder [220], screw in the screw plug [A].
 - ⇒ Tightening torque 1.8 Nm
14. 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].

15. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
16. 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 bracket, turn the encoder [220] clockwise.
 - ⇒ Tightening torque 3.3 Nm
 - ⇒ For safety encoders: Tightening torque 3.3 Nm ±10%
17. Screw the fan guard [35] firmly in place with the screws [22].
18. 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
19. 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
20. For size 71 – 280: Place the safety cover [361] onto the fan guard [35].
21. For size 315 – 355: Place the safety cover [657] onto the metal brackets [1710].
22. 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
23. Place the connection cover [619] onto the connection adapter [U].
24. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
25. 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

Removing EK8./EK9./AK8./AK9./RK8M – Add-on encoder set with M23 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, AK8W, EK8Z, EK9Z, and AK8Z 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].

Installing EK8./EK9./AK8./AK9./RK8M – Add-on encoder set with M23 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 63 – 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. Retrofitting insulation coupling on the encoder mounting adapter: Insert the insulation coupling [1891] into the conical bore of the rotor [1] and tighten the central retaining screw.
 - ⇒ Tightening torque 2.25 Nm
7. Use solvent to remove the residual adhesive from the central retaining screw.
8. For AK8H safety encoders: Wet the central retaining screw that is required in the following step with LOCTITE® 241.
9. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/[1891].
10. 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 $\pm$ 8%

NOTICE

For encoders RK8M, EK8W, AK8H, AK8W, EK9Z and AK8Z on DR2C.. motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 72) and "Additional work for EK8W, AK8H, AK8W, EK9Z, and AK8Z encoders on the DR2C.. motor" (→ 76).

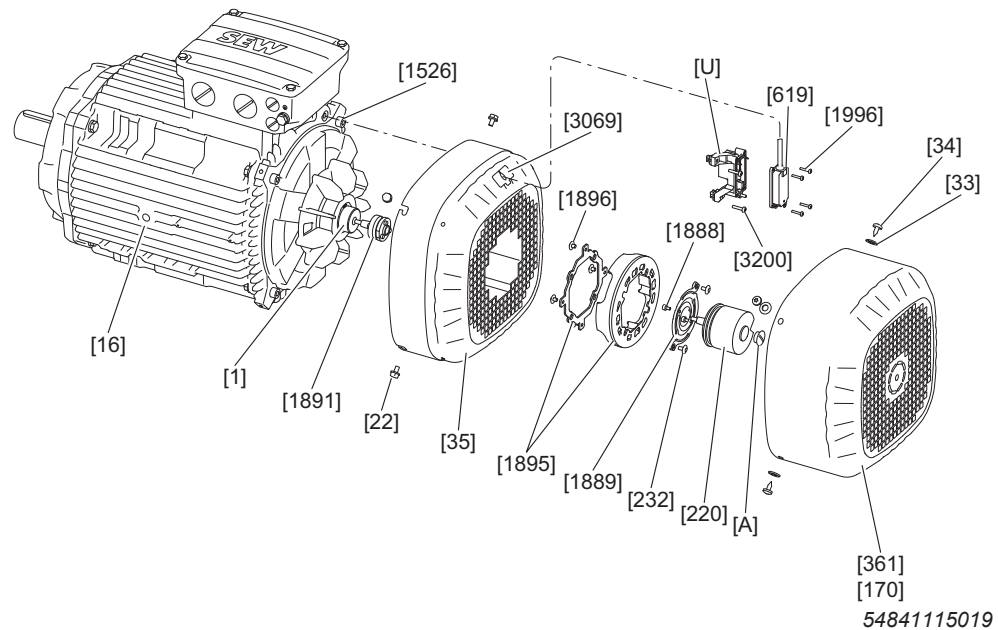
Failure to calibrate results in greater motor losses and reduced torque. In the worst-case scenario, the motor will not run.

11. To seal the encoder [220], screw in the screw plug [A].
 - ⇒ Tightening torque 1.8 Nm
12. For size 355 with forced cooling fan: Mount the spacer bolts [934].
13. For size 132M – 355 with forced cooling fan: Guide the torque bracket [935] over the connection adapter [U] and the encoder [220].
14. 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
15. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.

16. Retrofitting insulation coupling on the encoder mounting adapter: Replace the support ring [1895] with the spacer ring [1895] and screw it securely in place with the new M5×10 screws [1896].
 - ⇒ Tightening torque 7 Nm
17. 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%
18. For size 63 – 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 63 – 132S: Tightening torque 3.3 Nm
 - ⇒ For size 132M/L: Tightening torque 12 Nm
 - ⇒ For size 160 – 355: Tightening torque 29 Nm
19. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
20. For size 63 – 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
21. 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%
22. 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 bracket, 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%
23. Before you install the safety cover [361]/[657] or the forced cooling fan [170], slide the cable grommet [269] into the recess.
24. For size 63 – 280 without forced cooling fan: Place the safety cover [361] onto the fan guard [35].
25. For size 315 – 355: Place the safety cover [657] onto the metal brackets [1710].
26. For size 315 – 355: Secure the safety cover [657] in place by using the screws [1711].
 - ⇒ Tightening torque 12 Nm
27. 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

28. Insert the cable grommet [269] into the recess of the safety cover [361]/[657] or the forced cooling fan up to the stop.
29. 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
30. Without forced cooling fan: Secure the safety cover [361] in place by using the screws [34] and washers [33].
 - ⇒ For size 63 – 132S: Tightening torque 2 Nm
 - ⇒ For size 132M – 280: Tightening torque 3.5 Nm

Removing EK8./EK9./AK8./AK9./RK8M – Add-on encoder set A-Box-U for connection option in/on terminal box



NOTICE

Damage to the terminal strip when working below 0 °C.

Perform assembly/disassembly work on the terminal strip only at temperatures above 0 °C.

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, AK8W, EK8Z, EK9Z, and AK8Z 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].

Installing EK8./EK9./AK8./AK9./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. Retrofitting insulation coupling on the encoder mounting adapter: Insert the insulation coupling [1891] into the conical bore of the rotor [1] and tighten the central retaining screw.
 - ⇒ Tightening torque 2.25 Nm
7. Use solvent to remove the residual adhesive from the central retaining screw.
8. For AK8H safety encoders: Wet the central retaining screw that is required in the following step with LOCTITE® 241.
9. Insert the encoder [220] into the conical bore of the rotor [1] or the coupling [233]/[1891].
10. 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, AK8H, AK8W, EK9Z and AK8Z on DR2C.. motors, a calibration process must be carried out for flawless operation. See "Additional work for the RK8M encoder on the DR2C.. motor" (→ 72) and "Additional work for EK8W, AK8H, AK8W, EK9Z, and AK8Z encoders on the DR2C.. motor" (→ 76).

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

11. To seal the encoder [220], screw in the screw plug [A].
 - ⇒ Tightening torque 1.8 Nm
12. For size 132M – 180 with forced cooling fan: Guide the torque bracket [935] over the connection unit [U] and the encoder [220].

13. 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
14. 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 $\pm 10\%$
15. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
16. Retrofitting insulation coupling on the encoder mounting adapter: Replace the support ring [1895] with the spacer ring [1895] and screw it securely in place with the new M5×10 screws [1896].
 - ⇒ Tightening torque 7 Nm
17. 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
18. 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
19. For safety encoders: Wet the screws that are required in the following step with LOCTITE® 241.
20. For size 63 – 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
21. 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 bracket, turn the encoder [220] clockwise.
 - ⇒ Tightening torque 3.3 Nm
 - ⇒ For safety encoders: Tightening torque 3.3 Nm $\pm 10\%$
22. 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

23. Without forced cooling fan: Insert the signal cable of the cover [619] into the designated recess of the locking piece [3069].
 - ⇒ Fasten the signal cable into the rectangular cutout of the fan guard [35].
24. 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
25. 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.
26. For size 80 with brake: Attach the encoder cable [619] to the fan guard [35] using the cable tie [3229].
27. 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.
28. For size 71 – 180 without forced cooling fan: Place the safety cover [361] onto the fan guard [35].
 - ⇒ For size 63 – 132S: Tightening torque 2 Nm
 - ⇒ For size 132M – 180: Tightening torque 3.5 Nm
29. 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
30. 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
31. Without forced cooling fan: Secure the safety cover [361] in place by using the screws [34] and washers [33].
 - ⇒ For size 63 – 132S: Tightening torque 2 Nm
 - ⇒ For size 132M – 180: Tightening torque 3.5 Nm

4.5.2 Information on configuring the zero-angle position for EK8W/AK8H/AK8W/EK9Z/AK8Z/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" (→ 72) for additional 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.

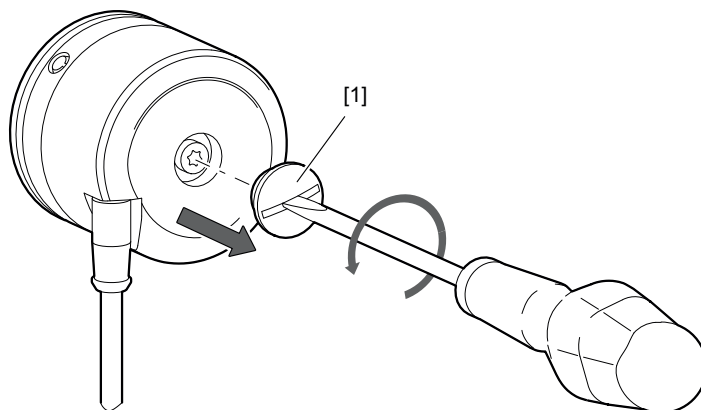
To that end, refer to the operating instructions for the frequency inverter or contact SEW-EURODRIVE Service.

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

Required tools:

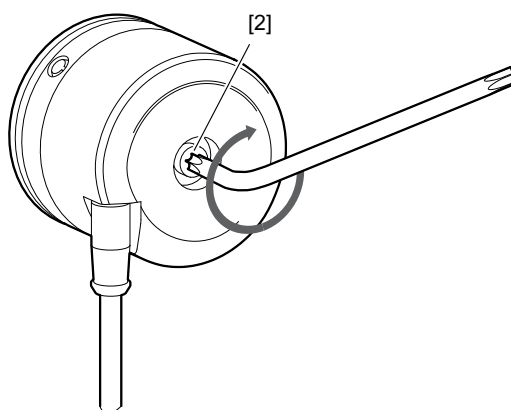
- Slotted screwdriver 1.6 × 8.0 mm
- Torx screwdriver TX20
- Allen wrench 2.5 mm

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



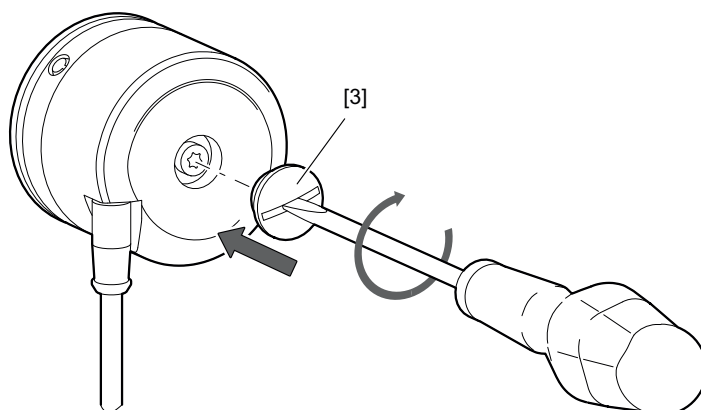
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2. Install the resolver by tightening the M5 central screw [2] with 3.3 Nm on the customer shaft.



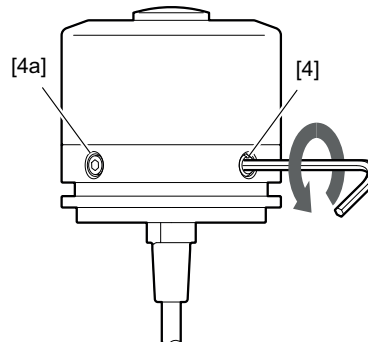
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3. Reinstall the screw plug [3] on the resolver with 1.8 Nm.



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4. When installing for the first time, loosen the set screw [4] slightly. When reinstalling, the set screw [4a] must also be loosened slightly.



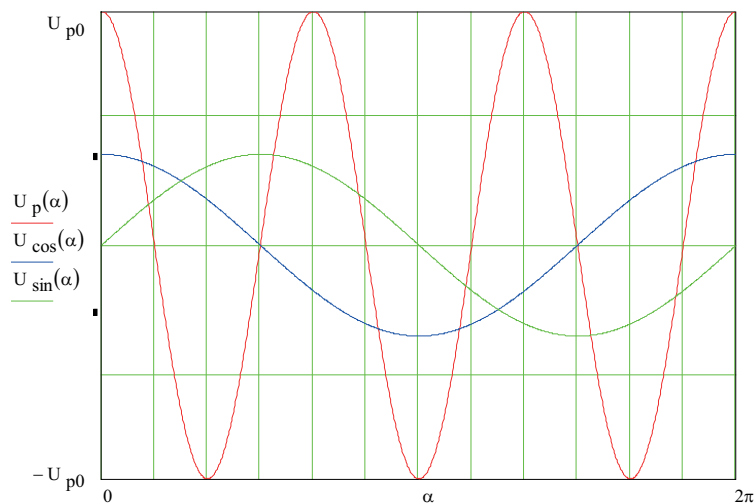
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⇒ The rear part of the resolver can now be moved.

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:



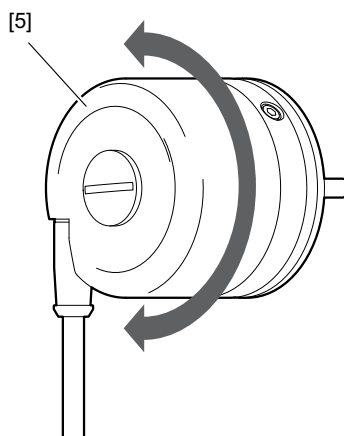
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Resolver zero position ($U_{\cos}$ (S1 – S3) positive maximum, $U_{\sin}$ (S2 – S4) positive zero crossing) coincides with positive maximum of excitation in magnetic circuit (EMF) U_p in phase u (with clockwise rotor rotation as viewed on the output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

Motor terminal	U	V	W
Supply	open	minus	plus

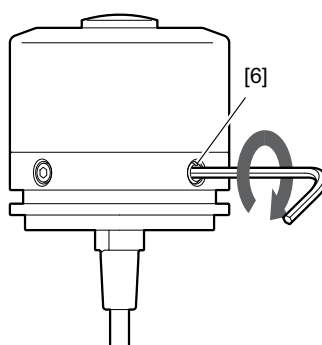
a) Adjustment check

- ✓ The motor is unloaded and the brake released. The rotor can freely align itself in the stator field. Supply the motor with direct current 60 – 80% 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 ($U_{\sin}$) positive zero crossing
 - ⇒ S1 – S3 ($U_{\cos}$) positive maximum



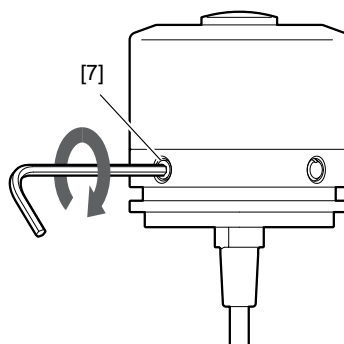
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6. Tighten the set screw [6] that was loosened at point (4) again with 1.2 Nm.



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7. Tighten the set screw [7] with 1.2 Nm.



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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**

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

- Rotor position identification FCB18 in the "With rotating motor" procedure using the MOVISUITE® engineering software
- Encoder adjustment with MTEAdjust using the MOVITOOLS® MotionStudio engineering software

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°.

4.5.4 Additional work for EK8W, AK8H, AK8W, EK9Z, and AK8Z encoders on the DR2C.. motor

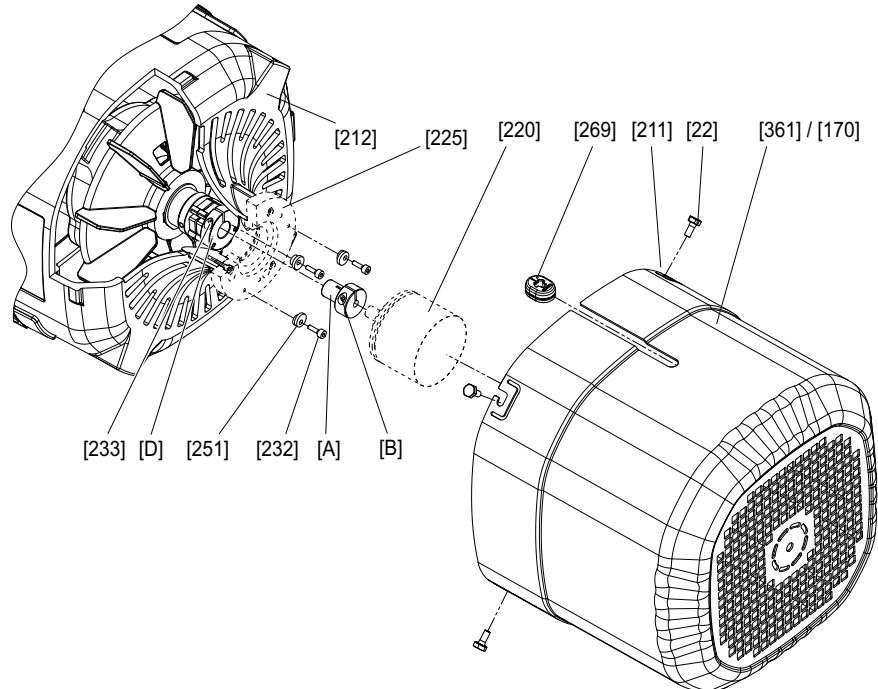
For the EK8W, AK8H, AK8W, EK9Z, and AK8Z encoders, perform the following steps after installing the encoder:

- ✓ 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

4.6 Removing/installing an add-on encoder with encoder mounting adapter with fan guard with encoder mount

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



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[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	[A]	Adapter
[220]	Encoder	[B]	Clamping screw
[225]	Intermediate flange (not applicable for XV1A)	[D]	Coupling (spread or solid shaft coupling)
[232]	Retaining screws (included with XV1A and XV2A)		
[233]	Clamping screw		

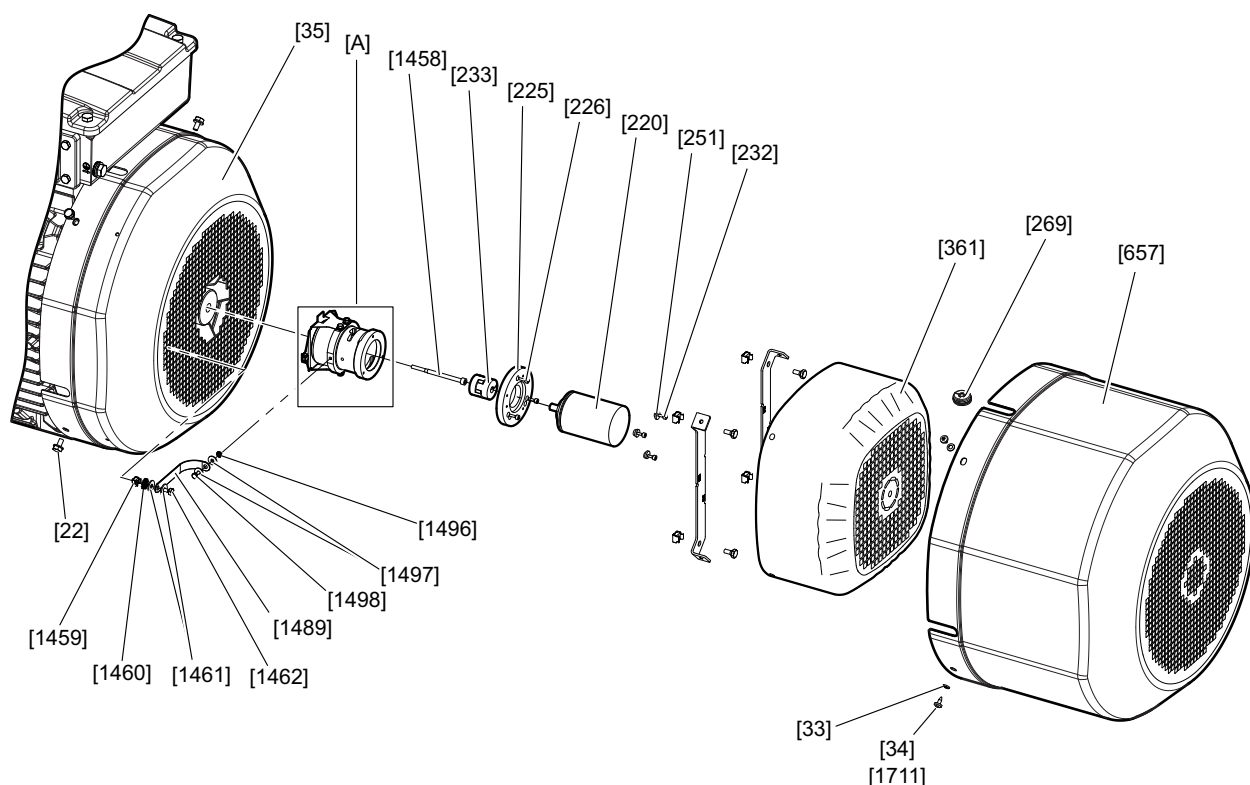
Removing EV../AV../XV..

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].

4.6.2 EV..., AV..., XV... rotary encoder - (E)DRN../DRU../DR2...250 – 315 motors, with encoder mounting adapter



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[22]	Screw	[657]	Safety cover (normal/long)
[33]	Washer	[1458]	Screw
[34]	Screw	[1459]	Cage nut
[35]	Fan guard	[1460]	Serrated lock washer
[220]	Encoder	[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	[1711]	Screw
[361]	Safety cover (normal/long)	[A]	Encoder mounting adapter

Removing the encoder mounting adapter

1. For size 250 – 280: Remove the screws [34] to disassemble the safety cover [361].
2. For size 315: Remove the screws [1711] to disassemble the safety cover [657].
3. Remove the encoder [220]; refer to chapter "Removing EV../AV../XV.." (→ 79).
4. 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].
5. Remove the screws [22] to disassemble the fan guard [35].
6. 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.

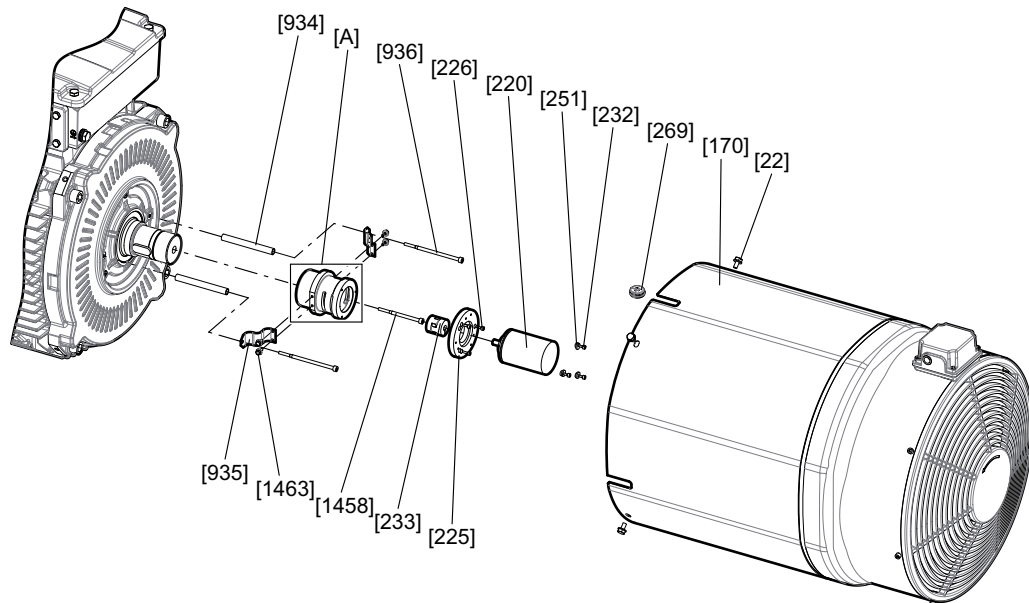
Removing EV../AV../XV..

1. For size 250 – 280: Remove the screws [34] to disassemble the safety cover [361].
2. For size 315: Remove the screws [1711] to disassemble the safety cover [657].
3. Pull out the cable grommet [269] together with the encoder cable from the safety cover [361].
4. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
5. 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].
6. 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. For size 250 – 280: Secure the safety cover [361] in place by using the screws [34] and washers [33].
4. For size 315: Secure the safety cover [657] in place by using the screws [1711].

4.6.3 EV..., AV..., XV... rotary encoder - (E)DRN../DRU../DR2...250 – 315 motors, with encoder mounting adapter and with forced cooling fan



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[22]	Screw	[269]	Grommet
[170]	Forced cooling fan cover	[934]	Spacer bushing
[220]	Encoder	[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.

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

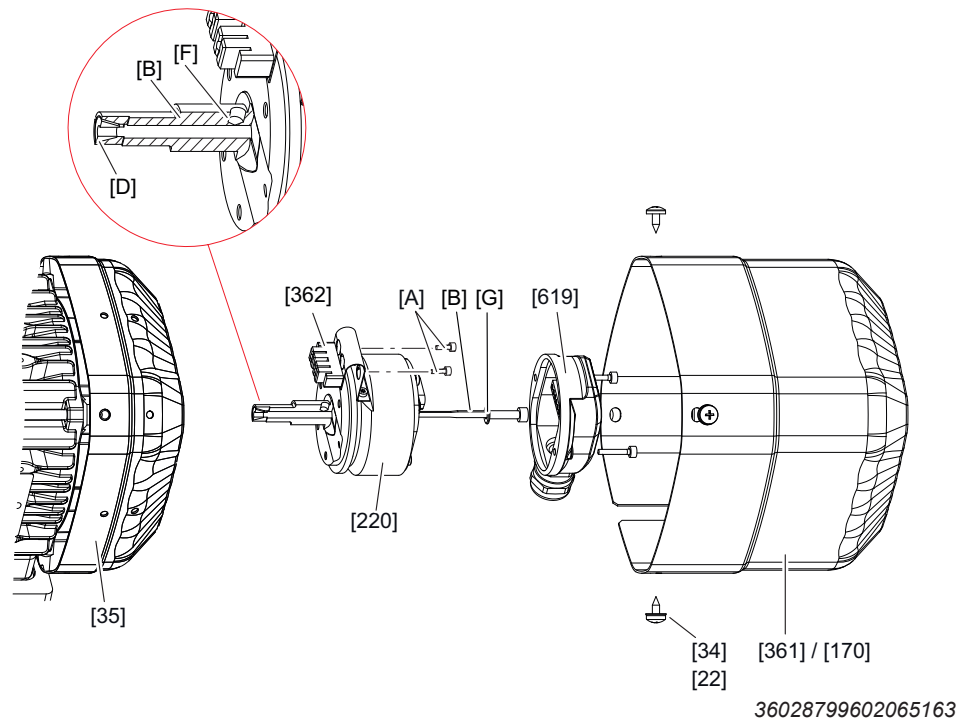
1. Remove the screws [22] to disassemble the forced cooling fan [170].
2. Remove the cable grommet [269] with the encoder cable from the forced cooling fan [170].
3. Loosen the retaining screws [232] and turn the conical spring washers [251] outwards.
4. Loosen the screw at the coupling clamping hub [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].

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

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



[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]	Encoder	[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].

Installing ES7./AS7.

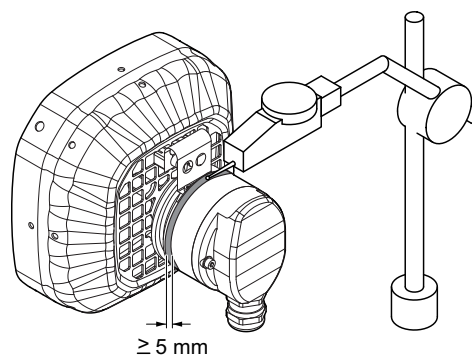
1. Apply a contact corrosion prevention compound, e.g. NOCO-Paste, to the encoder pins.
2. Attach the expansion anchor [362] to the torque bracket of the encoder.
⇒ For safety encoders: Use a new expansion anchor.
3. Push the encoder to the stop of the shaft end.
4. Tighten the central retaining screw [B].
⇒ Tightening torque $2.75 \text{ Nm} \pm 6\%$
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 $1.6 \text{ Nm} \pm 10\%$
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 EN 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 ($< 60 \text{ min}^{-1}$).
4. Check the wobble on the sensor.
⇒ The maximum permitted wobble on the encoder must be $\leq 0.07 \text{ mm}$ when turning the motor shaft.

Measured value exceeded

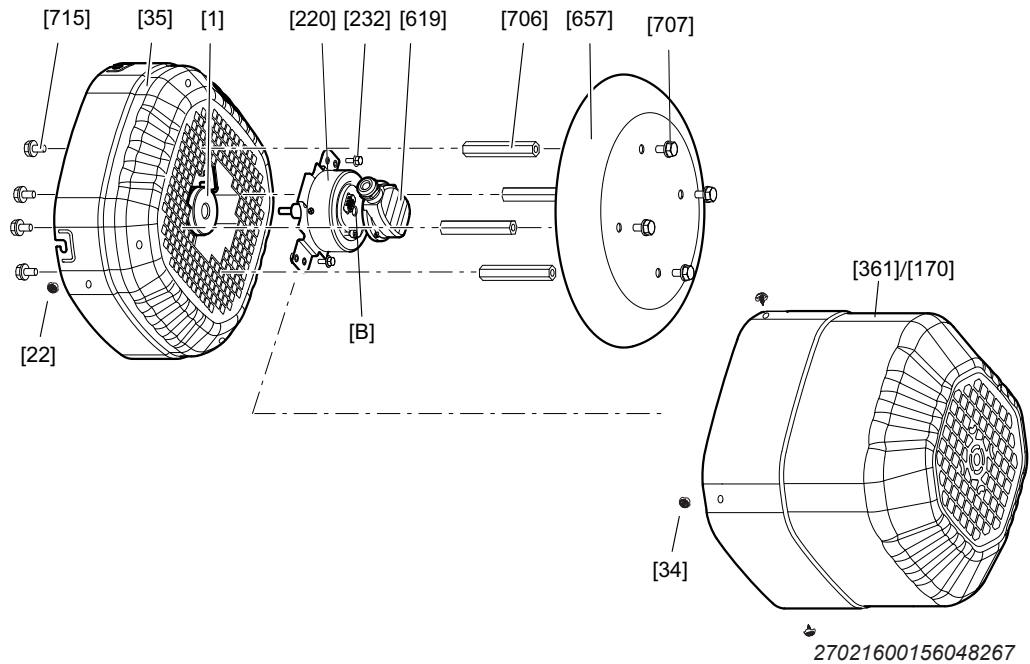
Repeat the check if the measured value is exceeded. Proceed as follows:

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.

4.7.2 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]	Screws
[220]	Encoder	[715]	
[232]	Screws	[B]	Central retaining screw

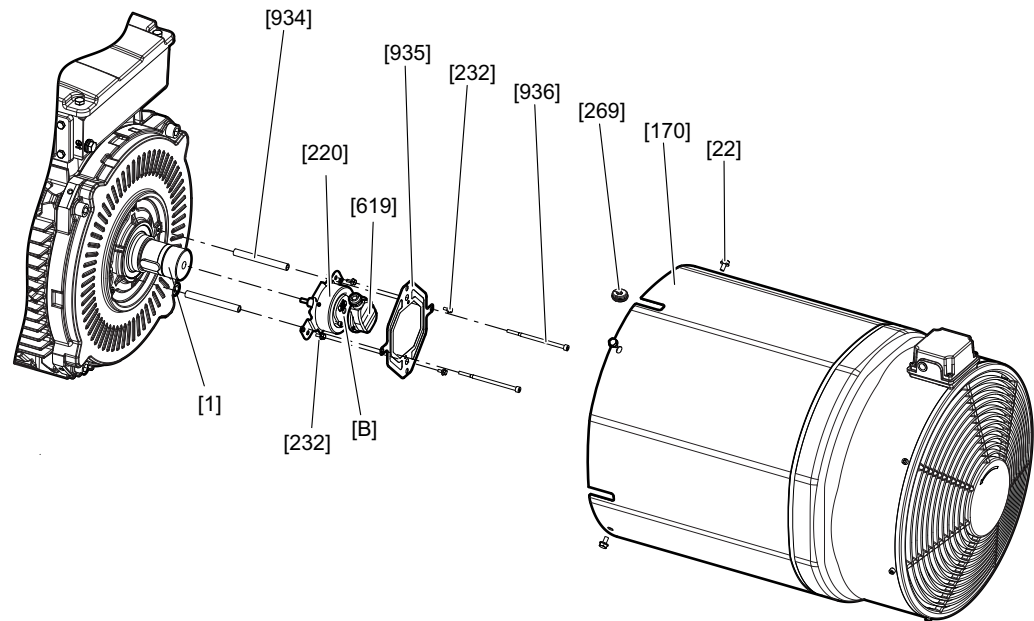
Removing EG7., AG7.

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 bracket.
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-Paste, 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 $\pm$ 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 bracket..
 - ⇒ Tightening torque 6 Nm $\pm$ 10%
6. Screw on the connection cover [619].
 - ⇒ Tightening torque 2.25 Nm $\pm$ 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

4.7.3 EG7., AG7. rotary encoder - (E)DR..160 – 225, (E)DRN132M – 280 motors, with forced cooling fan /V



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

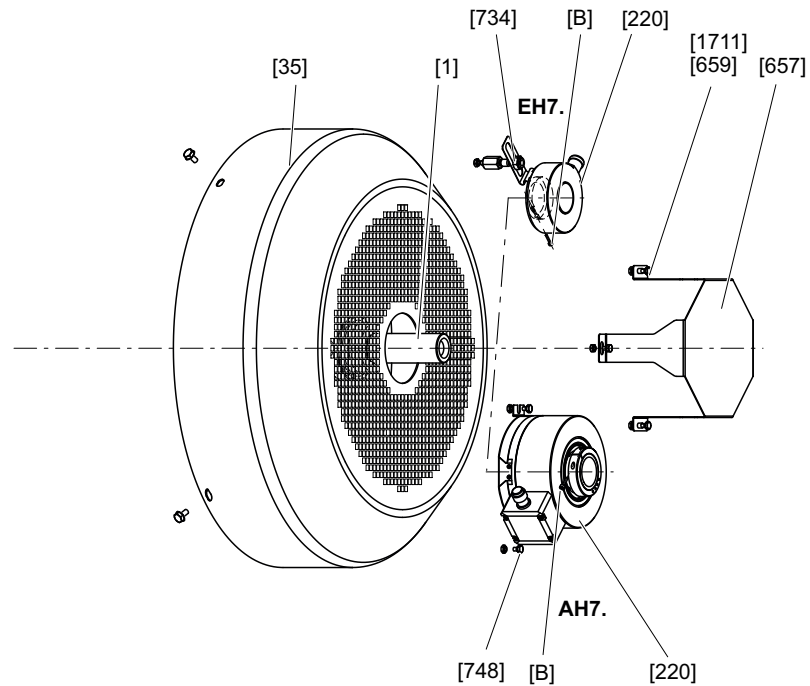
Removing EG7., AG7.

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-Paste, 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 $\pm$ 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 $\pm$ 10%, M8 = 27 Nm $\pm$ 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 bracket..
 - ⇒ Tightening torque 6 Nm $\pm$ 10%
7. Screw on the connection cover [619].
 - ⇒ Tightening torque 2.25 Nm $\pm$ 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

4.7.4 EH7., AH7. rotary encoder - (E)DRN315 motors



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

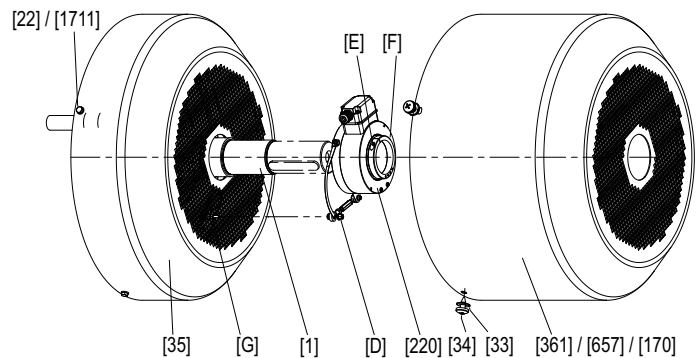
Removing EH7., AH7.

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

Encoder mounting with XH7A and XH8A encoder mounting adapter



[619]	Connection cover
[657]	Safety cover
[1711]	Screw
[B]	Central retaining screw
[C]	Connection cover screws
[D]	Torque bracket screws
[E]	Screw
[F]	Clamping ring
[G]	Nut of the torque bracket

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.

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.

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 $\pm$ 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

4.8 Checklist for installing safety encoders

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

4.8.1 Drive and encoder data

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

4.8.2 ES7., AS7. checklist

Checklist for (E)DR..80 – 132/(E)DRN80 – 132S motors with ES7., AS7. encoders	
Performed task	Completed
Encoder pin coated with NOCO-Paste	☐
Central retaining screw [B] of the encoder tightened (tightening torque 2.75 Nm $\pm$ 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 $\pm$ 10%)	☐
Connection cover [619] screwed in place (tightening torque 2.25 Nm)	☐
Wobble measurement performed (tolerance $\leq$ 0.07 mm)	☐
Safety cover [361] or, if necessary, the forced cooling fan [170] installed	☐

4.8.3 EG7., AG7. checklist

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

4.8.4 Checklist EK8., AK8., EK9.

Checklist for (E)DRN../DRU../DR2..63 – 315 motors with EK8., AK8., and EK9. encoders	
Performed task	Completed
Cone of the encoder [220] and the rotor [1] and, if available, of the insulation coupling [1891] or the coupling [233] cleaned	☐
For AK8H safety encoders, wet the central retaining screw of the encoder [220] with LOCTITE® 241	☐
Central retaining screws of the encoder [220] tightened (tightening torque 3.3 Nm $\pm$ 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 63 – 132S: Tightening torque 3.3 Nm) (For size 132M – 355: Tightening torque 3.3 Nm $\pm$ 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 $\pm$ 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)	☐

5 Electrical installation

5.1 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 cores with insufficient mechanical resistance.

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

- Avoid mechanical damage to the cables and cores.
- Use fabric hoses to mechanically protect the cables and cores.

⚠ DANGER



The cables and cores 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 cores used have the necessary dielectric strength.
- Observe air gaps 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.

5.2 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 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 air gaps and creepage distances.
 - Observe possible requirements regarding conformity with UL or CSA. For mechanical and electrical protection, use suitable glass fiber sheathing with UL style, for example.

Electrical requirements

- Polarity protection and overvoltage protection
 - Signal cables

Short-circuit protection:	
Signal outputs against each other	✓
Against supply	–
Against GND	✓
Against encoder housing	✓
Against shielding	✓ (Assumption: Potential difference of GND to shielding: 0 V)
Minimum short-circuit current per channel	50 mA
Overvoltage protection	–

- Digital interface

Short-circuit protection:	
Signal outputs against each other	✓
Against supply	✓ (up to 24 V)
Against GND	✓
Against encoder housing	✓
Against shielding	✓ (Assumption: Potential difference of GND to shielding: 0 V)

Overvoltage protection	± 70 V (fault protected, ± 70 V (transient))
------------------------	--

- Maximum cable length (inverter to encoder):
 - 100 m with a capacitance from core to shield ≤ 110 nF/km
 - 100 m with a capacitance from core to core ≤ 70 nF/km
- Core cross section:
 - Supply cores ≥ 0.25 mm² for cable lengths up to 50 m
 - Supply cores ≥ 0.5 mm² for cable lengths up to 100 m
 - Signal cores ≥ 0.25 mm²
- 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.

Encoders are protected from polarity reversal in the following areas:

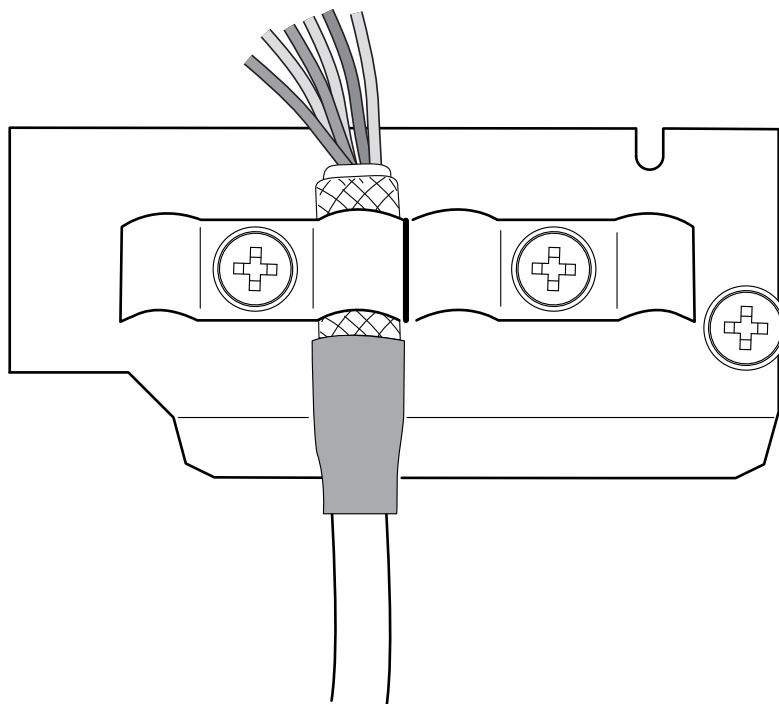
- Supply voltage
- Signal cables
- Digital signal cables, such as RS485

No voltage may be applied externally to output signals. There is no short-circuit protection between the encoder cables. Unused cables must be individually insulated and protected against short circuit.

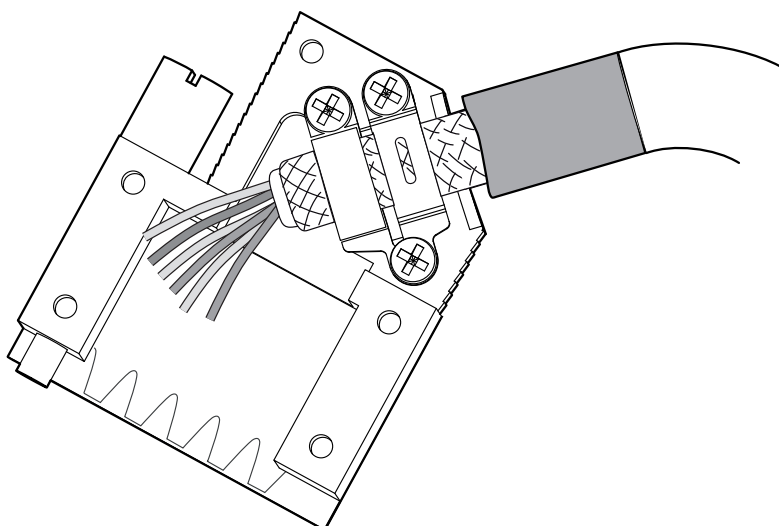
5.2.1 Installation requirements

Encoder line shield on inverter

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



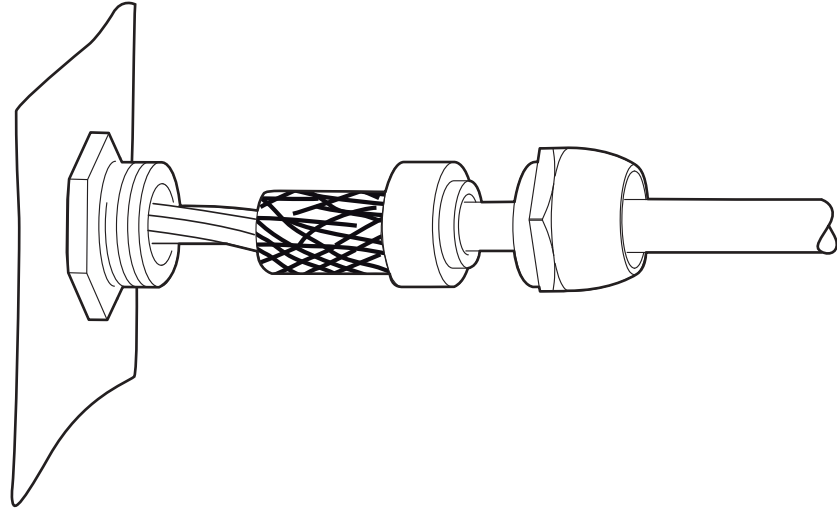
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Encoder line shield on encoder

Connect the shield of the encoder cable 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.



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5.3 Overview of wiring diagrams

5.3.1 Assignment of wiring diagrams to encoder designs

Legend

Type	=	Type designation of the encoder
SB-SNR	=	Wiring diagram part number
SB-NR	=	Wiring diagram number
AD	=	Connection cover on encoder
iGS	=	Integrated encoder connector: General designation for the encoder connector without specifying the design with/without connection cover or the installation location

Connector codes from SEW-EURODRIVE

AIGA	=	M23 without temperature sensor, e.g. /TF or /PI
AIGB	=	M23 with temperature sensor, e.g. /TF or /PI
AVSE	=	M12 without inverted signal tracks /A, /B and without temperature sensor, e.g. /TF or /PI
AVRE	=	M12 with non-inverted signal tracks A, B and with inverted signal tracks /A, /B and with optional temperature sensor, e.g. /TF or /PI. With EI7C FS safety encoder without TF.
AE + AVRE	=	Connection unit + M12 with non-inverted signal tracks and with optional temperature sensor /TF or /PI
AE	=	Terminal strip/connection unit in the terminal box
A1GA	=	Integrated encoder connector installed on the side or rear of the encoder cover, delivered with connection cover
A2GA	=	Integrated encoder connector installed on the side or rear of the encoder cover, delivered without connection cover
KIGA	=	M23 connector with 0.36 m cable directly installed on the encoder, delivered without mating connector

Connector catalog designation from SEW-EURODRIVE

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

Incremental encoder

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

1 Vpp sin/cos + RS485

Type	Connection	SB-SNR	Notes
EG7S	AD	63377500	–
EK8S	A1GA/A2GA	63377500	–
EK8S	AIGA/AIGB	63378043	–
EK8S	KIGA (AIGA)	63377454	–
EK8S	AE	63378108	–
ES7S	AD	63377500	–
EV8S	KIGA (AIGA)	63377454	–
EV8S	A1GA/A2GA	63377500	–

1 Vpp sin/cos

Type	Connection	SB-SNR	Notes
EH7S	AIGA	63160234	–

HTL

Type	Connection	SB-SNR	Notes
EH7C	AIGA	63160234	–
EI7.	M12, 4-pin + AVSE	63089149	With configuration box; without TF; EI7. Generation B
EI7.	internal to the drive	63079925	MOVIMOT® MQ../MFE72; with configuration box; without TF; EI7. Generation B
EI7.	M12, 4-pin + AVSE	63082659	With configuration box; without TF; EI7. Generation B
EI7.	M12, 8-pin + TF AVRE	63111063	With configuration box; with TF; EI7. Generation B
EI7.	M12, 8-pin + AVRE	63154439	With configuration box; without TF; EI7. Generation B
EI7.	M12, 8-pin + AVRE	63189151	With configuration box; without TF; EI7. Generation B
EI7.	AE	63125455	With configuration box; with TF; EI7. Generation B
EI71	internal to the drive	63091062	MOVIMOT® MM..D [MF..]; without configuration box; without TF; EI7. Generation A (discontinued)
EI71	internal to the drive	63255758	MOVIMOT® MM..D/MMLK3./TH/BEM; with configuration box; with TF (TH) external braking resistor; EI7. Generation B; AS-i
EI71	internal to the drive	63198207	MOVIMOT® MM..D/MMLK3.; with configuration box; without TF; Generation B; AS-i

Type	Connection	SB-SNR	Notes
EI71	internal to the drive	63080125	MOVIMOT® MM..D/MMLK3./TH; with configuration box; with TF (TH) internal braking resistor; EI7. Generation B; AS-i
EI71	internal to the drive	63106329	MOVIMOT® MM..D/MMLK3./TH; without configuration box; with TF (TH) internal braking resistor; EI7. Generation A (discontinued); AS-i
EI71	internal to the drive	63198347	MOVIMOT® MM..D/MMLK3./TH/URM; with configuration box; with TF (TH); EI7. Generation B; AS-i
EI71	internal to the drive	63113911	MOVIMOT® MM..D/MMLK3./TH/URM; without configuration box; with TF (TH); EI7. Generation A (discontinued); AS-i
EI71	internal to the drive	63012944	MOVI-SWITCH®; MSW-25/CK0/TF;TH; without configuration box; EI7. Generation A (discontinued); AS-i
EI71,EI72, EI76, EI7C	M12, 4-pin + AVSE	63137259	Without configuration box; without TF; EI7. Generation A (discontinued)
EI71,EI72, EI76, EI7C	internal to the drive	63088436	MOVIMOT® MM..D [MQ..]; without configuration box; without TF; EI7. Generation A (discontinued)
EI71,EI72, EI76, EI7C	M12, 4-pin + AVSE	63277689	MOVIMOT® MM..D/BME..; without configuration box; without TF; EI7. Generation A (discontinued)
EI71,EI72, EI76, EI7C	M12, 4-pin + AVSE	63076977	MOVIMOT® MM..; without configuration box; without TF; EI7. Generation A (discontinued)
EI71,EI72, EI76, EI7C	M12, 8-pin + TF AVRE	63076365	Without configuration box; with TF; EI7. Generation A (discontinued)
EI71,EI72, EI76, EI7C	M12, 8-pin + AVRE	63155176	Without configuration box; without TF; EI7. Generation A (discontinued)
EI71,EI72, EI76, EI7C	M12, 4-pin + AVSE	63069423	Without configuration box; without TF; EI7. Generation A (discontinued)
EI7C (63)	M12, 8-pin + AVRE	63430959	Without configuration box only for DRN63; with TF; EI7. Generation B
EI7C FS	M12, 8-pin + AVRE	63089238	Without configuration box; without TF
EI8C	AE	63290839	–
EI8C	AIGA/AIGB	63286114	–
EI8C	AVRE	63357615	–

HTL/TTL (RS422)

Type	Connection	SB-SNR	Notes
EG7C	AD	63377500	–
EK8C	A1GA/A2GA	63377500	–
EK8C	AIGA/AIGB	63378043	–
EK8C	KIGA (AIGA)	63377454	–
EK8C	AE	63378108	–
EK8X	A1GA/A2GA	63452537	–

Type	Connection	SB-SNR	Notes
EK8X	AE	63452626	–
EK8X	AIGA	63456672	–
ES7C	AD	63377500	–
ES7R	AD	63377500	–
EV8C	A1GA/A2GA	63377500	–
EV8C	KIGA (AIGA)	63377454	–

TTL

Type	Connection	SB-SNR	Notes
EI8R	AE	63290839	–
EI8R	AIGA/AIGB	63286114	–
EI8R	AVRE	63357615	–
EG7R	AD	63377500	–
EH7R	AIGA	63160234	–
EH7T	AIGA	63160234	–
EK8R	A1GA/A2GA	63377500	–
EK8R	AIGA/AIGB	63378043	–
EK8R	KIGA (AIGA)	63377454	–
EK8R	AE	63378108	–
EV8R	A1GA/A2GA	63377500	–
EV8R	KIGA (AIGA)	63377454	–

MOVILINK® DDI

Type	Connection	SB-SNR	Notes
EI8Z	KD	63329050	MOVILINK® DDI + KD external brake rectifier
EI8Z	KD	63329069	MOVILINK® DDI + KD + BG.Z
EI8Z	KD1	63329077	MOVILINK® DDI + KD1 (M23) external brake rectifier
EI8Z	KD1	63329085	MOVILINK® DDI + KD1 (M23) + BG.Z
EI8Z	KDB	63329093	MOVILINK® DDI + KDB (M40) external brake rectifier
EI8Z	KDB	63329115	MOVILINK® DDI + KDB (M40) + BG.Z
EI8Z	KDD	63338734	MOVILINK® DDI + KDD (M23) external brake rectifier
EI8Z	KDD	63338742	MOVILINK® DDI + KDD (M23) + BG.Z
EK8Z	KD	63329050	MOVILINK® DDI + KD external brake rectifier
EK8Z	KD	63329069	MOVILINK® DDI + KD + BG.Z
EK8Z	KD1	63329077	MOVILINK® DDI + KD1 (M23) external brake rectifier
EK8Z	KD1	63329085	MOVILINK® DDI + KD1 (M23) BG.Z
EK8Z	KDB	63329093	MOVILINK® DDI + KDB (M40) external brake rectifier
EK8Z	KDB	63329115	MOVILINK® DDI + KDB (M40) BG.Z

Type	Connection	SB-SNR	Notes
EK8Z	KDD	63338734	MOVILINK® DDI + KDD (M23) external brake rectifier
EK8Z	KDD	63338742	MOVILINK® DDI + KDD (M23) + BG.Z

Absolute encoder

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

1 Vpp sin/cos + RS485

Type	Connection	SB-SNR	Notes
AG7W	AD	63377926	–
AG7W	AIGA	63377918	–
AK8W	A1GA/A2GA	63377926	–
AK8W	KIGA (AIGA)	63377918	–
AK8W	AIGA/AIGB	63377276	–
AK8W	AE	63377292	–
AS7W	AD	63377926	–
AS7W	AIGA	63377918	–
AV8W	A1GA/A2GA	63377926	–
EV8W	A1GA/A2GA	63377926	–
AV8W	KIGA (AIGA)	63377918	–
EK8W	A1GA/A2GA	63377926	–
EK8W	KIGA (AIGA)	63377918	–
EK8W	AIGA/AIGB	63377276	–
EK8W	AE	63377292	–
EV8W	KIGA (AIGA)	63377918	–

1 Vpp sin/cos + SSI

Type	Connection	SB-SNR	Notes
AG7Y	AD	63377926	–
AK8Y	A1GA/A2GA	63377926	–
AK8Y	KIGA (AIGA)	63377918	–
AK8Y	AIGA/AIGB	63377276	–
AK8Y	AE	63377292	–
AS7Y	AD	63377926	–
AS7Y	AIGA	63377918	–
AV8Y	KIGA (AIGA)	63377918	–
AV8Y	A1GA/A2GA	63377926	–

HIPERFACE®

Type	Connection	SB-SNR	Notes
AK8H	A1GA/A2GA	63377926	–
AK8H	KIGA (AIGA)	63377918	–

Type	Connection	SB-SNR	Notes
AK8H	AIGA/AIGB	63377276	–
AK8H	AE	63377292	–
AV8H	A1GA/A2GA	63377926	–
AV8H	KIGA (AIGA)	63377918	–

TTL (RS422) + SSI

Type	Connection	SB-SNR	Notes
AH7Y	AD	63121085	–

MOVILINK® DDI

Type	Connection	SB-SNR	Notes
EK9Z/AK8Z	KD	63329050	MOVILINK® DDI + KD external brake rectifier
EK9Z/AK8Z	KD	63329069	MOVILINK® DDI + KD + BG.Z
EK9Z/AK8Z	KD1	63329077	MOVILINK® DDI + KD1 (M23) external brake rectifier
EK9Z/AK8Z	KD1	63329085	MOVILINK® DDI + KD1 (M23) + BG.Z
EK9Z/AK8Z	KDB	63329093	MOVILINK® DDI + KDB (M40) external brake rectifier
EK9Z/AK8Z	KDB	63329115	MOVILINK® DDI + KDB (M40) + BG.Z
EK9Z/AK8Z	KDD	63338734	MOVILINK® DDI + KDD (M23) external brake rectifier
EK9Z/AK8Z	KDD	63338742	MOVILINK® DDI + KDD (M23) + BG.Z

Resolver

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

Resolver, analog modulated

Type	Connection	SB-SNR	Notes
RK8M	A1GA/A2GA	63359685	–
RK8M	KIGA (AIGA)	63374935	–
RK8M	AE	63377306	–
RK8M	AIGA/AIGB	63377284	–

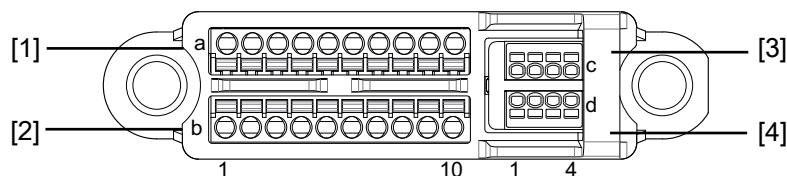
Encoder mounting adapters

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

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

Connection via terminal strip in the terminal box

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



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[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)	$\bar{A}$ (WH)	$\bar{B}$ (YE)	B (GN)
b	TF1 ¹⁾	TF1 ¹⁾	TF2 ¹⁾ opt.	TF2 ¹⁾ opt.	+UB	GND	A	$\bar{A}$	B	$\bar{B}$

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

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

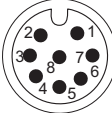
Pin assignment EI76				
	1	2	3	4
c	GND_ Config (BU)	n. c.	n. c.	n. c.
d	n. c.	EI76 (RD)	n. c.	n. c.

Pin assignment EI72				
	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 EI71				
	1	2	3	4
c	GND_ Config (BU)	n. c.	n. c.	n. c.
d	n. c.	n. c.	n. c.	EI71 (RD)

Connection via M12 connector on the terminal box

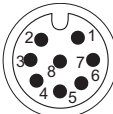
An 8-pin or a 4-pin M12 connector is available for the connection.

4-pin M12 connector AVSE		8-pin M12 connector AVRE	
- A-coded - male 	Pin 1: $+U_B$	- A-coded - male 	Pin 1: $+U_B$
	Pin 2: B		Pin 2: GND
	Pin 3: GND		Pin 3: A
	Pin 4: A		Pin 4: $\bar{A}$
			Pin 5: B
			Pin 6: $\bar{B}$
			Pin 7: TF1
			Pin 8: TF1

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

Connection via M12 connector on the terminal box

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

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



INFORMATION

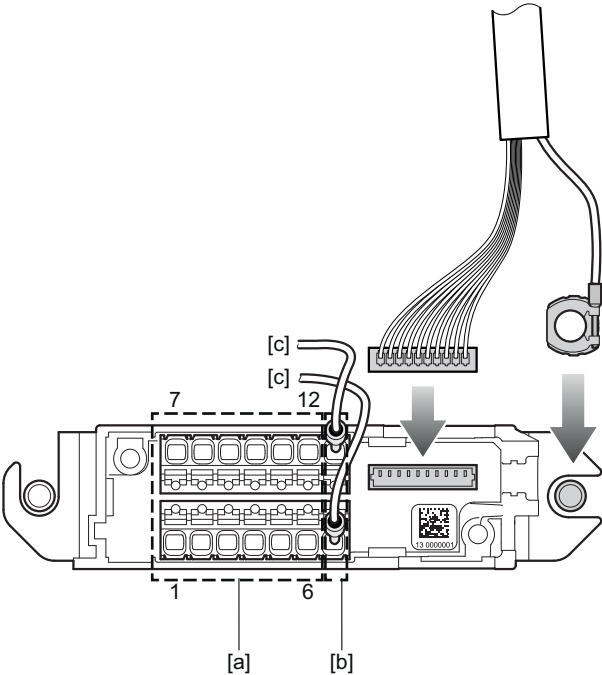
Pins 7 and 8 must **not** be used.

The following guidelines apply for the encoder cable:

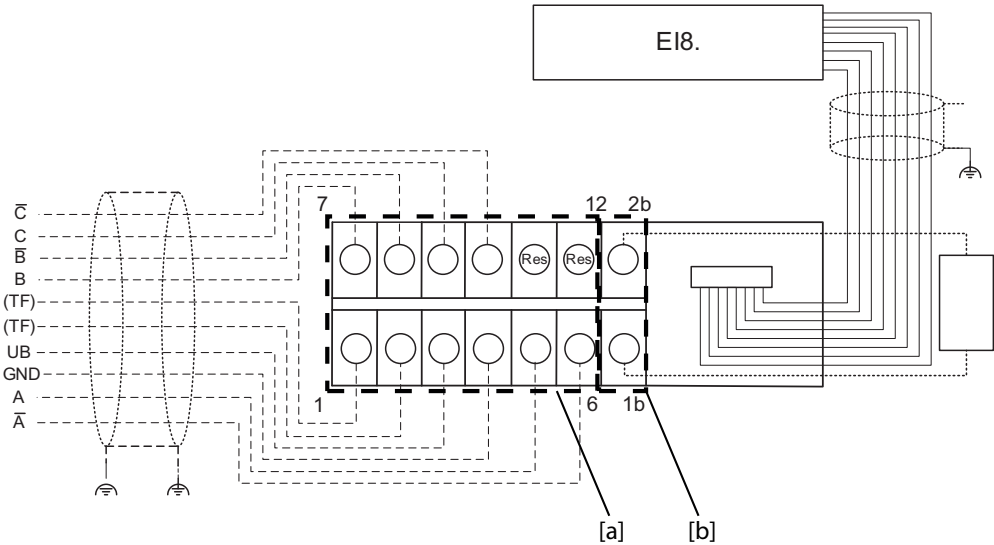
- Max. length of the cable: 100 m. The cable length may be limited by the encoder evaluation unit.
- The minimum core cross section must meet the specifications of the encoder evaluation unit. If this value is not specified, the core cross section must be at least 0.25 mm^2 .
- The cable must be shielded. The shield must be connected over a large surface area on both sides.
- The cable must have pairs of twisted cores.

5.3.4 Structure of wiring diagram of EI8R, EI8C

Connection unit via terminal strip in the terminal box



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

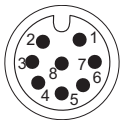
Basic connection:

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

Connection via M12 connector on the terminal box

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

8-pin M12 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

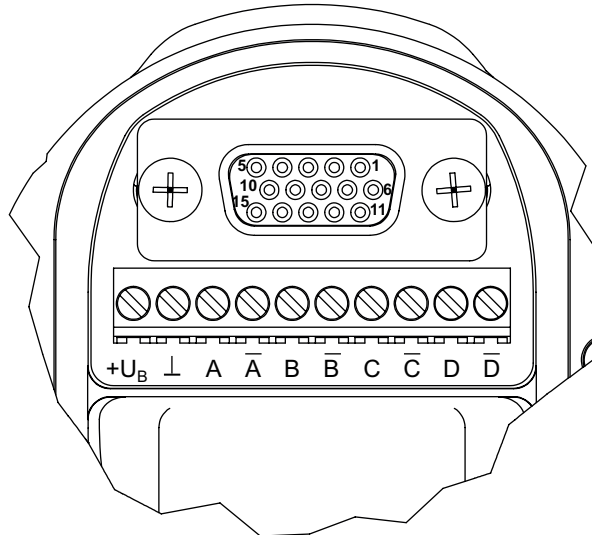
The following guidelines apply for the encoder cable:

- 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 cores.

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

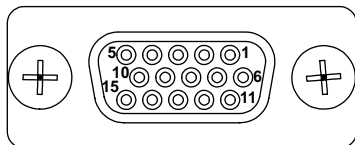
Connection via integrated encoder connector

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
	+UB	+UB	+UB	+UB	+UB	+UB	R1 ref+
	⊥	DGND	DGND	DGND	DGND	DGND	R2 ref-
	A	Cos+	Cos+	Cos	A	Cos+	S1 cos+
	A̅	Cos-	Cos-	Cos ref	A̅	Cos-	S3 cos-
	B	Sin+	Sin+	Sin	B	Sin+	S2 sin+
	B̅	Sin-	Sin-	Sin ref	B̅	Sin-	S4 sin-
	C	–	Clock+	–	C	C	n.c.
	C̅	–	Clock-	–	C̅	C̅	n.c.
	D	Data+	Data+	Data+	–	Data+	n.c.
	D̅	Data-	Data-	Data-	–	Data-	n.c.

15-pin D-sub socket



Pin 1: D+, data+

Pin 2: D-, data-

Pin 3: n.c.

Pin 4: n.c.

Pin 5: U_B

Pin 6: C-, clock-

Pin 7: n.c.

Pin 8: n.c.

Pin 9: GND

Pin 10: GND

Pin 11: C+, clock+

Pin 12: B-, sin-

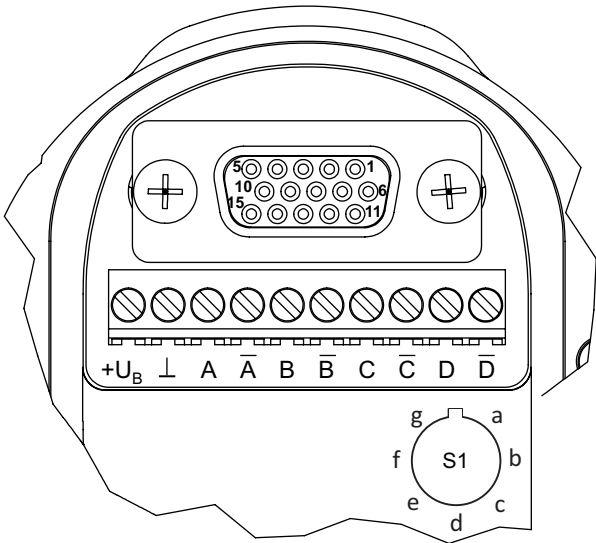
Pin 13: B+, sin+

Pin 14: A-, cos-

Pin 15: A+, cos+

5.3.6 Structure of wiring diagram of EK8X add-on encoder – with adjustable resolution

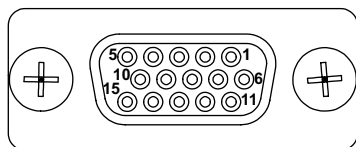
Connection via integrated encoder connector



EK8X		
	+U _B	+U _B
	⊥	DGND
	A	A
	$\bar{A}$	$\bar{A}$
	B	B
	$\bar{B}$	$\bar{B}$
	C	C
	$\bar{C}$	$\bar{C}$
	D	–
	$\bar{D}$	–

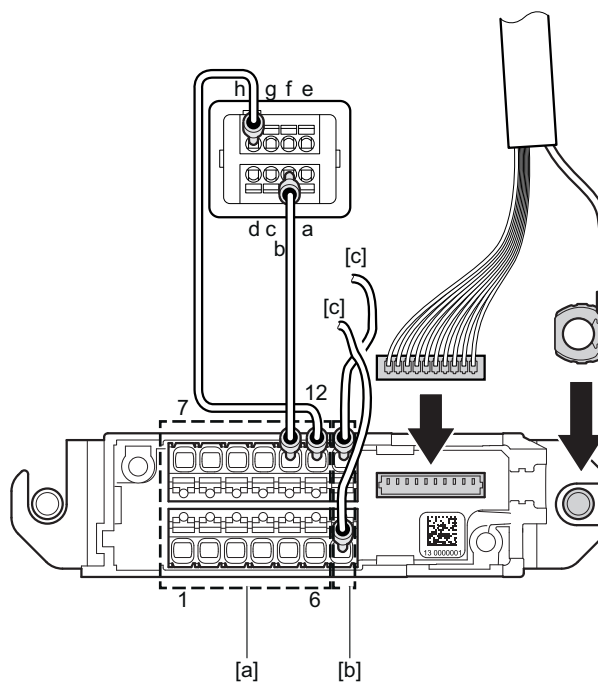
S1 switch position	Resolution
a	1
b	2
c	6
d	24
e	100
f	128
g	1024

15-pin D-sub socket



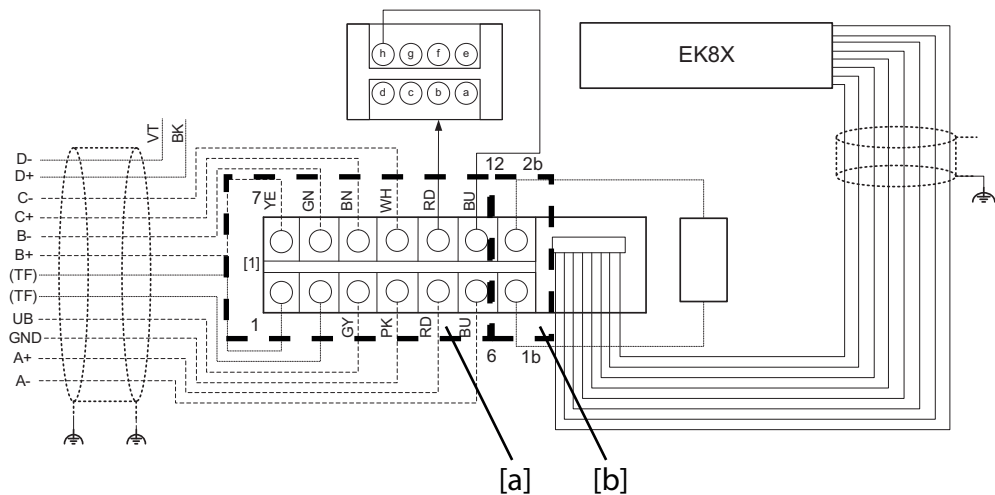
Pin 1: D+, data+
Pin 2: D-, data-
Pin 3: n.c.
Pin 4: n.c.
Pin 5: U_B
Pin 6: C-, clock-
Pin 7: n.c.
Pin 8: n.c.
Pin 9: GND
Pin 10: GND
Pin 11: C+, clock+
Pin 12: B-, sin-
Pin 13: B+, sin+
Pin 14: A-, cos-
Pin 15: A+, cos+

Connection via terminal strip in the terminal box



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

Pin assignment

Pin	Signal	EK8X
1	TF	TF
2	TF	TF
3	U _B	U _B
4	GND	GND
5	A+	A+
6	A-	A-
7	B+	B+
8	B-	B-
9	C+	C+
10	C-	C-
11	–	Configuration a – g
12	–	Configuration h

Color assignment of the cable to the options

Option	Cable 1b	Cable 2b
/TF (100 °C)	RD	RD
/TF (130 °C)	BU	BU
/TF (150 °C)	BK	BK
/TF (170 °C)	WH	BN
/KY	RD(+)	BU(-)
/PT	RD	WH

Option	Cable 1b	Cable 2b
/PK	RD	BK
/PI	BK	BK

Assignment of resolution to pin 11 and pin 12

Resolution	Pin 11 (RD)	Pin 12 (BU)
1	a	h
2	b	h
6	c	h
24	d	h
100	e	h
128	f	h
1024	g	h

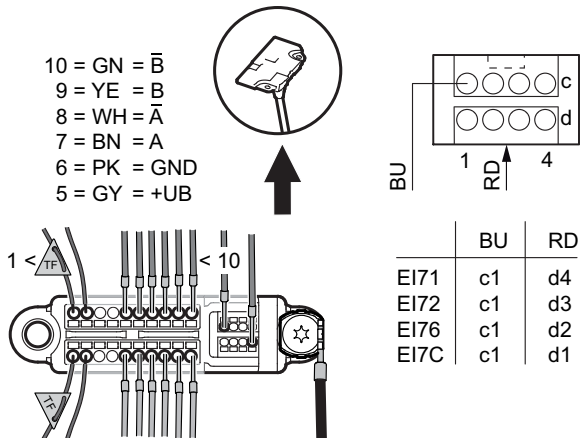
5.4 Connecting EI7. built-in encoders

INFORMATION

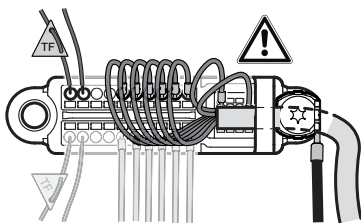


Observe the wiring diagrams in chapter "Overview of wiring diagrams"

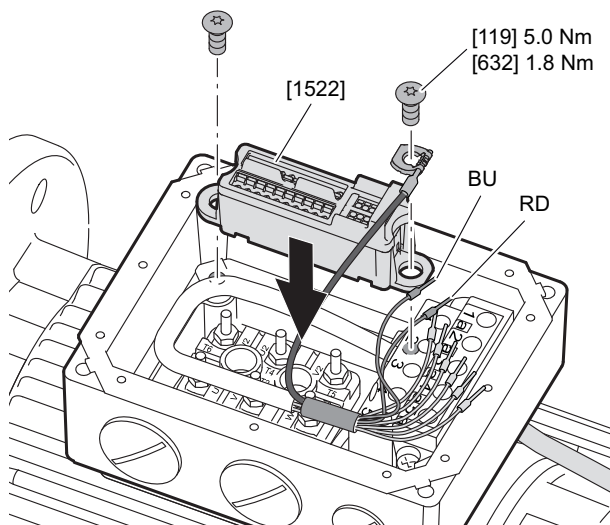
5.4.1 Wiring EI7. - with M12 connector and connection box



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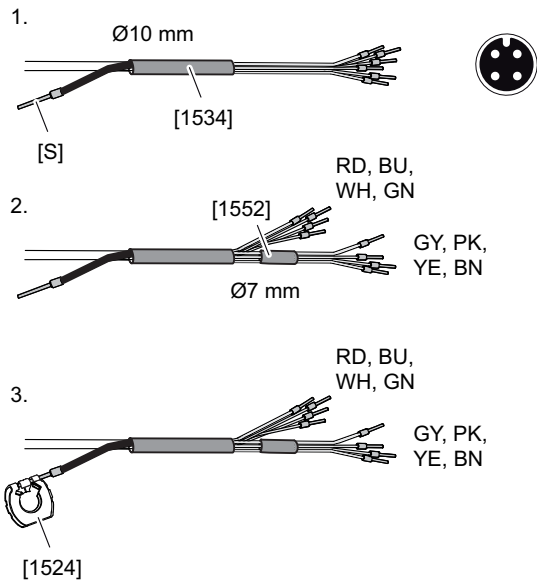
1. Wire the connection unit [1522] in accordance with the installed encoder type and the wiring diagrams (see "Overview of wiring diagrams").

1. Secure the connection unit with the M8 screws [119] or M4 screws [632].

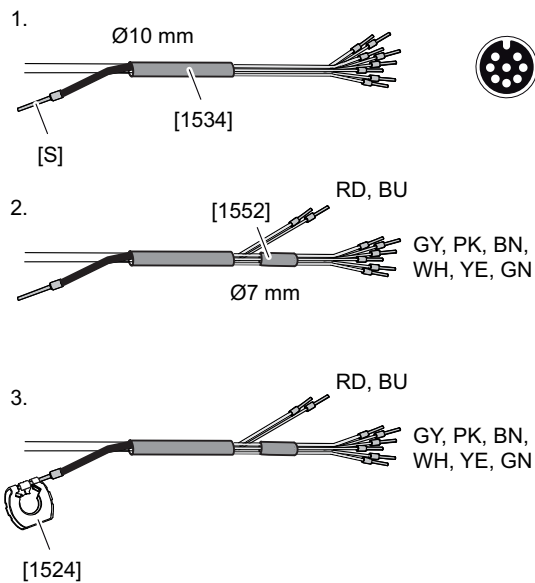
⇒ For M8 screws: Tightening torque 5 Nm

⇒ For M4 screws: Tightening torque 1.8 Nm

5.4.2 Wiring EI7. – with connection unit



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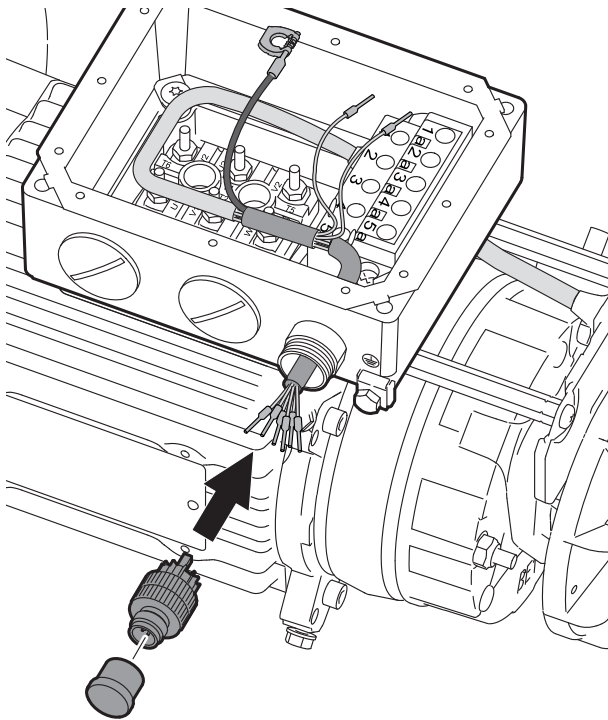
18014407973891467

4-pin:

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

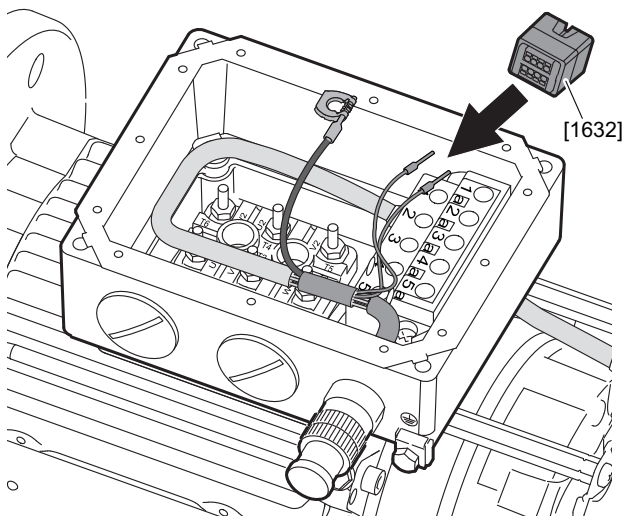
8-pin:

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



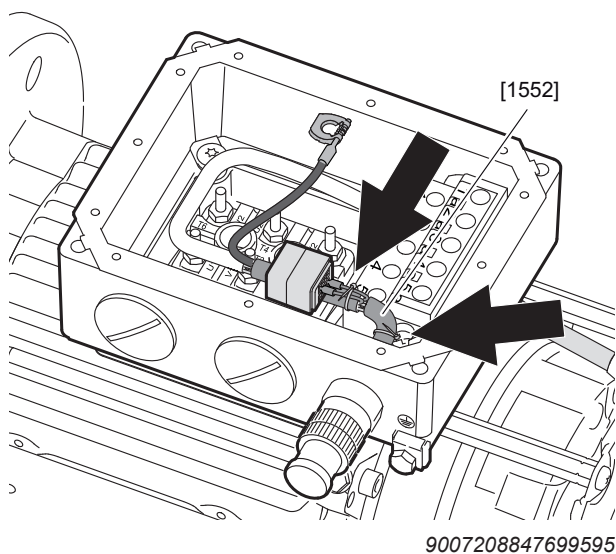
1. Route the cores through the thread reduction out of the terminal box to the outside.
2. Connect the M12 connector as shown in the wiring diagram (see "Overview of wiring diagrams").
3. Screw the cores to the M12 connector.
⇒ Tightening torque $0.8 \text{ Nm} \pm 10\%$
4. Fasten the connector.

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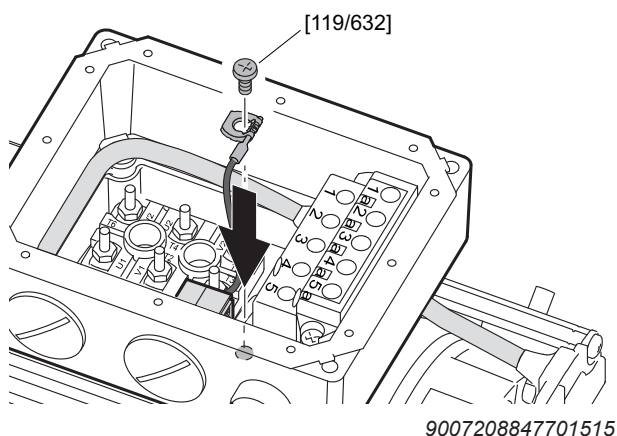


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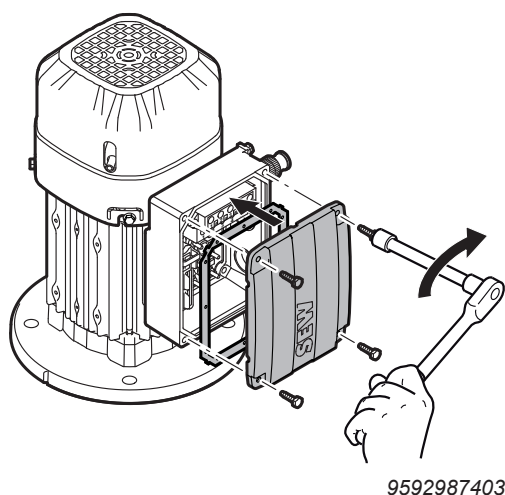
1. Wire the connection unit [1632] in accordance with the previously installed encoder type (see "Overview of wiring diagrams").



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 core end sleeves on the glass fiber sheathing as possible.



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



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

5.4.3 Connecting EI7C FS – with M12 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 EK8Z, EK9Z, AK8Z safety encoders, work on the MOVILINK® DDI communication unit is not permitted. Place an order with SEW-EURODRIVE Service to have any necessary work on the encoder performed.
- 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 using an encoder mounting adapter to retrofit a safety encoder, the retrofitting of the FS motor option is not identifiable on the motor, e.g. by the FS logo on the motor nameplate. If retrofitting of a safety encoder is performed by the user, the user accepts responsibility and liability. Retrofitting by SEW-EURODRIVE Service is recommended.

For further information, refer to the wiring diagrams in chapter "Overview of wiring diagrams".

5.5 Connecting EI8. built-in encoders

Note the available wiring diagrams from chapter "Overview of wiring diagrams" and the assembly procedure from "EI8. built-in encoders and EI8A encoder mounting adapters – DRN../DRU../DR2..71 – 132S motors, with connection unit".

5.6 Connecting .K8./K9./V8. conical encoders

Note the available wiring diagrams from chapter "Overview of wiring diagrams" (→ 100) and the assembly procedure from "Removing/installing conical encoders and encoder mounting adapters for conical encoders" (→ 48).

5.6.1 Connecting the .K8./K9./V8. conical encoder with integrated A1GA/A2GA encoder 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.
8. EK8X encoder: Set the desired encoder resolution using the rotary switch in the connection cover [619].

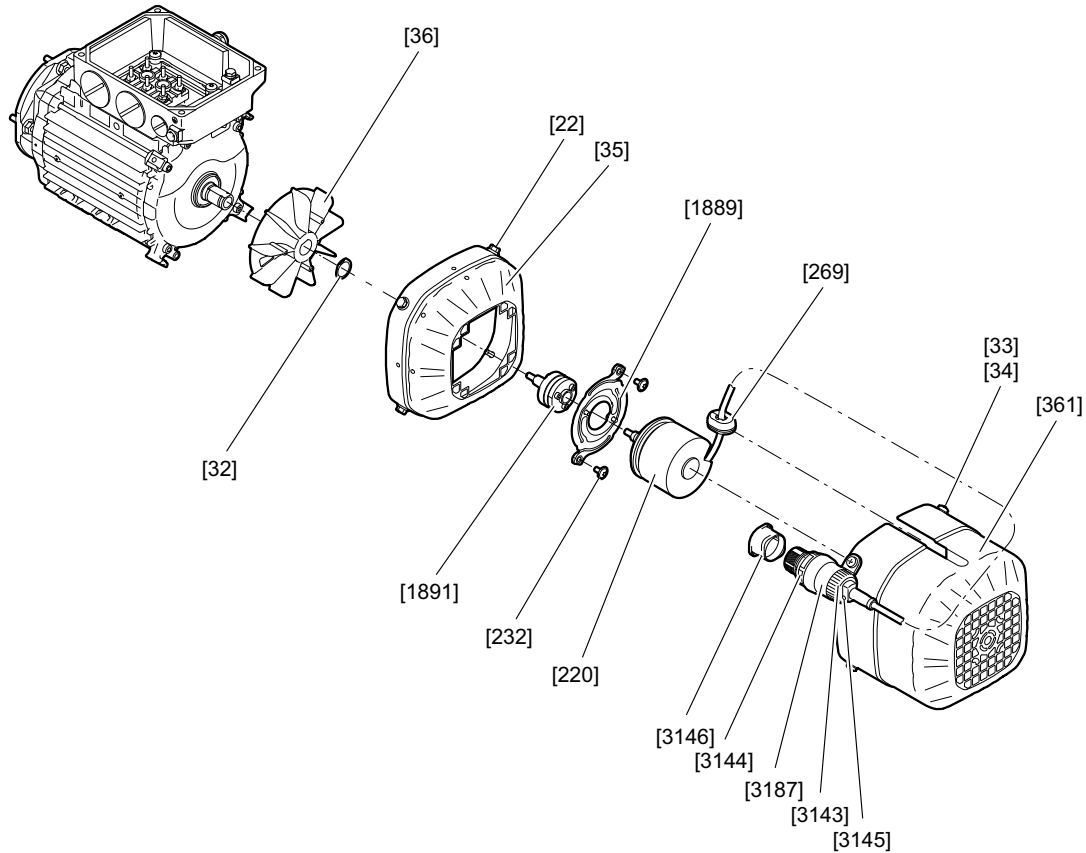
INFORMATION



The connection covers of the EK8X and .K8./V8. encoder designs are not compatible. Observe the following information to avoid damaging the encoder:

- Do not use a .K8./V8. connection cover with the EK8X encoder design.
- Do not use an EK8X connection cover with the .K8./V8. encoder designs.

5.6.2 Connecting the .K8./.K9./.V8. conical encoder with cable and M23 connector directly on the KIGA encoder

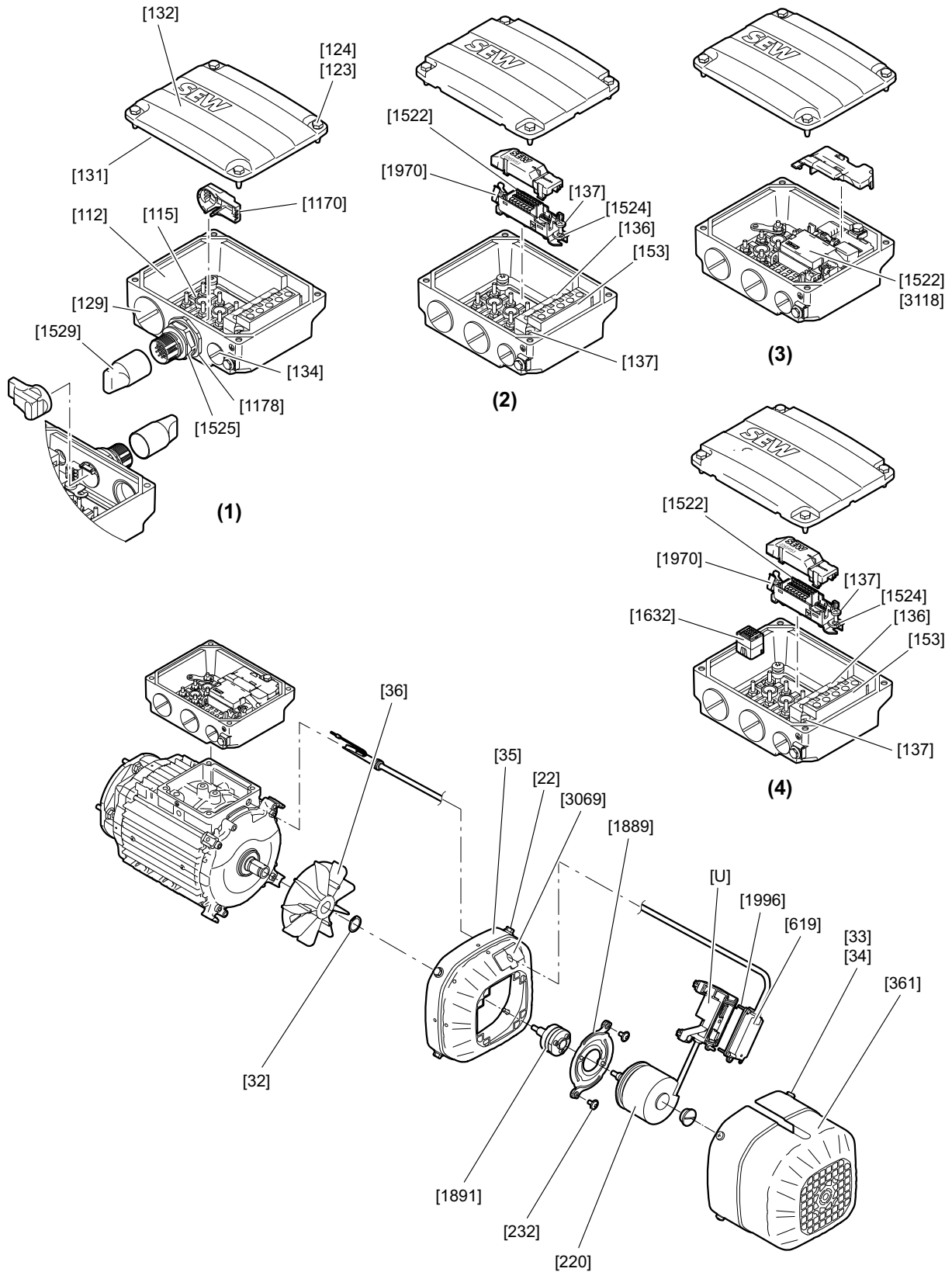


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✓ Required resources: Screwdriver

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

5.6.3 Terminal box connections



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

- ✓ 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].

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

- 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 [1970]. Attach the cover of the connection unit [1522].
- 4. Mount the terminal box cover [132] using the screws [123] (4 × M5 SW8).
 - ⇒ Tightening torque 4 Nm

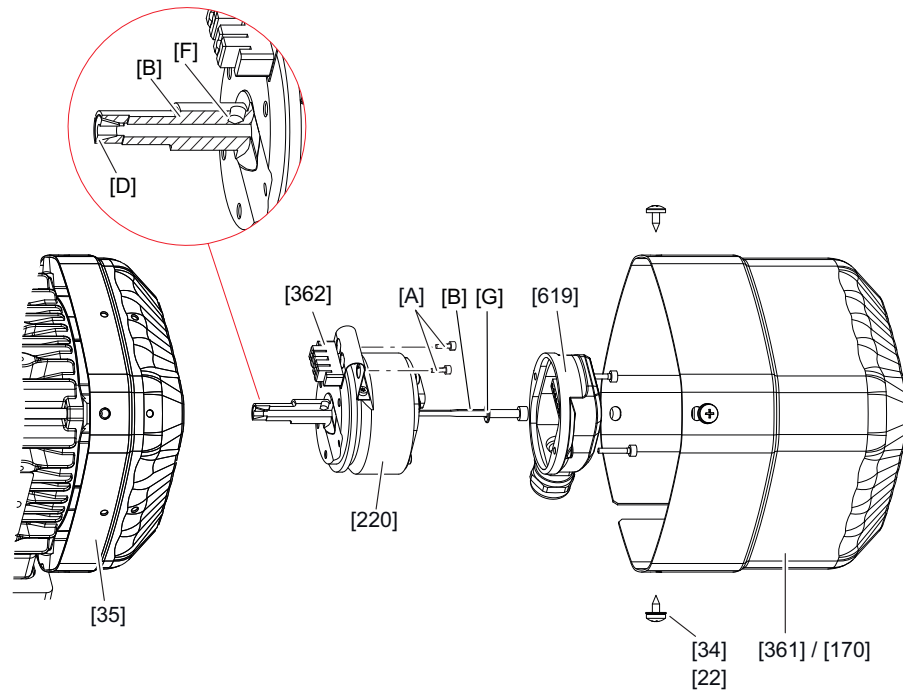
(3) – Connecting the .K8./.V8. conical encoder with DDI KD1, KDB, KD, or KDD

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

(4) – Connecting the EK8X conical encoder with the connection unit in the terminal box

- 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 [1970]. Attach the cover of the connection unit [1522].
- 4. Mount the terminal box cover [132] using the screws [123] (4 × M5 SW8).
 - ⇒ Tightening torque 4 Nm

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



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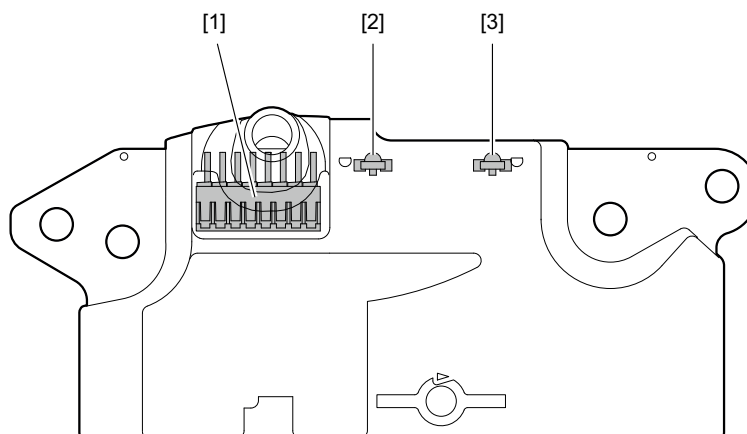
1. Remove the safety cover [361] or the forced cooling fan [170] if applicable.
2. Loosen the screws of the connection cover [619] and remove it.
3. Connect the encoder as shown in the wiring diagram.
4. Screw on the connection cover [619].
 - ⇒ For size 71 – 132S: Tightening torque 2.25 Nm
 - ⇒ For sizes 132M – 315: Tightening torque 2.25 Nm $\pm$ 10%
5. Tighten the cable gland.
 - ⇒ Tightening torque 2 Nm $\pm$ 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 Operation

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

6.1.1 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.



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- [1] Connector
- [2] Duo LED - H1
- [3] Duo LED - H2

LED H1 – Status and fault

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

Faults 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 fault (e.g. due to short circuit, overtemperature)

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

6.1.2 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 a fault history by means of a flash code.

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

Indicating the normal state

During normal operation, the green status LED lights up constantly. Usually, no fault has occurred and the red fault history LED is off. If a fault 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 fault

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

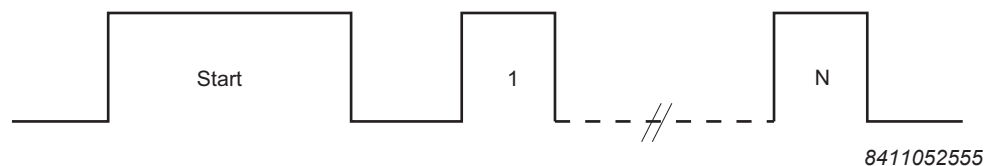
If the encoder is supplied with a voltage lower than that specified in chapter "EI7C FS" when it is switched on, it will automatically switch to the service mode. The service mode is used to configure and adjust the encoder. It may not be used as a safety encoder in this operating state.

During the process, the output drivers are disabled. The red fault 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 fault statuses

The start of a fault code is indicated by a long pulse (START). The number of brief flash pulses indicates the most recent fault 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" (→ [130](#)) table provides an overview of possible fault statuses and the defined LED signals for these statuses.



LED codes for the operating statuses

Normal operation

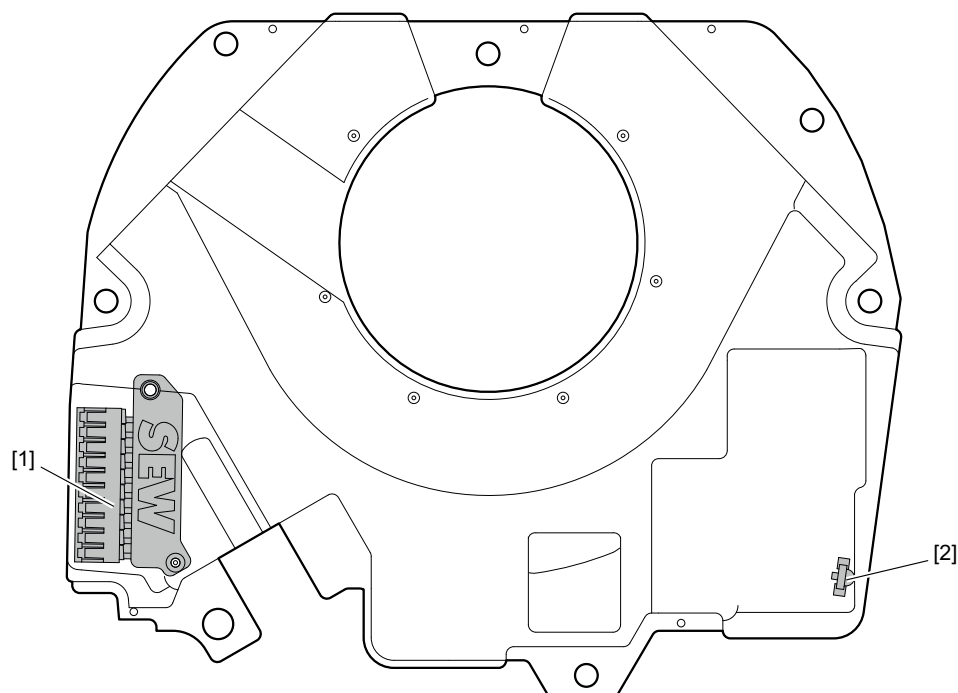
Displayed status	Green LED (status)	Red LED (fault)
No voltage or defective	OFF	OFF
Internal diagnostics fault	ON	ON
No fault	ON	OFF
Currently no fault Last fault is displayed.	ON	Fault code
A fault is currently present Current fault is displayed.	OFF	Fault code
	Temperature fault	1×
	Supply voltage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

Service operation/setup mode

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

6.1.3 Visual feedback of EI8C, EI8R built-in encoders

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



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[1] Connector

[2] Duo LED

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

Diagnostics LED color orange/red	Meaning and measures
Red	Encoder diagnostics has detected a fault. Permanently lit: Fault regarding the internal encoder sensors (incremental sensors) Flashes 5 Hz: Fault 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: Fault 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.

6.1.4 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 and measures
Off	Encoder not supplied or defective
Permanently green	Encoder operational, no faults
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 faults, see chapter "Installing EI8. – DRN../DRU../DR2..71 – 132S motors, with connection unit".
Permanently red Inverter fault message; fault 13.26, 13.27 on the inverter and in MOVISUITE®	Encoder reports self-diagnostic information or a fault. The mechanical adjustment of the encoder is outside the permitted tolerance range. This fault 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, readjust and resecure the fan and pole ring, see chapter "Installing EI8. – DRN../DRU../DR2..71 – 132S motors, with connection unit".

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, a fault will only be reported via a fault message from the inverter as described below:

Diagnostics	Meaning and measures
Inverter fault message; fault 13.26, 13.27 on the inverter and in MOVISUITE®	The encoder diagnostics has detected a fault or the encoder is defective. The mechanical adjustment of the encoder is outside the permitted tolerance range. This fault 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, readjust and resecure the fan and pole ring, see chapter "Installing EI8. – DRN../DRU../DR2..71 – 132S motors, with connection unit".

7 Contacting SEW-EURODRIVE

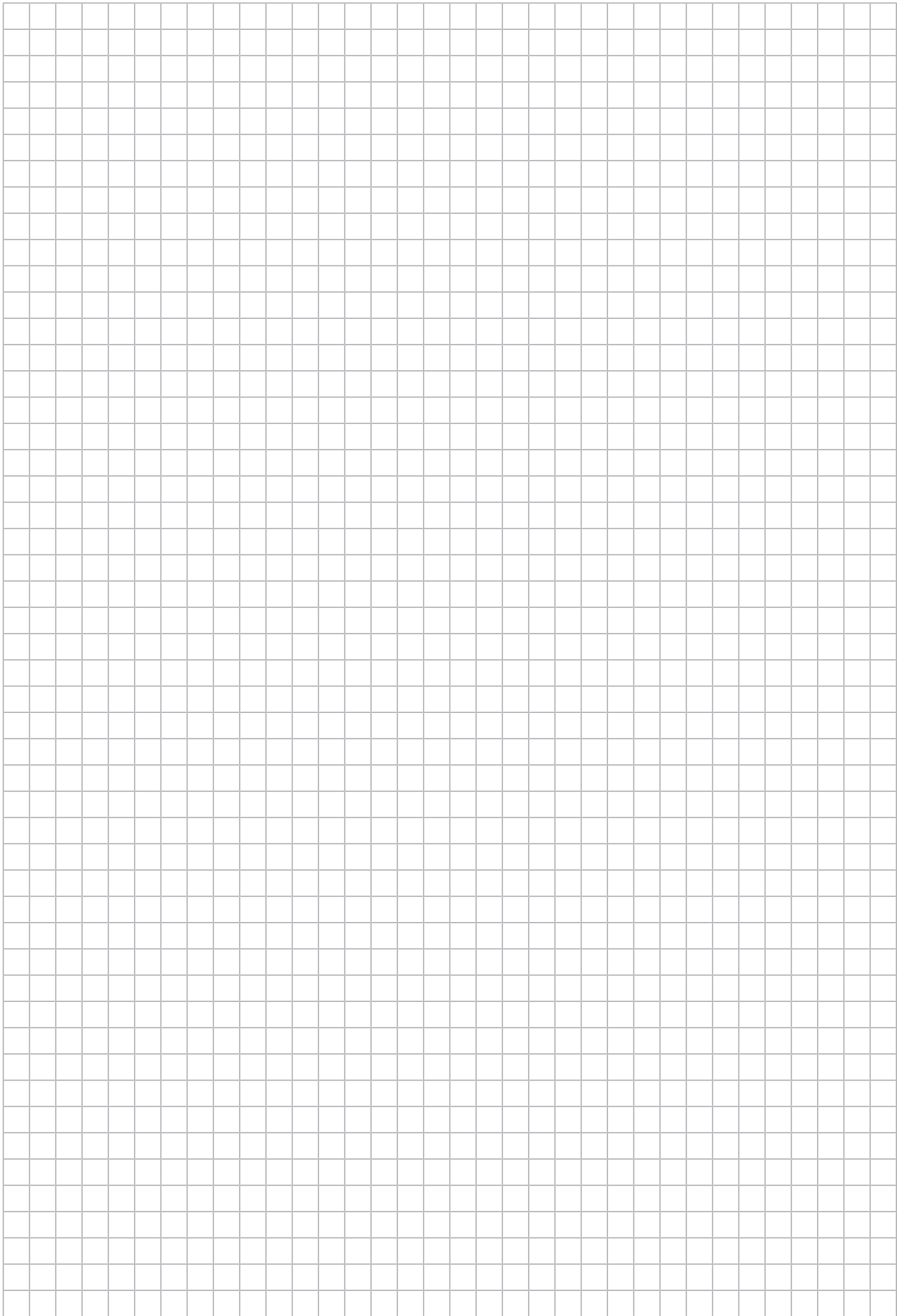
You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

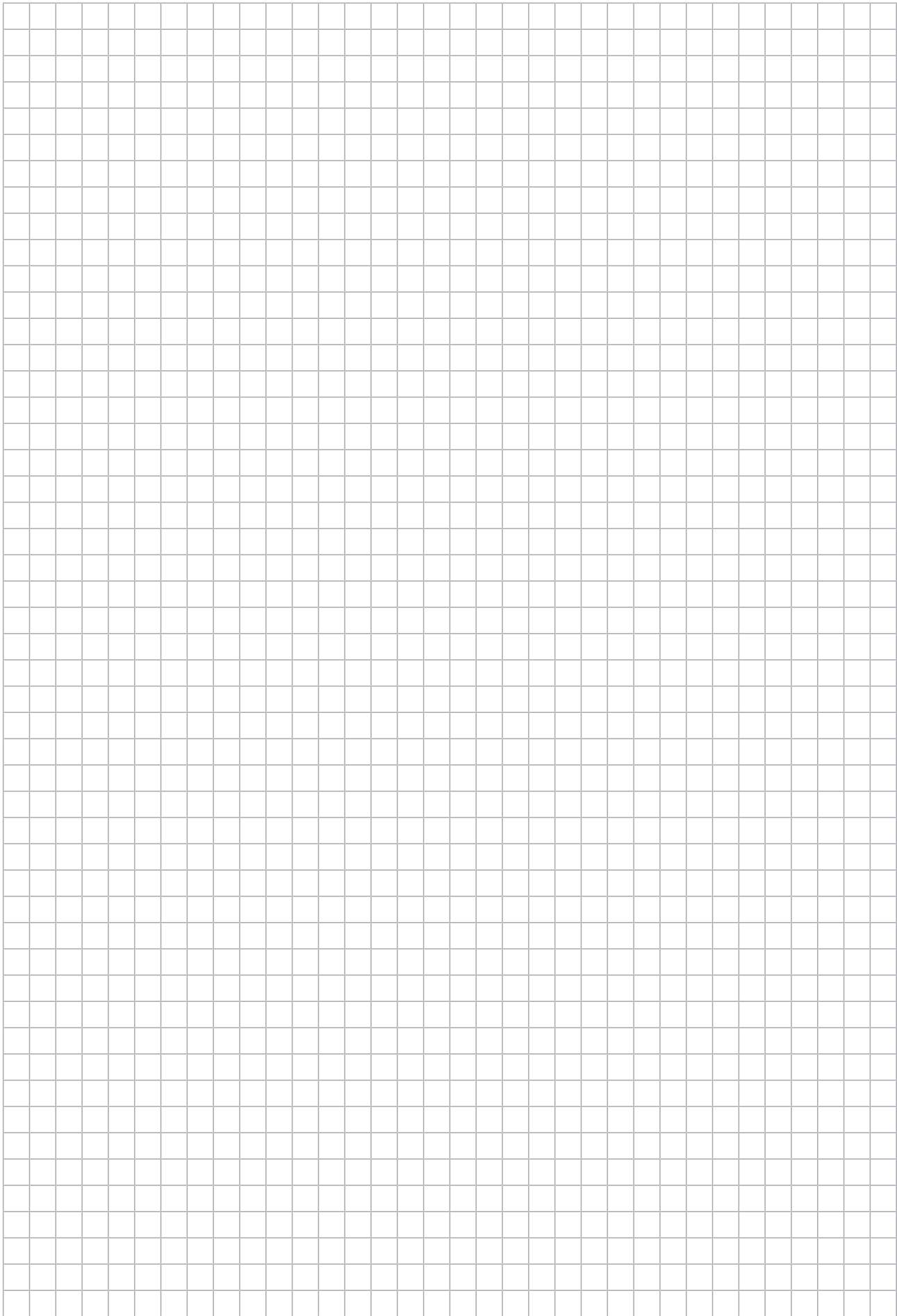
<https://www.sew-eurodrive.de/contacts-worldwide>

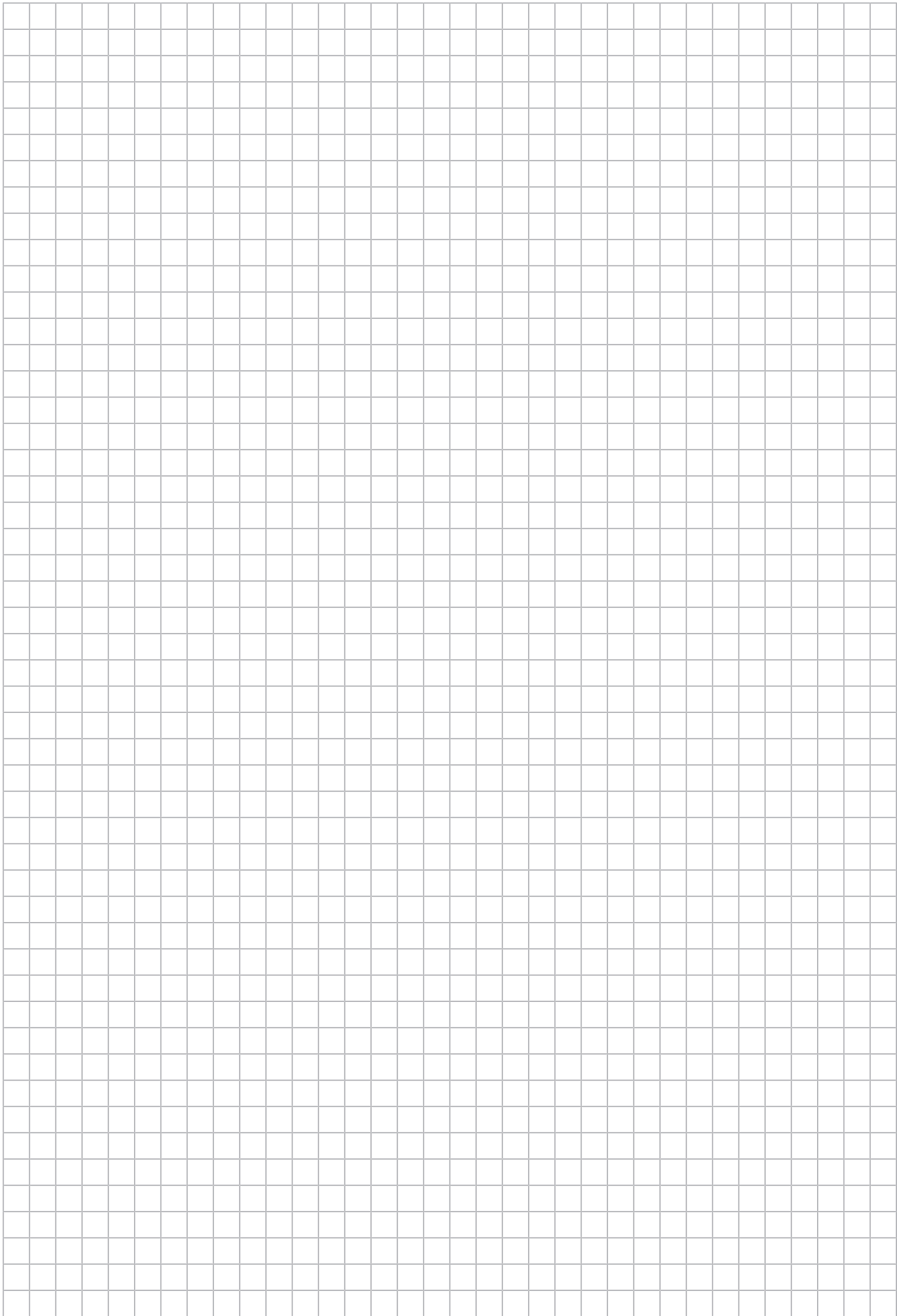


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