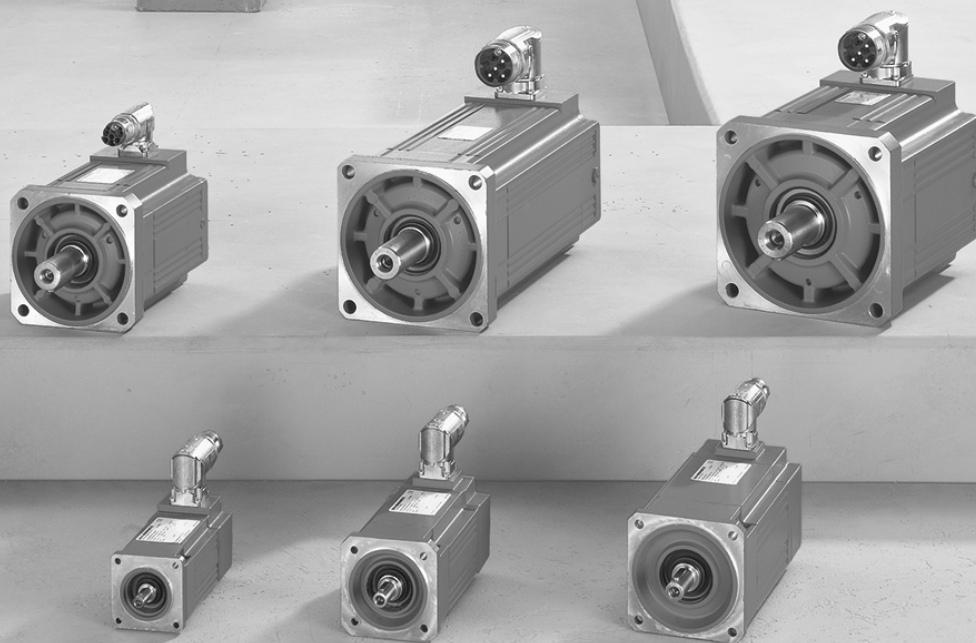




Addendum to the operating instructions



Encoders with EnDat 2.2 and EnDat 3 interface

CMP40 – 112



Table of contents

1	General information	5
1.1	How to use this documentation	5
1.2	Contents of this documentation	5
1.3	Other applicable documentation	5
2	Basic structure	6
3	Motor nameplates	7
4	Type designation example	8
5	Designs and options	9
5.1	Mechanical attachments	9
5.2	Encoder.....	9
5.3	Connection variants	9
6	Electrical installation	10
6.1	Notes on connection via connectors	10
6.2	Connection to right-angle connectors	10
6.2.1	Connector positions SE1, SF1, and SF4	10
6.2.2	Connecting SE1 hybrid plug connectors (M23)	11
6.2.3	Connection with SF1 hybrid connector (M23).....	12
6.2.4	Connection with SF4 hybrid connector (M23).....	13
6.3	Connection to the terminal box	14
6.3.1	Connector positions for connection with KEE and KEF terminal box	14
6.3.2	Connection of KEE hybrid connector.....	14
6.3.3	Connection of KEF hybrid connector	15
6.4	Connection technology for motors with encoders and EnDat 2.2 interface	16
6.5	Connection technology for motors with encoders and EnDat 3 interface	16
7	Startup.....	17
7.1	General information	17
7.2	Zero angle setting of the encoder	18
7.3	Startup of encoders with EnDat 2.2 and EnDat 3 interface	18
7.4	Evaluation of the PK motor temperature sensor for encoders with EnDat 2.2 and EnDat 3 interface	18
7.5	Notes on evaluating the PK motor temperature sensor for encoders with EnDat 2.2 and EnDat 3 interface	20
8	Encoder technical data.....	21
8.1	Encoder properties.....	21
8.1.1	Overview of encoder properties.....	21
8.1.2	Overview of technical properties.....	21
8.1.3	Overview of encoders and motors	21
8.1.4	Overview of encoders and inverters	22
8.1.5	Overview of encoders and connection technology	22
8.1.6	Summary of encoders with electronic nameplates	22
8.2	Technical data for EnDat 2.2 – EH0E, AH0E.....	23
8.3	Technical data for EnDat 2.2– EH1E, AH1E.....	23

8.4 Technical data EnDat 3 – EH4F, AH4F 25

9 Contacting SEW-EURODRIVE..... 27

33956162/EN – 03/2026

1 General information

1.1 How to use this documentation

This addendum to the operating instructions contains special information on EnDat 2.2 and EnDat 3 interfaces in conjunction with the CMP.. motor series.

In addition to the addendum to the operating instructions at hand, the following operating instructions apply for motors with EnDat 2.2 and EnDat 3 encoders:

- "CMP40 – CMP112, CMPZ71 – CMPZ100 Synchronous Servomotors" operating instructions

The documentation is an integral part of the product and contains important information on operation and service. The documentation is intended for all persons who perform assembly, installation, startup, and service work on the product and the test system. Make sure this documentation is available and legible. Ensure that persons responsible for the systems and their operation as well as persons who work on the product independently have read the documentation carefully and understood it. If you have any questions or if you require further information, contact SEW-EURODRIVE. Always use the latest edition of the documentation and software.

1.2 Contents of this documentation

This documentation contains additions and conditions for the use of encoders with EnDat 2.2 or EnDat 3 interface.

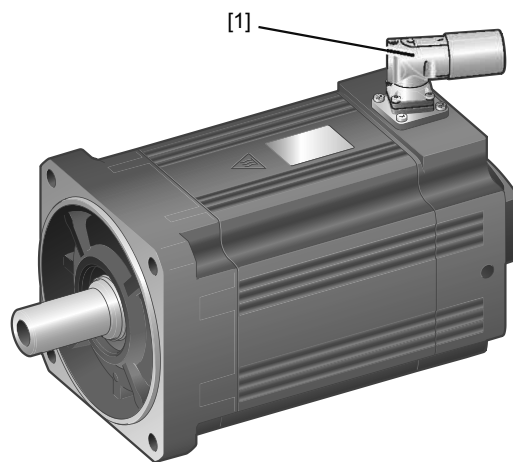
1.3 Other applicable documentation

The following documentation and documents must also be observed:

- When the encoders are designed as safety encoders:
 - Addendum to the operating instructions "Safety encoders and safety brakes – CMP.., CMPZ.., CM3C.., ECM3C.., CM3P.., CM3G.. – Functional safety"

2 Basic structure

The following figure shows an example of a CMP.. servomotor with encoder:



[1] Hybrid connector

29017423115

4 Type designation example

The following table shows an example of a type designation:

Example: CMP80L/BP/PK/AH1E/SE1		
Synchronous servomotor	CMP80	Flange-mounted motor size 80
Length	L	Long
Mechanical attachments	/BP	BP holding brake
Standard equipment: temperature sensor	/PK	PK temperature sensor
Encoder motor option	/AH1E	Absolute encoder, EnDat 2.2 interface (multi-turn)
Connection motor option	/SE1	M23 motor connector, only motor-side female connector, hybrid connector for motor, brake, and AH1E encoder

5 Designs and options

5.1 Mechanical attachments

Designation	Description
/BK	Holding brake for CMP40 – 63
/BP	Holding brake for CMP71 – 100
/BY	Spring-loaded holding brake with increased working capacity for CMP112

5.2 Encoder

Designation	Description	Capability class
/EH0E ¹⁾	Single-turn encoder, EnDat 2.2	High class
/AH0E ¹⁾	Multi-turn encoder, EnDat 2.2	High class
/EH1E ²⁾	Single-turn encoder, EnDat 2.2	High class
/AH1E ²⁾	Multi-turn encoder, EnDat 2.2	High class
/EH4F ²⁾	Single-turn encoder, EnDat 3	High class
/AH4F ²⁾	Multi-turn encoder, EnDat 3	High class

1) In preparation.

2) Optionally available as a safety encoder.

5.3 Connection variants

Designation	Description
/SE1	M23 motor/brakemotor hybrid connector (BK..., BKB..., BZ...D) (for power and data) for EnDat 2.2 Connector on the motor side
/SF1	Hybrid connector motor/brakemotor (BK..., BKB..., BZ..., BZ...D) M23 (power and data) for EnDat 3, for DC 24 V brakes in two-wire technology Connector on the motor side
/SF4	Hybrid connector motor/brakemotor (BK..., BKB..., BZ..., BZ...D) M23 (power and data) for EnDat 3, for all brake voltages in two-wire and three-wire technology Connector on the motor side
/KEE	Terminal box with cable glands for motor and brakemotor power and signal connector i-Tec TE series 615 for AH1E and EH1E encoders
/KEF	Terminal box with cable glands for motor and brakemotor power and signal connector itec TE series 615 for AH4F and EH4F encoders

6 Electrical installation

6.1 Notes on connection via connectors

The cables are connected to adjustable right-angle connectors or to connectors on the terminal box.

Observe the following points when working on the device:

- Align the right-angle connector only while the mating connector is plugged in.
If no mating connector is available, use pliers to align the right-angle connector. Avoid damage to the connection part and the insulation insert.

- Avoid frequent alignment of the right-angle connectors.

The connector should be rotated to install and connect the motor. Do not turn the angular plug connector regularly once it has been installed.

- Make sure not to turn the connector regularly once it has been installed.
- Comply with the permitted bending radii of the cables.

With low-capacity trailing cables, the bending radii are larger than for standard cables.

- Observe the maximum possible cable length and strain relief.
- To prevent interference with the motor protection devices and/or the brake controls, unshielded cables must not be routed alongside pulsed power cables in the same cable duct or close to each other.

6.2 Connection to right-angle connectors

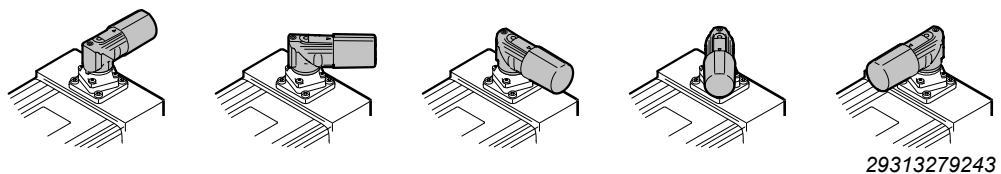
Note that hybrid cables for motors with encoders with the EnDat 2.2 or EnDat 3 interface are not available from SEW-EURODRIVE.

The SE1, SF1 and SF4 connector is plug-compatible with hybrid connectors and hybrid cables from B&R Industrial Automation GmbH.

Observe the relevant wiring diagram.

6.2.1 Connector positions SE1, SF1, and SF4

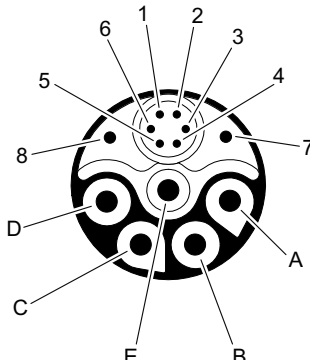
Right-angle connectors SE1, SF1, and SF4 can be aligned horizontally in any desired position. The following figure illustrates an example of various plug-in connector alignments:



29313279243

6.2.2 Connecting SE1 hybrid plug connectors (M23)

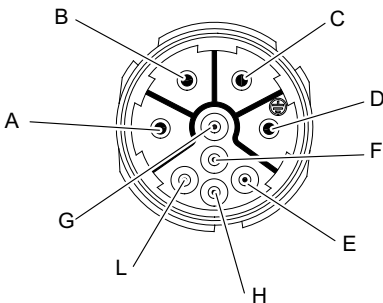
The connection diagram of the connector depicts the contact end of the connections.

Function
Hybrid motor, brakemotor and signal connection for motors with EnDat 2.2 interface
Connection type
M23, male, male thread, TE Connectivity – Intercontec products, 723 htec series, SpeedTec equipment, coded. Insulator code SE1: TE series 723, code 13, 5+2+6-pin - 40-A756-000-000, 40-A484-000-000, 40-A721-000-000
Connection diagram
 9007231548959371

Motor assignment			
Contact	Signal	Without brake	With BK../BKB../BP../BZ...D brake
A	U	Motor phase U	Motor phase U
B	V	Motor phase V	Motor phase V
C	W	Motor phase W	Motor phase W
D	Reserved	Do not connect	Do not connect
E	PE	Protective earth	Protective earth
1	Up	Voltage supply	Voltage supply
2	0 V	Reference potential	Reference potential
3	D +	Data + (serial data transmission)	Data + (serial data transmission)
4	D -	Data - (serial data transmission)	Data - (serial data transmission)
5	CLK +	Clock + (serial data transmission)	Clock + (serial data transmission)
6	CLK -	Clock - (serial data transmission)	Clock - (serial data transmission)
7	Depending on the option	Do not connect	Brake -
8	Depending on the option	Do not connect	Brake +

6.2.3 Connection with SF1 hybrid connector (M23)

The connection diagram of the connector depicts the contact end of the connections.

Function
Hybrid motor, brakemotor and signal connection for motors with EnDat 3 interface
Connection type
M23, male, male thread, TE Connectivity – Intercontec products, 923 series, SpeedTec equipment TE series 923, uncoded, 4+5-pin, codes: 22-0173-031-000, 40-A293-000-000, 40-A253-000-000
Connection diagram
 18014430803706123

Motor assignment				
Contact	Signal	Without brake	With BK../BKB../BZ..D brake	With BZ.. brake
A	U	Motor phase U	Motor phase U	Motor phase U
B	V	Motor phase V	Motor phase V	Motor phase V
C	W	Motor phase W	Motor phase W	Motor phase W
D	PE	Protective earth	Protective earth	Protective earth
E	P_SD -	Data - (serial data transmission)	Data - (serial data transmission)	Data - (serial data transmission)
F	Depending on the option	Do not connect	Do not connect	Brake 14
G	Depending on the option	Do not connect	Brake +	Brake 13
H	P_SD +	Data + (serial data transmission)	Data + (serial data transmission)	Data + (serial data transmission)
L	Depending on the option	Do not connect	Brake -	Brake 15

6.2.4 Connection with SF4 hybrid connector (M23)

The connection diagram of the connector depicts the contact end of the connections.

Function
Hybrid motor, brakemotor and signal connection for motors with EnDat 3 interface
Connection type
M23, male, male thread, TE Connectivity – Intercontec products, 723 htec series, SpeedTec equipment, coded Code 4, 7+3-pin – 40-B094-00, 40-A567-00, 40-A570-00
Connection diagram

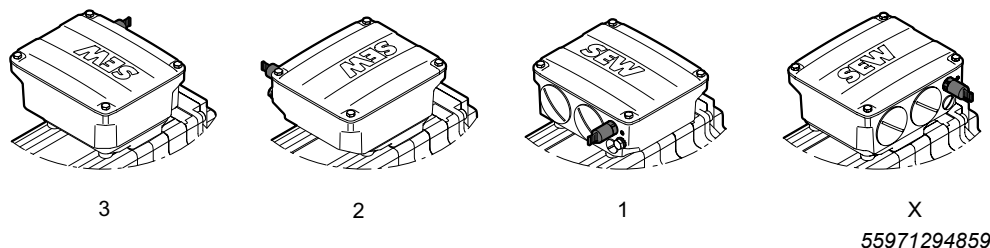
Motor assignment				
Contact	Signal	Without brake	With BK../BKB../BZ..D brake	With BZ.. brake
A	U	Motor phase U	Motor phase U	Motor phase U
B	V	Motor phase V	Motor phase V	Motor phase V
C	W	Motor phase W	Motor phase W	Motor phase W
D	Depending on the option	Do not connect	Brake +	Brake 13
E	Depending on the option	Do not connect	Do not connect	Brake 14
F	Depending on the option	Do not connect	Brake -	Brake 15
PE	PE	Protective earth	Protective earth	Protective earth
1	P_SD +	Data + (serial data transmission)	Data + (serial data transmission)	Data + (serial data transmission)
2	Reserved	Do not connect	Do not connect	Do not connect
3	P_SD -	Data - (serial data transmission)	Data - (serial data transmission)	Data - (serial data transmission)

6.3 Connection to the terminal box

Note that hybrid cables for motors with encoders with the EnDat 2.2 or EnDat 3 interface are not available from SEW-EURODRIVE.

6.3.1 Connector positions for connection with KEE and KEF terminal box

The terminal box can be attached in 4 positions (X, 1, 2, 3), see the following figure. With standard position "X" of the terminal box, the connector is on the right side with view to the motor shaft.



6.3.2 Connection of KEE hybrid connector

The connection diagram of the connector depicts the contact end of the connections.

Function
Hybrid motor, brakemotor and signal connection for motors with EnDat 2.2 interface
Connection type
TE Connectivity – Intercontec products, 615 series, itec locking system
Connection diagram

Motor assignment			
Contact	Signal	Without brake	With BY.. brake
1	Up	Voltage supply	Voltage supply
2	D +	Data + (serial data transmission)	Data + (serial data transmission)
3	D -	Data - (serial data transmission)	Data - (serial data transmission)
4	CLK +	Clock + (serial data transmission)	Clock + (serial data transmission)
5	CLK -	Clock - (serial data transmission)	Clock - (serial data transmission)
6	0 V	Reserved ¹⁾	Reserved ¹⁾
7	0 V	Reference potential	Reference potential
8	–	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	Up	Reserved ¹⁾	Reserved ¹⁾

1) Optional connection of the supply. Connection is connected to the voltage supply in the encoder.

6.3.3 Connection of KEF hybrid connector

The connection diagram of the connector depicts the contact end of the connections.

Function
Hybrid motor, brakemotor and signal connection for motors with EnDat 3 interface
Connection type
TE Connectivity – Intercontec products, 615 series, itec interlocking system
Connection diagram

Motor assignment			
Contact	Signal	Without brake	With BY.. brake
1	P_SD +	Data + (serial data transmission)	Data + (serial data transmission)
2	Reserved	Do not connect	Do not connect
3	Reserved	Do not connect	Do not connect
4	Reserved	Do not connect	Do not connect
5	Reserved	Do not connect	Do not connect
6	Reserved	Do not connect	Do not connect
7	P_SD -	Data - (serial data transmission)	Data - (serial data transmission)
8	Reserved	Do not connect	Do not connect
9	Reserved	Do not connect	Do not connect
10	Reserved	Do not connect	Do not connect
11	–	–	–
12	Up	Reserved ¹⁾	Reserved ¹⁾

1) Optional connection of the supply. Connection is connected to the voltage supply in the encoder.

6.4 Connection technology for motors with encoders and EnDat 2.2 interface

The motors are designed with single-cable technology. Motor and brake power as well as encoders signals are connected using a hybrid cable.

The encoder signals contain the temperature evaluation of the motor.

The motor and brake power are connected via an M23 connector or an M40 connector depending on the current of the motor.

Note that hybrid cables for motors with encoders with the EnDat 2.2 interface are not available from SEW-EURODRIVE.

6.5 Connection technology for motors with encoders and EnDat 3 interface

The motors are designed with single-cable technology. Motor and brake power as well as encoders signals are connected using a hybrid cable.

The encoder signals contain the temperature evaluation of the motor.

The motor and brake power are connected via an M23 connector or an M40 connector depending on the current of the motor.

Note that hybrid cables for motors with encoders with the EnDat 3 interface are not available from SEW-EURODRIVE.

7 Startup

7.1 General information

Observe that encoders with the EnDat 2.2 and EnDat 3 interfaces cannot be evaluated on frequency inverters and controllers from SEW-EURODRIVE. Check the compatibility with inverters and controllers of other manufacturers.

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.

Observe the following points to prevent damage to the encoder due to braking or motor block travel:

- For .H0E, .H1E and .H4F encoders, the maximum permitted acceleration according to the following table applies.
- Only startup the following stand-alone motors or brakemotors in conjunction with the H0E, .H1E or .H4F encoders with a motor-external inertia.
- The drive is not permitted to come to a hard stop.

Motor type	Required external inertia in 10^{-4} kgm^2	
	Stand-alone motor	Brakemotor
CMP40S	0.09	0.37
CMP40M	0.23	0.32
CMP50S	0.1	0.23
CMP50M	0.36	0.25
CMP50L	0.62	0.21
CMP63M	0.22	–
CMP63L	0.35	–
CMP71S	–	0.15
CMP112S	–	195.4
CMP112M	6.7	166.4
CMP112L	18.5	106.4
CMP112H	24.8	76.4
CMP112E	36.1	47.4

Motor type	Maximum permitted acceleration in rad/s^2
CMP../.H0E	100000
CMP../.H1E	100000 CMP112: 12400
CMP../.H4F	100000 CMP112: 12400

7.2 Zero angle setting of the encoder

This chapter explains how to set the rotor zero angle position of the motor with encoders with EnDat 2.2, EnDat 3, HIPERFACE DSL® or Drive-CLiQ interface.

Note that only SEW-EURODRIVE Service may change settings and perform maintenance work on motors with safety encoders. If necessary, contact SEW-EURODRIVE.

For synchronous motors from SEW-EURODRIVE, the zero angle for EH0E, EH1E, AH0E, AH1E, EK0J, AK0J, AH1Q, EH4F and AH4F encoders is adjusted according to the following criteria.

Criteria for commutation offset

Phase U	Open
Phase V	–
Phase W	+
Electrical angle	270°/4.7124 rad

- The current injection was achieved by feeding a DC current into the phases U/V/W according to the diagram above.
- The current to be injected may maximally be 60% – 100% of I_0 .
- In this aligned position the encoder position is set to 0°.

7.3 Startup of encoders with EnDat 2.2 and EnDat 3 interface

Always observe the notes and information in the valid documentation of the inverter when starting up the encoders with EnDat 2.2 and EnDat 3.

If you have any questions, contact the SEW-EURODRIVE Service.

7.4 Evaluation of the PK motor temperature sensor for encoders with EnDat 2.2 and EnDat 3 interface

For the EH4F and AH4F encoders with EnDat 3 interface from Heidenhain supports the conversion of the motor temperature sensor (PK) as Pt1000. The encoders are configured so that they output the correct temperature value directly.

For EH0E, AH0E, EH1E and AH1E encoders with EnDat 2.2 interface from Heidenhain, the encoder-internal temperature evaluation is designed for a KTY 84-130 PTC thermistor. Synchronous servomotors of the CMP and CM3. series are equipped with a PK (Pt1000) motor temperature sensor. Direct output of the measured temperature value for PK is not supported by the encoders. The temperature value is depicted by a representative output value.

For this purpose, the sensor type characteristic curve and the connected sensor type are set to "Pt1000".

The temperature value must therefore be converted accordingly for a correct interpretation of the output value. This can be done in the controller through curve point parameters or a conversion using a polynomial.

Also observe the operating instructions from SEW-EURODRIVE on the use of the PK motor temperature sensor.

Inform yourself from the manufacturer of the controller or encoder evaluation about the interpretation of the temperature output value.

According to the EnDat 2.2 specifications, the sensor type connected to the encoder is stored in the memory of the encoder in the address word 10 and 11 of the parameters.

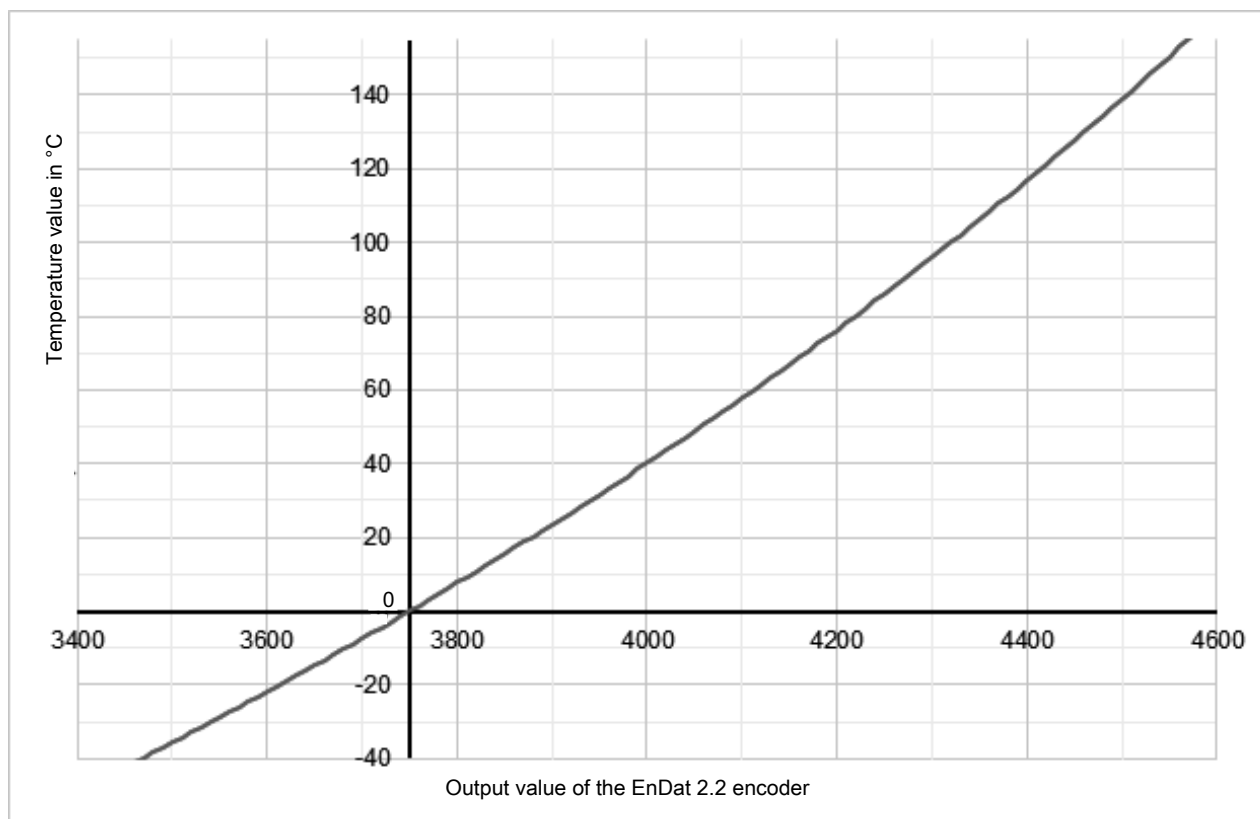
The following polynomials can be used for the calculation of the temperature value T_{PK} :

$$T_{PK} \text{ in } 0.1 \text{ K} = 1.3823 \times 10^{-7} \times A^3 - 1.2005 \times 10^{-3} \times A^2 + 4.6807 \times A - 5.2276 \times 10^3$$

$$T_{PK} \text{ in } ^\circ\text{C} = 0.1 \times (1.3823 \times 10^{-7} \times A^3 - 1.2005 \times 10^{-3} \times A^2 + 4.6807 \times A - 5.2276 \times 10^3) - 273.15$$

A = output value.

The polynomials are valid for the output value $3400 \leq A \leq 4810$.



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7.5 Notes on evaluating the PK motor temperature sensor for encoders with EnDat 2.2 and EnDat 3 interface

Evaluation	Value/note	EnDat 2.2	EnDat 3
Measuring accuracy	±6 K	✓	✓
Total delay of the temperature evaluation	Maximum 160 ms	✓	✓
Output values ≤ 1151	Possible short circuit at sensor input	✓	–
Output values > 6000	High-impedance sensor input (e.g. in the event of wire break)	✓	–

The EH0E, EH1E, AH0E and AH1E encoders with EnDat 2.2 interface as well as EH4F and AH4F with EnDat 3 interface evaluate the PK motor temperature sensor of the motor and provide the temperature values without additional cabling.

A protection model in an inverter is used for thermal motor protection. If the third-party inverter supports such a protection model for a motor from SEW-EURODRIVE, corresponding parameters must be set in the third-party inverter. Motor protection is not set automatically on third-party inverters during startup.

Usually, a warning threshold for preliminary information and a fault threshold for triggering a fault can be set in most inverters for temperature monitoring, regardless of a motor protection model.

Observe the startup information third-party inverter.

If you have questions regarding the motor parameters, contact SEW-EURODRIVE.

8 Encoder technical data

Encoders with electronic interface have internal temperature monitoring. SEW-EURODRIVE recommends using the temperature monitoring to avoid errors and failures due to excessively high temperatures.

Note that in case of emergency stop braking operations from speeds $> 20 \text{ min}^{-1}$, the encoders can output warnings or errors if the negative acceleration exceeds certain limit values. These messages must be checked or acknowledged before restart.

8.1 Encoder properties

8.1.1 Overview of encoder properties

Type designation	Interface	Encoder type	Capability class	FS	EX
EH0E	EnDat 2.2	Single-turn	High class	–	–
AH0E	EnDat 2.2	Multi-turn	High class	–	–
EH1E	EnDat 2.2	Single-turn	High class	✓	–
AH1E	EnDat 2.2	Multi-turn	High class	✓	–
EH4F	EnDat 3	Single-turn	High class	✓	–
AH4F	EnDat 3	Multi-turn	High class	✓	–

✓ Available
– Not available

8.1.2 Overview of technical properties

Type designation	Interface	Resolution single-turn	Resolution multi-turn	System accuracy	Temperature of the motor environment	Brake combinations
EH0E	EnDat 2.2	19 bit	–	$\pm 120''$	$-40 - 60 \text{ }^{\circ}\text{C}$	BK, BKB
AH0E	EnDat 2.2	19 bit	12 bit	$\pm 120''$	$-40 - 60 \text{ }^{\circ}\text{C}$	BK, BKB
EH1E	EnDat 2.2	19 bit	–	$\pm 65''$	$-40 - 60 \text{ }^{\circ}\text{C}$ FS encoder: $-20 - 40 \text{ }^{\circ}\text{C}$	BK, BKB, BP, BY, BZ, BZ..D
AH1E	EnDat 2.2	19 bit	12 bit	$\pm 65''$	$-40 - 60 \text{ }^{\circ}\text{C}$ FS encoder: $-20 - 40 \text{ }^{\circ}\text{C}$	BK, BKB, BP, BY, BZ, BZ..D
EH4F	EnDat 3	23 bits	–	$\pm 40''$	$-40 - 60 \text{ }^{\circ}\text{C}$	BK, BKB, BZ..D, BZ, BY, BP
AH4F	EnDat 3	23 bits	12 bits	$\pm 40''$	$-40 - 60 \text{ }^{\circ}\text{C}$	BK, BKB, BP, BY, BZ, BZ..D

8.1.3 Overview of encoders and motors

Type designation	Interface	CMP	CM3C	CM3P	CM3G	ECM3C
EH0E	EnDat 2.2	40	–	–	–	–
AH0E	EnDat 2.2	40	–	–	–	–
EH1E	EnDat 2.2	50 – 112	63 – 100	63 – 100	63 – 100	–
AH1E	EnDat 2.2	50 – 112	63 – 100	63 – 100	63 – 100	–
EH4F	EnDat 3	50, 63, 112	63 – 100	63 – 100	63 – 100	–
AH4F	EnDat 3	50, 63, 112	63 – 100	63 – 100	63 – 100	–

8.1.4 Overview of encoders and inverters

Type designation	Interface	MOVI-C® control cabinet technology	MOVI-C® decentralized technology	Third-party inverters
EH0E	EnDat 2.2	–	–	✓
AH0E	EnDat 2.2	–	–	✓
EH1E	EnDat 2.2	–	–	✓
AH1E	EnDat 2.2	–	–	✓
EH4F	EnDat 3	–	–	✓
AH4F	EnDat 3	–	–	✓

✓ Available
 – Not available

8.1.5 Overview of encoders and connection technology

Type designation	Interface	M23 hybrid plug connector	M40 hybrid plug connector	M58 power and M23 signal	Terminal box with terminal strip	Terminal box with connector
EH0E	EnDat 2.2	✓	–	–	–	–
AH0E	EnDat 2.2	✓	–	–	–	–
EH1E	EnDat 2.2	✓	✓	–	–	✓
AH1E	EnDat 2.2	✓	✓	–	–	✓
EH4F	EnDat 3	✓	✓	–	–	✓
AH4F	EnDat 3	✓	✓	–	–	✓

✓ Available
 – Not available

8.1.6 Summary of encoders with electronic nameplates

Type designation	Interface	Electronic nameplate
EH0E	EnDat 2.2	ET3001
AH0E	EnDat 2.2	ET3001
EH1E	EnDat 2.2	ET3001
AH1E	EnDat 2.2	ET3001
EH4F	EnDat 3	ET6001
AH4F	EnDat 3	ET6001

The electronic nameplate allows for the gearmotor to be identified for asset management and quick startup on a third-party inverter. Implementation in the application is required for use (controller and/or inverter). For further information, refer to the "Digital third-party encoders with electronic nameplate" manual.

8.2 Technical data for EnDat 2.2 – EH0E, AH0E

Encoders		EH0E	AH0E
Manufacturer		Heidenhain	
Manufacturer's designation		ECI 1119	EQI 1131
Interface		EnDat 2.2	
Supply voltage	V_B	DC 3.6 – 14 V	
Current consumption	$I_{btyp} (V_B = 5 \text{ V})$	95 mA	115 mA
Power consumption	$P_{max} (V_{B_{min}} - V_{B_{max}})$	650 – 700 mW	750 – 850 mW
Processing time (delay)	t_{cal}	$\leq 5 \mu\text{s}$	
Clock frequency		$\leq 16 \text{ MHz}$	
Resolution	Single-turn	19 bits (524 288 position values/revolution)	
Accuracy	Encoder system	$\pm 120''$	
speed	n_{max}	15000 min ⁻¹	12000 min ⁻¹
Angular acceleration	a_{max}	$\leq 1 \times 10^5 \text{ rad/s}^2$	
Installation altitude		$\leq 6000 \text{ m}$	
Working temperature ¹⁾	T_A (motor with encoder)	-40 to 60 °C	
	T_E (encoder)	-40 to 110 °C	
	$T_{E_{max}}$ (encoder error message)	125°C $\pm 1\text{K}$	
Storage temperature	T_S (encoder)	see T_E	
Service life ²⁾	t_{LT}	40 000 h operation, maximum 2000 emergency stop braking actions	
Connection technology ³⁾		Hybrid connector (single-cable technology) SE1: M23, EH0E, AH0E, EH1E and AH1E with BK, BKB, BZ..D (TE code 13)	
		Terminal box (multi-cable technology) KEE: Motor power and brake with cable gland, encoder with signal connector TE series 315, iTEC interlocking system	
Cable length		$\leq 100 \text{ m}$	
Functional safety		–	
Explosion protection		–	
Electronic nameplate		ET3001	

- 1) The specifications apply to the respective option installed in the motor. Observe potential constraints or derating by the motor, gear-motor, or other options. Monitor encoders using electronic temperature detection in order to prevent malfunctions.
- 2) If using the encoder as a safety encoder, observe the maximum service life of 20 years.
- 3) Observe that SEW-EURODRIVE does not offer cables for encoders with EnDat 2.2.

8.3 Technical data for EnDat 2.2– EH1E, AH1E

Encoders		EH1E	AH1E
Manufacturer		Heidenhain	
Manufacturer's designation		ECI 1319	EQI 1331
Interface		EnDat 2.2	
Supply voltage	V_B	DC 3.6 – 14 V	
Current consumption	$I_{btyp} (V_B = 5 \text{ V})$	95 mA	115 mA
Power consumption	$P_{max} (V_{B_{min}} - V_{B_{max}})$	650 – 700 mW	750 – 850 mW
Processing time (delay)	t_{cal}	$\leq 5 \mu\text{s}$	
Clock frequency		$\leq 16 \text{ MHz}$	
Resolution	Single-turn	19 bits (524 288 position values/revolution)	
Accuracy	Encoder system	$\pm 65''$	
speed	n_{max}	15000 min ⁻¹	12000 min ⁻¹
Angular acceleration	a_{max}	$\leq 1 \times 10^5 \text{ rad/s}^2$	
Installation altitude		$\leq 6000 \text{ m}$	

Encoders		EH1E	AH1E
Working temperature ¹⁾	T _A (motor with encoder)	-40 to 60 °C Safety encoder: -20 – 40 °C	
	T _E (encoder)	-40 to 115 °C	
	T _{E_max} (encoder error message)	130°C ±1K	
Storage temperature	T _S (encoder)	see T _E	
Service life ²⁾	t _{LT}	40 000 h operation, maximum 2000 emergency stop braking actions For CM3G63 to CM3G80, the conditions listed below for bearing service life apply to safety encoders.	
Connection technology ³⁾		Hybrid connector (single-cable technology) SE1: M23, EH0E, AH0E, EH1E and AH1E with BK, BKB, BZ..D (TE code 13) Terminal box (multi-cable technology) KEE: Motor power and brake with cable gland, encoder with signal connector TE series 315, ITEC interlocking system	
Cable length		≤ 100 m	
Functional safety		SIL 2/PL d (optional)	
Explosion protection		–	
Electronic nameplate		ET3001	

1) The specifications apply to the respective option installed in the motor. Observe potential constraints or derating by the motor, gear-motor, or other options. Monitor encoders using electronic temperature detection in order to prevent malfunctions.

2) If using the encoder as a safety encoder, observe the maximum service life of 20 years.

3) Observe that SEW-EURODRIVE does not offer cables for encoders with EnDat 2.2.

Bearing service life for CM3G63 to CM3G80 motors with EH1E, AH1E, AH1Q, EH4F or AH4F

The B-side bearing must be replaced after 20 000 h.

However, the B-side bearing must be replaced earlier for the following gearmotors:

- P7.GM42-0028.. CM3G80M-.A-E.. after 16000 h
- P7.GM42-038X.. CM3G80M-.A-E.. after 17000 h
- P7.GM42-0055.. CM3G80M-.A-E.. after 15000 h
- P7.GM42-0040.. CM3G80M-.A-E.. after 18500 h
- P..GM41-0010.. CM3G80M-.A-E.. after 12500 h

The following conditions apply to the bearing service life:

- 60% cdf
- Thermal rms speed of the motor $n_{e,eff} \leq 2000 \text{ min}^{-1}$
- Compliance with the permitted output torques according to the configuration

For $ED > 60\%$ and for $n_{e,eff} > 2000 \text{ min}^{-1}$, contact SEW-EURODRIVE.

8.4 Technical data EnDat 3 – EH4F, AH4F

Encoders		EH4F	AH4F
Manufacturer		Heidenhain	
Manufacturer's designation		ECI 1323	EQI 1335
Interface		EnDat 3	
Supply voltage	V_B	DC 4 to 14 V	
Current consumption after initialization	$I_{btyp} (V_B = 5 \text{ V})$	n.s.	n.s.
	$I_{btyp} (V_B = 12 \text{ V})$	25 mA	33 mA
	$I_{btyp} (V_B = 24 \text{ V})$	–	–
Current consumption on initialization	$I_{init_max} (t_{init})$	n.s.	n.s.
Power consumption	$P_{max} (V_{B_min} - V_{B_max})$	≤ 530 mW	≤ 660 mW
Power consumption	$P_{max} (V_B = 28.8 \text{ V})$	–	–
Processing time (delay)	t_{cal}	22.9 μs	
Clock frequency		n.s.	n.s.
Resolution	Single-turn	23 bits	
	Multi-turn	–	12 bits
Accuracy	Encoder system	±40"	
Output frequency for position value		n.s.	n.s.
speed	n_{max}	15000 min ⁻¹	12000 min ⁻¹
	n_{max_Reset} (when switching on after a reset)	n.s.	n.s.
Angular acceleration	a_{max}	100000 rad/s ²	
Vibrations EN 60068-2-6		≤ 400 m/s ² (Hz)	
Shocks EN 60068-2-27 (6 ms)		≤ 2000 m/s ²	
Installation altitude		≤ 6000 m	
Working temperature ¹⁾	T_A (motor with encoder)	-40 to 60 °C	
	T_E (encoder)	-40 to 115 °C	
	T_{E_max} (encoder error message)	126°C ±1K	
Storage temperature	T_S (encoder)	see T_E	
Service life ²⁾	t_{LT}	40 000 h of operation Maximum 2000 emergency stop braking actions For CM3G63 to CM3G80, the conditions listed below for bearing service life apply to safety encoders.	
Connection technology ³⁾		Hybrid connector (single-cable technology) SF1, SF4: M23, EH4F, AH4F with BK, BKB, BZ, BZ..D SFB: M40, EH4F, AH4F with BK, BZ, BZ..D Terminal box (multi-cable technology) KEF: Motor power and brake with cable gland, encoder with signal connector TE series 315, iTEC interlocking system	
Cable length		≤ 100 m at 12.5 Mbit/s ≤ 40 m at 25 Mbit/s	
Functional safety		SIL 2/PL d (optional)	
Explosion protection		–	
Electronic nameplate		ET6001	

1) The specifications apply to the respective option installed in the motor. Observe potential constraints or derating by the motor, gear-motor, or other options. Monitor encoders using electronic temperature detection in order to prevent malfunctions.

2) If using the encoder as a safety encoder, observe the maximum service life of 20 years.

3) Observe that SEW-EURODRIVE does not offer cables for encoders with EnDat 3.

Bearing service life for CM3G63 to CM3G80 motors with EH1E, AH1E, AH1Q, EH4F or AH4F

The B-side bearing must be replaced after 20 000 h.

However, the B-side bearing must be replaced earlier for the following gearmotors:

- P7.GM42-0028.. CM3G80M-.A-E.. after 16000 h
- P7.GM42-038X.. CM3G80M-.A-E.. after 17000 h
- P7.GM42-0055.. CM3G80M-.A-E.. after 15000 h
- P7.GM42-0040.. CM3G80M-.A-E.. after 18500 h
- P..GM41-0010.. CM3G80M-.A-E.. after 12500 h

The following conditions apply to the bearing service life:

- 60% cdf
- Thermal rms speed of the motor $n_{e,eff} \leq 2000 \text{ min}^{-1}$
- Compliance with the permitted output torques according to the configuration

For $ED > 60\%$ and for $n_{e,eff} > 2000 \text{ min}^{-1}$, contact SEW-EURODRIVE.

9 Contacting SEW-EURODRIVE

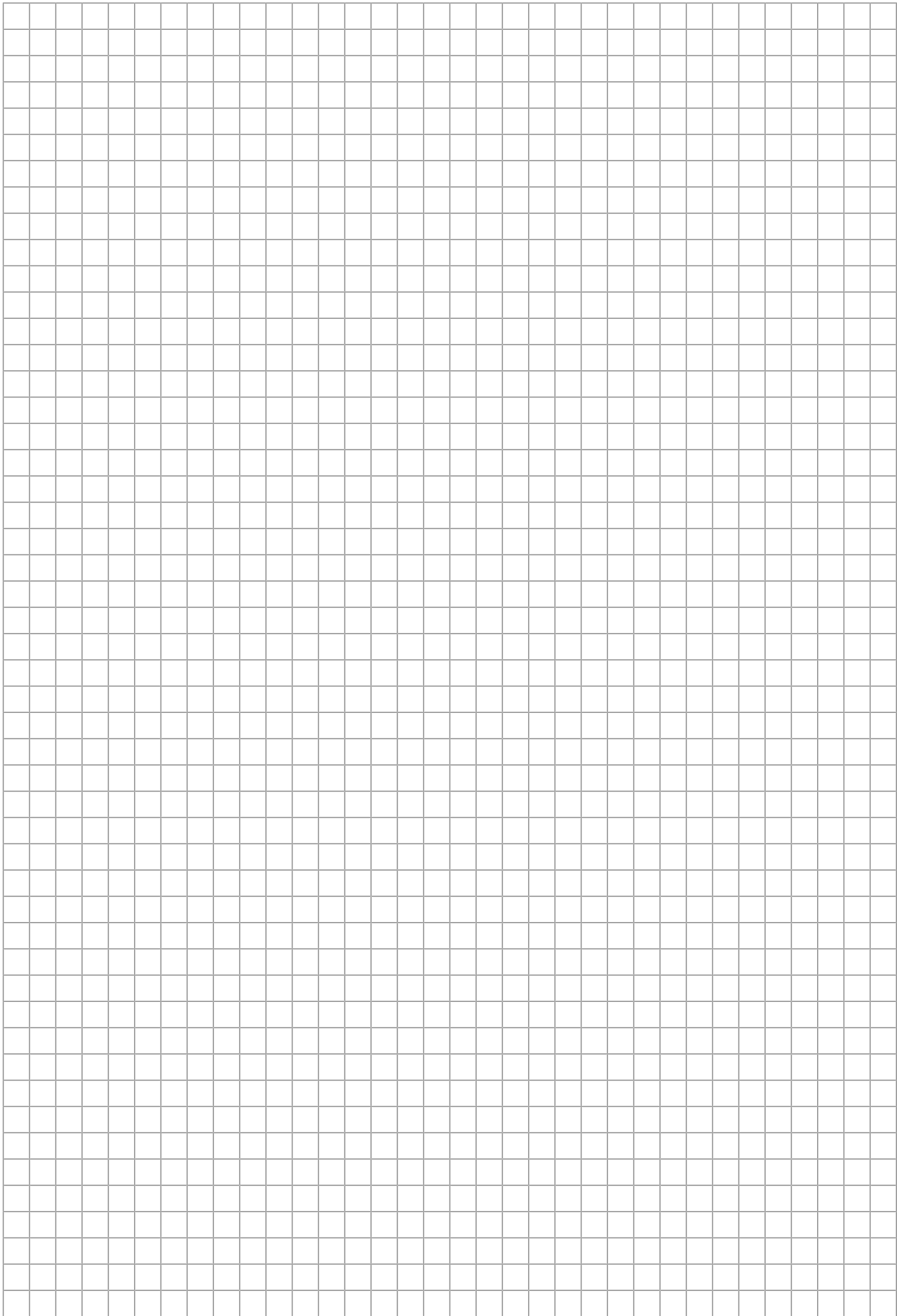
You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

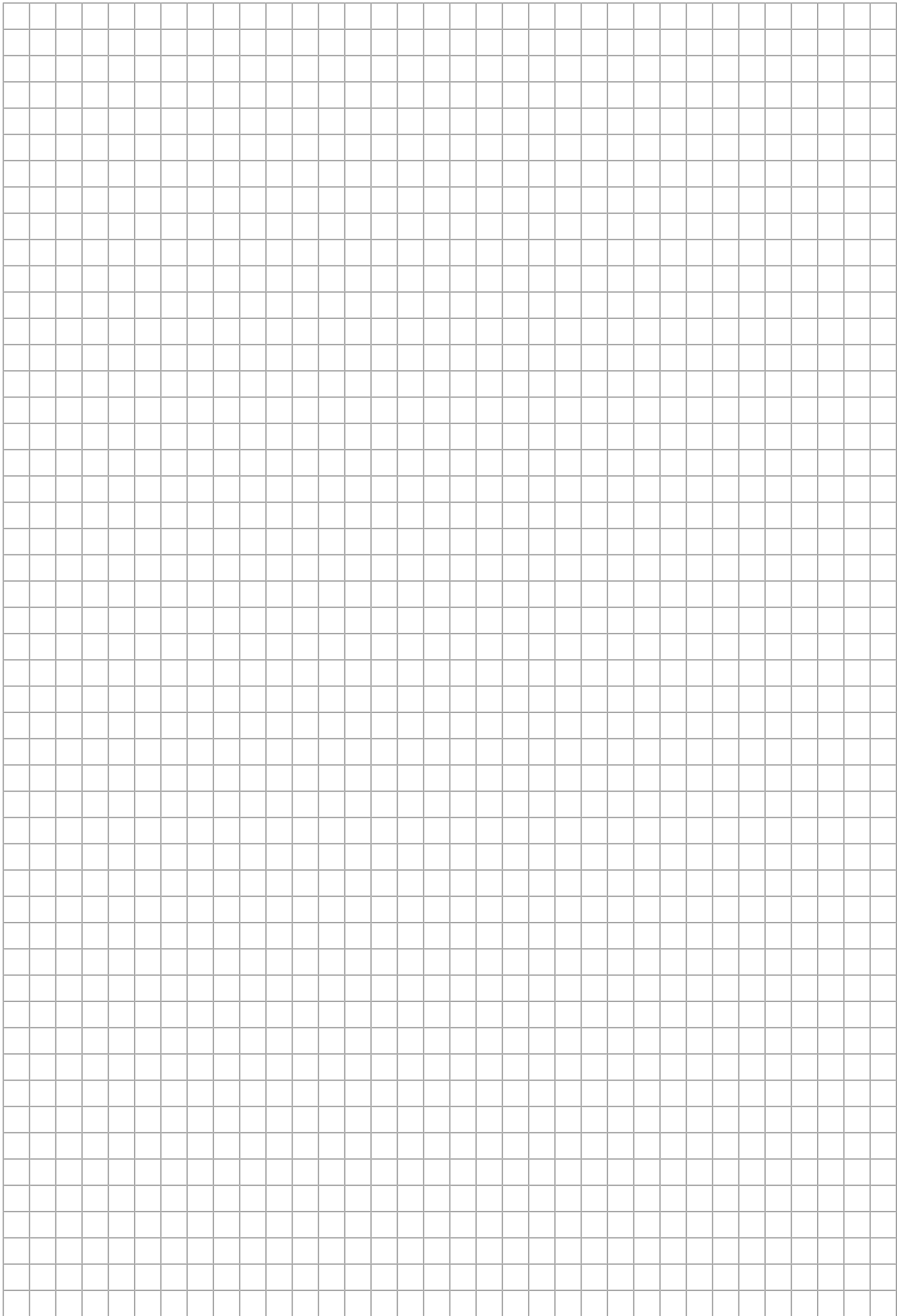
<https://www.sew-eurodrive.de/contacts-worldwide>

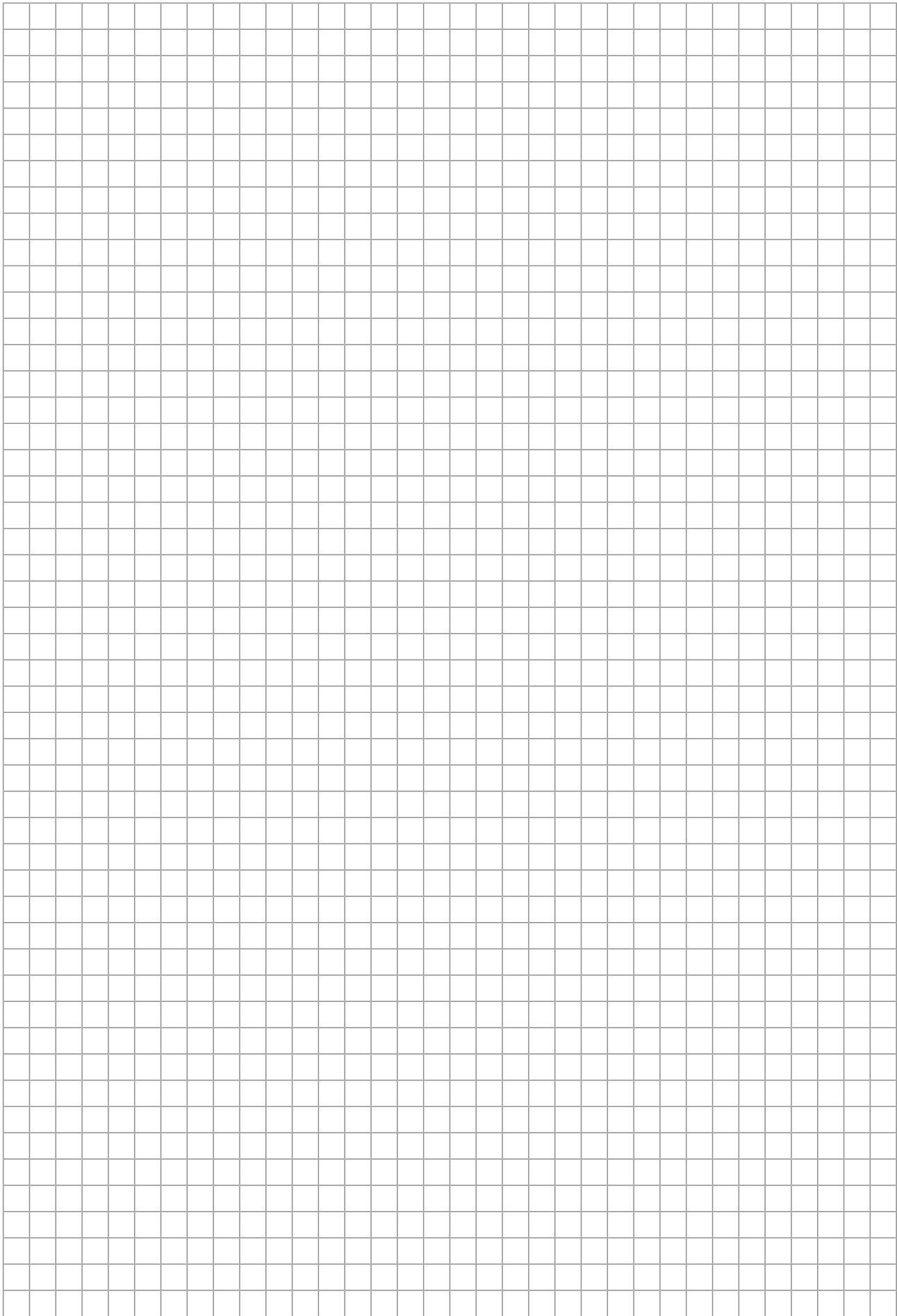


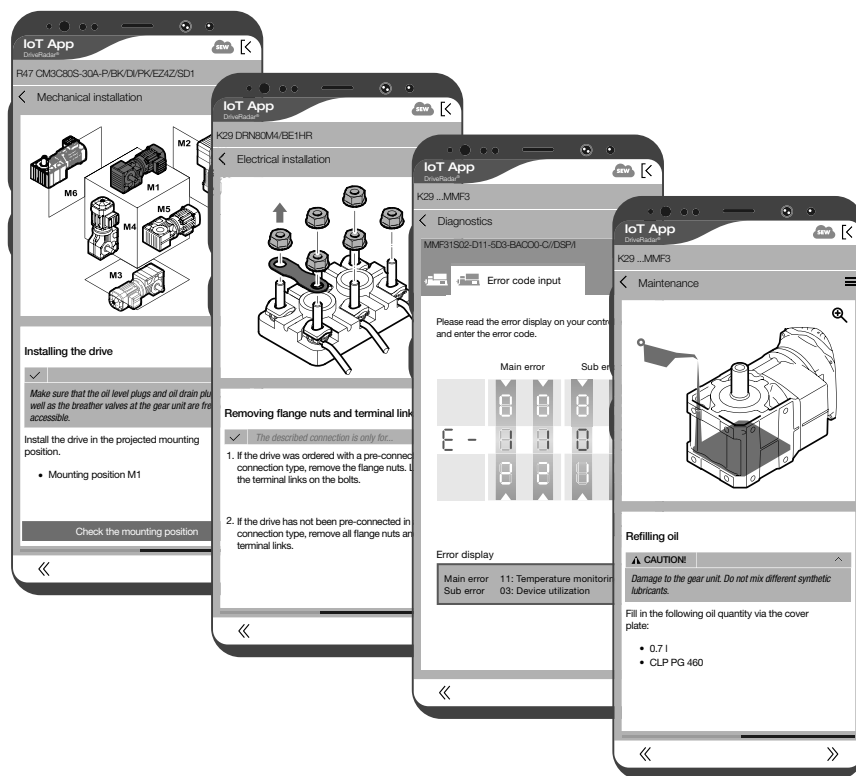
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