



Addendum to the operating instructions



Encoders with HIPERFACE DSL[®], EnDat 2.2, EnDat 3 and DRIVE-CLiQ interfaces
CM3C., CM3P., CM3G..



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1 General information

1.1 How to use this documentation

This addendum to the operating instructions contains special information on encoders with the interfaces HIPERFACE DSL®, EnDat 2.2, and DRIVE-CLiQ for the CM3C..., CM3P..., CM3G... motors

In addition to the addendum to the operating instructions at hand, the following operating instructions apply to the motors listed above:

- "Synchronous servomotors – CM3C63 – 100 / CM3P63 – 100" operating instructions
- "PxG® integrated precision planetary gearmotors – PxG® CM3G.. series" 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 amendments and conditions for the use of CM3C..., CM3P..., and CM3G.. motors with encoders with HIPERFACE DSL®, EnDat 2.2, EnDat 3, and DRIVE-CLiQ interfaces.

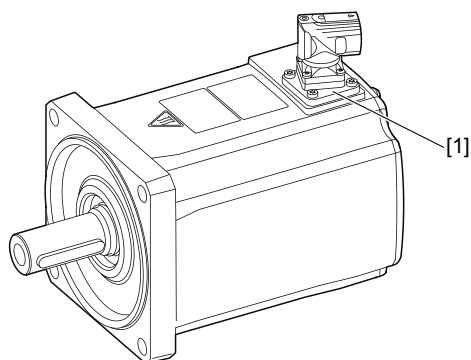
1.3 Other applicable documentation

Observe the following additional documents:

- When the encoders are designed as safety encoders:
 - Addendum to the "Safety encoders and safety brakes – CMP..., CMPZ..., CM3C..., ECM3C..., CM3P..., CM3G.. – functional safety" operating instructions
- For more information on Heidenhain encoders, refer to the Heidenhain document "Brochure on measuring devices for electric drives".

2 Basic structure

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



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[1] Hybrid plug connector

3 Motor nameplates

The following figures show examples of nameplates of a CM3C.. servomotor with AH1E encoder:

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[1]

CM3C80S-60A-K/PK/BK/AH1E/SE1

[2]

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Mo	10,1 Nm	VT nC	6000r/min	IM	B5
Mpk	30,3 Nm	n max	7200 r/min	IP	65
Io	15,0 A	Up	271 V	kg	13,570
Imax	50,7A	Ta	-20..40°C	Th.Kl.	155(F)
Usys	400V	Mbr	18 Nm	TENV	
		Ubr	21,6-26,4 DC V		

3~IEC60034 22935908 Made in Germany

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- [1] Type designation
- [2] Information about encoder and plug connector

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CM3C80S-60A-K/PK/BK/AH1E/SE1

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4 Type designation example

The following table shows the example of a type designation:

Example: CM3C80S-60A-K/PK/BK/AH1E/SE1		
Synchronous servomotor	CM3C80	Flange-mounted motor size 80
Length	S	Short
Rated speed and system voltage	60 A	6000 min ⁻¹ , 400 V
Shaft design	K	Shaft with key
Standard equipment temperature sensor	/PK	PK temperature sensor
Mechanical attachments	/BK	BK.. permanent magnet brake
Encoder motor option	/AH1E	Absolute encoder, EnDat2.2 interface (multi-turn)
Motor connection option	/SE1	M23 motor plug connector, only motor-side female connector, hybrid plug connector for motor, brake, and AH1E encoder

5 Designs and options

5.1 Mechanical attachments

Designation	Description
/BK	Permanent-magnet holding brake
/BKB	Permanent-magnet holding brake
/BZ ¹⁾	Spring-loaded holding brake with increased working capacity
/BZ..D ¹⁾	Spring-loaded holding brake with increased working capacity for operation on direct DC voltage supply
/HR	Manual brake release of BZ..., BZ..D, and BZ..Z brake Automatic re-engaging

1) Optionally available as a safety brake.

5.2 Encoders

Designation	Description	Capability class
/EK0J ¹⁾	Single-turn encoder, HIPERFACE DSL®	High class
/AK0J ¹⁾	Multi-turn encoder, HIPERFACE DSL®	High class
/AH1Q ²⁾	Multi-turn encoder, DRIVE-CLiQ	High class
/EH0E ³⁾	Single-turn encoder, EnDat 2.2	High class
/AH0E ³⁾	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) Safety encoder available on request.

2) Optionally available as a safety encoder.

3) In preparation.

5.3 Connection options

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
/SE4	M23 motor/brakemotor hybrid connector (BK..., BZ..., BZ...D) (for power and data) for EnDat 2.2 Connector on the motor side
/SEB	M40 motor/brakemotor hybrid connector (BK..., BZ..., BZ...D) (for power and data) for EnDat 2.2
/SJ1	M23 motor/brakemotor hybrid connector (power and data) for HIPERFACE® DSL Connector on the motor side
/SJB	M40 motor/brakemotor hybrid connector (power and data) for HIPERFACE® DSL Connector on the motor side
/SQ1	M23 motor/brakemotor connector and M23 DRIVE-CLiQ sig- nal connector Connector on the motor side, plug-in motor and encoder cable
/SQB	M40 motor/brakemotor connector and M40 DRIVE-CLiQ sig- nal connector Connector on the motor side, plug-in motor and encoder cable
/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
/SFB	Hybrid connector motor/brakemotor (BK..., BZ..., BZ...D) M40 (power and data) for EnDat 3 Connector on the motor side

6 Electrical installation

6.1 Notes on connection via plug connectors

The cables are connected to adjustable right-angle connectors.

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.

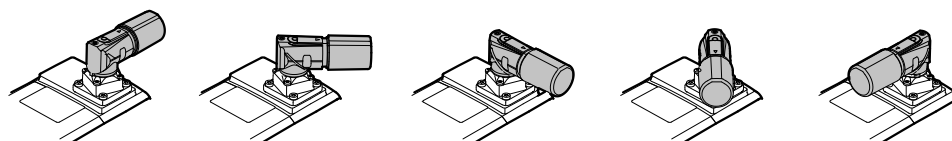
- Observe the maximum possible cable length and strain relief.
- To prevent interference with the motor protection devices and/or the brake controls, unshielded cables must not be routed alongside pulsed power cables in the same cable duct or close to each other.

6.2 Connection with plug connectors

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

6.2.1 Connector positions SE1, SE4, SEB, SJ1, SJB, SF1, SF4 and SFB

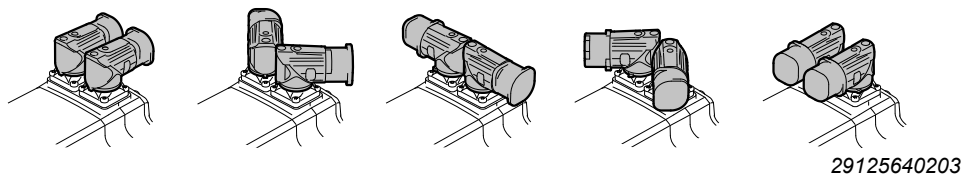
Right-angle connectors SE1, SE4, SEB, SJ1, SJB, SF1, SF4 and SFB can be aligned horizontally in any desired position. The following figure illustrates an example of various plug-in connector alignments:



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6.2.2 Connector positions SQ1 and SQB

Right-angle plug connectors SQ1 and SQB can be aligned horizontally in any desired position. The following figure illustrates an example of various plug connector alignments:



6.2.3 Connection with SJ1 hybrid connector (M23)

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

Function	
Hybrid connection for motor, brakemotor, and signal for motors with HIPERFACE® DSL interface	
Connection type	
M23, male, external 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
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	PE	Protective earth	Protective earth
E	D -	Data - (serial data transmission)	Data - (serial data transmission)
F	PE	Protective earth (encoder)	Protective earth (encoder)
G	Depending on the option	Do not connect	Brake +
H	D +	Data + (serial data transmission)	Data + (serial data transmission)
L	Depending on the option	Do not connect	Brake -

6.2.4 Connection with SJB hybrid connector (M40)

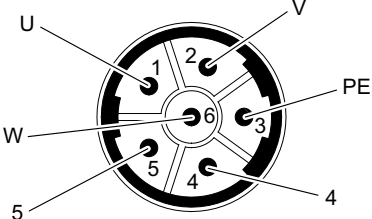
The connection diagram of the connector depicts the contact end of the connections.

Function		
Hybrid connection for motor, brakemotor, and signal for motors with HIPERFACE® DSL interface		
Connection type		
M40, male, external thread, TE Connectivity – Intercontec products, 940 series, SpeedTec equipment TE series 740, uncoded, 5+4+6-pin, codes: H86E502NN00000100000, 40-A746-000-000, 40-A749-000-000		
Connection diagram		
Motor assignment		
Contact	Signal	With BK../BZ..D brake
+	Brake +	Brake +
-	Brake -	Brake -
1	Reserved	Do not connect
2	Reserved	Do not connect
PE	PE	Protective earth
U	U	Motor phase U
V	V	Motor phase V
W	W	Motor phase W
N	Reserved	Do not connect
H	D +	Data + (serial data transmission)
L	D -	Data - (serial data transmission)

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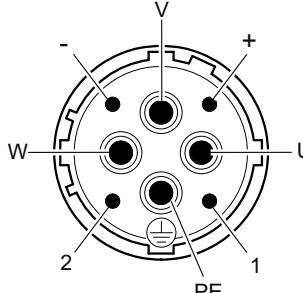
6.2.5 Connecting SQ1 power plug connectors (M23)

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

Function			
Motor connection for motors with DRIVE-CLiQ interface			
Connection type			
M23, male, male thread, TE Connectivity – Intercontec products, 923 series, SpeedTec equipment TE series 923, uncoded, 6-pin, codes: 22-0093-031-P00, 40-A080-000-000, 40-A079-000-000			
Connection diagram			
			
Motor assignment			
Contact	Signal	Without brake	With BK..., BKB..., BZ...D brake
1	U	Motor phase U	Motor phase U
2	V	Motor phase V	Motor phase V
3	PE	Protective earth	Protective earth
4	Depending on the option	Do not connect	Brake +
5	Depending on the option	Do not connect	Brake -
6	W	Motor phase W	Motor phase W

6.2.6 Connecting SQB power plug connectors (M40)

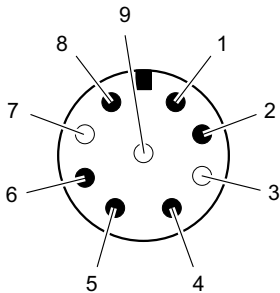
The connection diagram of the connector depicts the contact end of the connections.

Function	
Motor connection for motors with DRIVE-CLiQ interface	
Connection type	
M40, male, male thread, TE Connectivity – Intercontec products, 940 series, SpeedTec equipment TE series 940, uncoded, 4+2-pin, codes: 22-0099-035-000, 40-A083-000-000, 40-A158-000-000	
Connection diagram	
	

Motor assignment			
Contact	Signal	Without brake	With BK../BZ..D brake
+	Depending on the option	Do not connect	Brake +
-	Depending on the option	Do not connect	Brake -
1	Reserved	Do not connect	Do not connect
2	Reserved	Do not connect	Do not connect
PE	PE	Protective earth	Protective earth
U	U	Motor phase U	Motor phase U
V	V	Motor phase V	Motor phase V
W	W	Motor phase W	Motor phase W

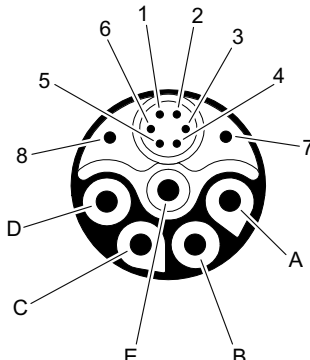
6.2.7 Connecting SQ1/SQB signal plug connectors (M23)

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

Function		
Signal connection for motors with DRIVE-CLiQ interface		
Connection type		
M23, male, male thread, TE Connectivity – Intercontec products, SpeedTec equipment TE series 623, uncoded, 9-pin		
Connection diagram		
		
Motor assignment		
Contact	Signal	with DRIVE-CLiQ
1	TXP	Serial data transmission (transmit)
2	TXN	Serial data transmission (transmit)
3	Reserved	Do not connect
4	0 V	Reference potential
5	RXP	Serial data transmission (receive)
6	RXN	Serial data transmission (receive)
7	Reserved	Do not connect
8	Up	Voltage supply
9	Reserved	Do not connect

6.2.8 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
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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 +

6.2.9 Connecting SE4 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 SE4: TE series 723, code 29, 4+4+6-pole - 40-A887-000-000, 40-A875-000-000, 40-A877-000-000

Connection diagram

Motor assignment				
Contact	Signal	Without brake	With BK../BKB../BZ..D brake	With BZ.. brake
A	Depending on the option	Do not connect	Brake -	Do not connect
B	Depending on the option	Do not connect	Do not connect	Brake 15
C	Depending on the option	Do not connect	Do not connect	Brake 13
D	Depending on the option	Do not connect	Brake +	Brake 14
U	U	Motor phase U	Motor phase U	Motor phase U
V	V	Motor phase V	Motor phase V	Motor phase V
W	W	Motor phase W	Motor phase W	Motor phase W
PE	PE	Protective earth	Protective earth	Protective earth
1	Up	Voltage supply	Voltage supply	Voltage supply
2	0 V	Reference potential	Reference potential	Reference potential
3	D +	Data + (serial data transmission)	Data + (serial data transmission)	Data + (serial data transmission)
4	D -	Data - (serial data transmission)	Data - (serial data transmission)	Data - (serial data transmission)
5	CLK +	Clock + (serial data transmission)	Clock + (serial data transmission)	Clock + (serial data transmission)
6	CLK -	Clock - (serial data transmission)	Clock - (serial data transmission)	Clock - (serial data transmission)

6.2.10 Connection with SEB hybrid connector (M40)

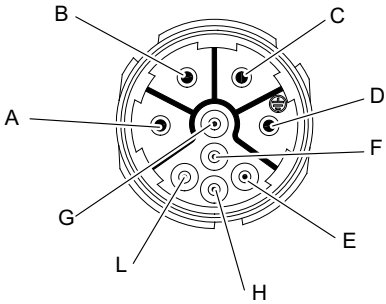
The connection diagram of the connector depicts the contact end of the connections.

Function
Hybrid motor, brakemotor and signal connection for motors with EnDat 2.2 interface
Connection type
M40, male, male thread, TE Connectivity – Intercontec products, series 740, used by SEW-EURODRIVE, SpeedTec equipment, coding ring: none, protected against contact. TE series 740, uncoded, 5+4+6-pin, codes: H86E502NN00000100000, 40-A746-000-000, 40-A749-000-000
Connection diagram

Motor assignment				
Contact	Signal	Without brake	With BK../BZ..D brake	With BZ.. brake
W	W	Motor phase W	Motor phase W	Motor phase W
V	V	Motor phase V	Motor phase V	Motor phase V
U	U	Motor phase U	Motor phase U	Motor phase U
N	Depending on the option	Do not connect	Do not connect	Brake 13
PE	PE	Protective earth	Protective earth	Protective earth
-	Reserved	Do not connect	Do not connect	Do not connect
+	Depending on the option	Do not connect	Do not connect	Brake 15
1(a)	Depending on the option	Do not connect	Brake -	Do not connect
2(a)	Depending on the option	Do not connect	Brake +	Brake 14
1(b)	Up	Voltage supply	Voltage supply	Voltage supply
2(b)	0 V	Reference potential	Reference potential	Reference potential
3	D +	Data + (serial data transmission)	Data + (serial data transmission)	Data + (serial data transmission)
4	D -	Data - (serial data transmission)	Data - (serial data transmission)	Data - (serial data transmission)
5	CLK +	Clock + (serial data transmission)	Clock + (serial data transmission)	Clock + (serial data transmission)
6	CLK -	Clock - (serial data transmission)	Clock - (serial data transmission)	Clock - (serial data transmission)

6.2.11 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
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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

6.2.12 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)

6.2.13 Connection with SFB hybrid connector (M40)

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
M40, male, male thread, TE Connectivity – Intercontec products, 940 series, SpeedTec equipment TE series 740, uncoded, 5+4+6-pin, codes: H86E502NN00000100000, 40-A746-000-000, 40-A749-000-000
Connection diagram

Motor assignment				
Contact	Signal	Without brake	With BK../BZ..D brake	With BZ.. brake
+	U	Do not connect	Brake +	Brake 13
-	V	Do not connect	Do not connect	Do not connect
1	W	Do not connect	Do not connect	Do not connect
2	Depending on the option	Do not connect	Brake -	Brake 15
PE	PE	Protective earth	Protective earth	Protective earth
U	U	Motor phase U	Motor phase U	Motor phase U
V	V	Motor phase V	Motor phase V	Motor phase V
W	W	Motor phase W	Motor phase W	Motor phase W
N	Depending on the option	Do not connect	Do not connect	Brake 14
H	P SD +	Data + (serial data transmission)	Data + (serial data transmission)	Data + (serial data transmission)
L	P SD-	Data - (serial data transmission)	Data - (serial data transmission)	Data - (serial data transmission)

6.3 Connection technology for motors with encoders and EnDat 2.2 or HIPERFACE DSL® interface

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

The encoder signal contains the temperature evaluation of the motor.

The motor and braking 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 EnDat 2.2 and HIPERFACE DSL® are not available from SEW-EURODRIVE.

6.4 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.

6.5 Connection technology for motors with encoders and DRIVE-CLiQ interface

The motors are designed in double-cable technology. The encoder, including its temperature evaluation, is connected via an M23 signal connector. The motor power and the brake are connected via an M23 connector or an M40 connector depending on the current of the motor.

Note that signal cables for DRIVE-CLiQ with signal connector on the motor and signal connector for the inverter are not available from SEW-EURODRIVE. The part numbers of the supplier Heidenhain are shown below for suitable signal cables. Refer to the manufacturer's documentation for the specifications and technical data.

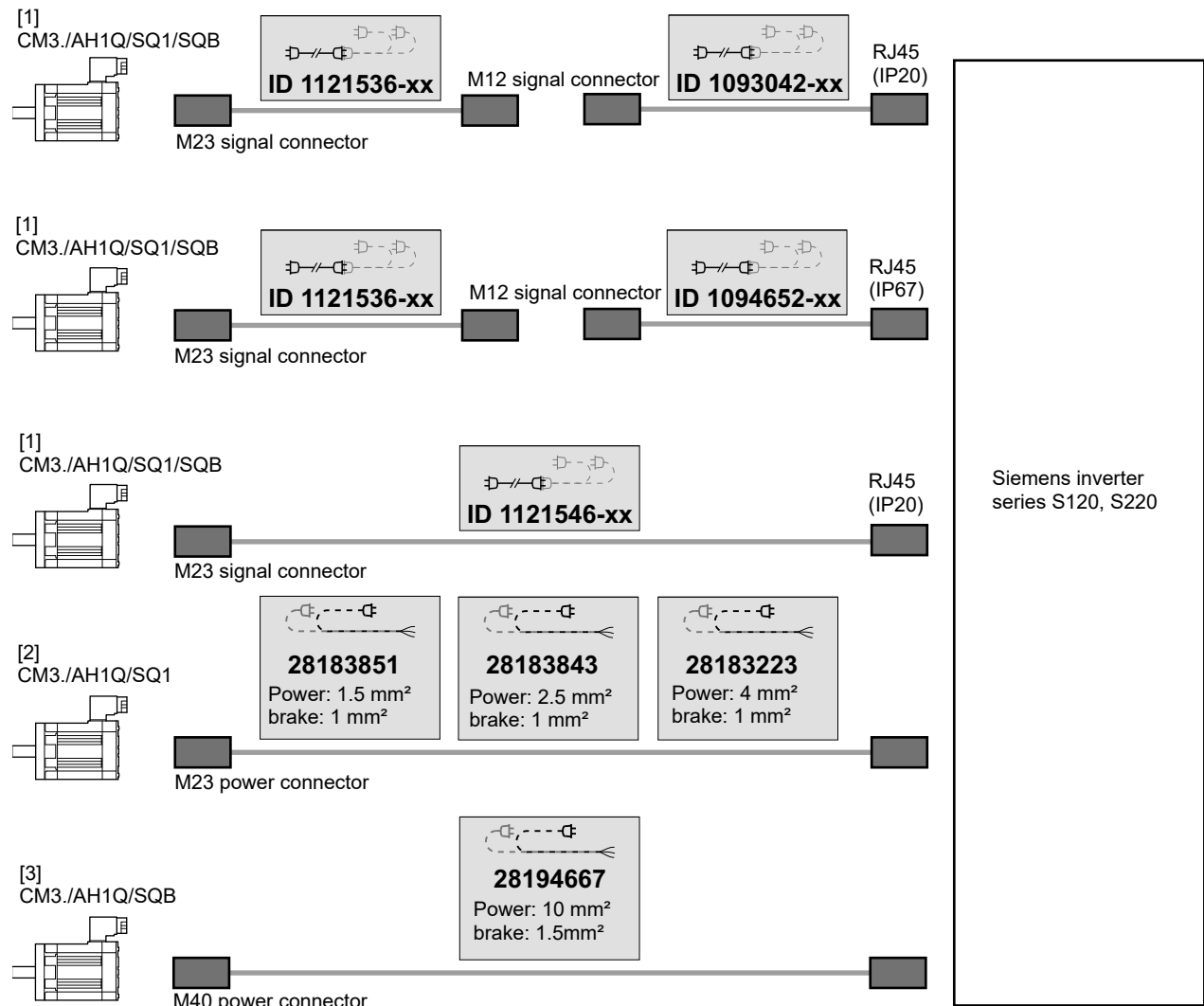
Motor power cables and brake cables are available from SEW-EURODRIVE under the mentioned part numbers and can be connected to the terminals of the inverter. Observe the configuration for the cable cross section depending on the nominal motor current and the cable length.

6.5.1 Cable overview DRIVE-CLiQ

The motors are designed in double-cable technology. The encoder, including its temperature evaluation, is connected via an M23 signal connector. The motor power and the brake are connected via an M23 connector or an M40 connector depending on the current of the motor.

Note that signal cables for DRIVE-CLiQ with signal connector on the motor and signal connector for the inverter are not available from SEW-EURODRIVE. The part numbers of the supplier Heidenhain are shown below for suitable signal cables. Refer to the manufacturer's documentation for the specifications and technical data.

Power cables for motors and brakemotors are available from SEW-EURODRIVE under the mentioned part numbers and can be connected to the terminals of the inverter. Observe the configuration according to the technical data of the motor for the cable cross section depending on the nominal motor current and the cable length.



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- [1]

Motors with M23 signal connector for transferring encoder signals via DRIVE-CLiQ interface, including motor temperature monitoring.
- [2]

Motors with M23 connector for motor and brake power. Unused brake cores must be insulated individually.
- [3]

Motors with M40 connector for motor and brake power. Unused brake cores must be insulated individually.
- ID 1234567-xx

Signal cable from the manufacturer Heidenhain. The length of the cable is defined via the positions xx in the ID, e.g. 03: length = 3 m.
- 12345678

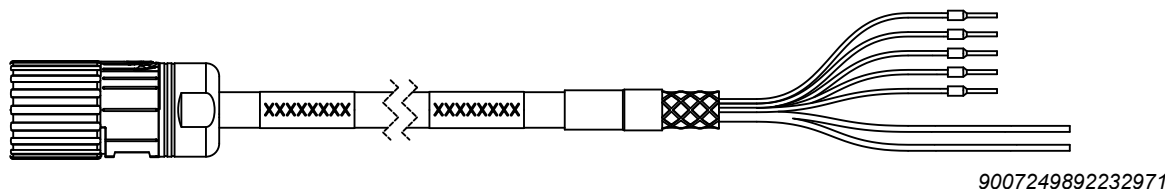
Part number of the power cable for motors and brakemotors by SEW-EURODRIVE.

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6.5.2 Structure of the power cables for motors and brakemotors

Power cables SQ1 – M23 to open end

Figure



Types

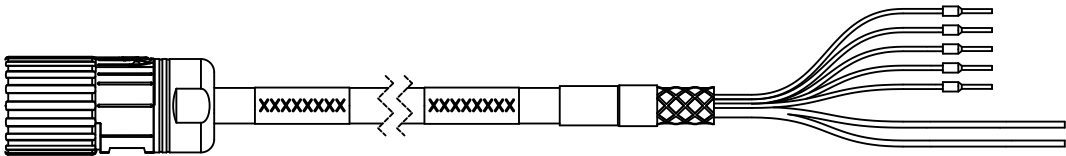
Design and cable cross section	Part number	Installation type	Motor/encoder/connector
$4 \times 1.5 \text{ mm}^2 + 2 \times 1.0 \text{ mm}^2$	28183851	Cable carrier installation	CM3./AH1Q/SQ1
$4 \times 2.5 \text{ mm}^2 + 2 \times 1.0 \text{ mm}^2$	28183843	Cable carrier installation	CM3./AH1Q/SQ1
$4 \times 4.0 \text{ mm}^2 + 2 \times 1.0 \text{ mm}^2$	28183223	Cable carrier installation	CM3./AH1Q/SQ1

Pin assignment

Connection						Evaluation
Connector view	Contact	Signal	Cable/ core color	Signal	Contact	Connector view
	1	U	Black (BK) U/ L1	L1	Open	
	2	V	Black (BK) V/ L2	L2	Open	
	6	W	Black (BK) W/ L3	L3	Open	
	PE	PE	Green-yellow (GNYE)	PE	Open	
	4	Brake +	Black (BK) 1	Brake +	Open	
	5	Brake -	Black (BK) 2	Brake -	Open	

Power cables SQB – M40 to open end

Figure



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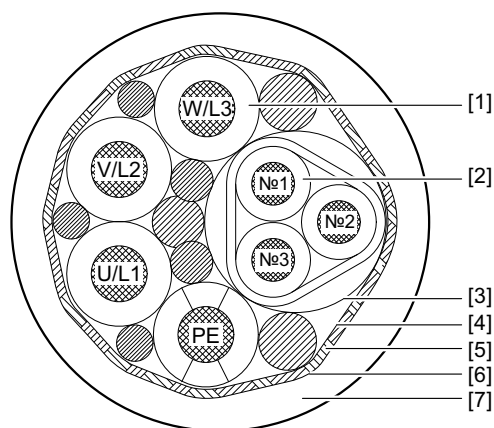
Types

Design and cable cross section	Part number	Installation type	Motor/encoder/con- nector
4 × 10 mm ² + 2 × 1.5 mm ²	28194667	Cable carrier installation	CM3./AH1Q/SQB

Pin assignment

Connection					Evaluation	
Connector view	Contact	Signal	Cable/ core color	Signal	Contact	Connector view
	1	U	Black (BK) U/ L1	L1	Open	
	2	V	Black (BK) V/ L2	L2	Open	
	6	W	Black (BK) W/ L3	L3	Open	
	PE	PE	Green-yellow (GNYE)	PE	Open	
	4	Brake +	Black (BK) 1	Brake +	Open	
	5	Brake -	Black (BK) 3	Brake -	Open	

Cable specification for power cables SQ1 and SQB– M23 to open end



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Mechanical structure

Key	Element	Description
[1]	Cores U/L1, V/L2, W/L3, PE	
	Conductor	Copper bare, class 6 according to EN 60228
	Insulation	Polypropylene
	Color	Black (U/L1, V/L2, W/L3, U1, V2, W3), green-yellow (PE)
	Diameter	1.5 mm ² : approx. 3.0 mm 2.5 mm ² : approx. 3.4 mm 4.0 mm ² : approx. 3.8 mm 10.0 mm ² : approx. 5.8 mm
[2]	Cores no. 1, 2, 3	
	Conductor	Copper bare, class 6 according to EN 60228
	Insulation	Polypropylene
	Twisting	3 cores, twisted
	Color	Black
	Winding	Polyester fleece
	Shielding	Braided wires, tinned, min. optical coverage 85%
	Winding	Polyester film
	Diameter	1.0 mm ² : approx. 2.1 mm 1.5 mm ² : approx. 2.4 mm
[3]	Twisting	4 cores and 1 core bundle twisted with optional filling elements
[4]	Winding	Polyester fleece
[5]	Shielding	Braided wires, tinned, min. optical coverage 85%
[6]	Winding	Polyester fleece

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Key	Element	Description
[7]	Outer cable jacket	
	Material	Polyurethane, flame retardant, halogen-free
	Color	Pastel orange
	Diameter	1.5 mm ² : 11.8 ± 0.3 mm 2.5 mm ² : 13.4 ± 0.3 mm 4.0 mm ² : 14.2 ± 0.3 mm 10.0 mm ² : 14.2 ± 0.4 mm
	Identification	Printed in black 1.5 mm ² : SEW EURODRIVE 25662635 Li9YC11Y-HF 4 G 1,5 + (3 x 1)C E170315 cRUus AWM STYLE 21209 AWM I/II A/B 90°C 1000V FT1 - DESINA - production order no. CE 2.5 mm ² : SEW EURODRIVE 25662643 Li9YC11Y-HF 4 G 2,5 + (3 x 1)C E170315 cRUus AWM STYLE 21209 AWM I/II A/B 90°C 1000V FT1 - DESINA - production order no. CE 4.0 mm ² : SEW EURODRIVE 25662651 Li9YC11Y-HF 4 G 4 + (3 x 1)C E170315 cRUus AWM STYLE 21209 AWM I/II A/B 90°C 1000V FT1 - DESINA - production order no. CE 10.0 mm ² : SEW-EURODRIVE 25662686 Li9YC11Y-HF 4 G 10 + (3 x 1,5)C E170315 cRUus AWM STYLE 21209 AWM I/II A/B 90°C 1000V FT1 - DESINA - production order no. CE

Electrical properties at 20 °C

Property	Description	Test specifications
Conductor resistance	1.0 mm ² : ≤ 19.5 Ω/km 1.5 mm ² : ≤ 13.3 Ω/km 2.5 mm ² : ≤ 7.98 Ω/km 4.0 mm ² : ≤ 4.95 Ω/km 10.0 mm ² : ≤ 1.91 Ω/km	EN 50395
Insulation resistance	min. 500 MΩ × km	EN 50395
Test voltage at 50 Hz 5 min	Core/core: 4.0 kV Core/shield: 4.0 kV	DIN VDE 0472, part 509C
Operating voltage	max. 1000 V _{AC} (UL)	—

Mechanical properties

Property	Description
Use	Use in cable carriers
Minimum bending radius	3 × d for fixed installation 5 × d for multiple movements 7 × d for cable carrier use
Travel speed	max. 300 m/min
Acceleration	Max. 50 m/s ² to 3 m travel distance Max. 30 m/s ² to 5 m travel distance Max. 15 m/s ² to 10 m travel distance Max. 5 m/s ² to 20 m travel distance
Horizontal travel distance	Max. 20 m
Vertical travel distance	Max. 5 m
Bending cycles	min. 5 million
Static tensile load	max. 50 N/mm ²
Dynamic tensile load	max. 20 N/mm ²
Torsion	max. ±30°/m

Physical properties

Property	Description	Test specifications
Operating temperature	Stationary state: -50 °C to +90 °C, +105 °C for 3000 h Moving state: -30°C to +90°C	–
Permitted short-circuit temperature	+150 °C for t = 1 s	–
Oil resistance	Requirement according to EN 50363-10-2	EN 60811-404
Fuel resistance	✓	ISO 6722, T1 and T2
General resistance	Against diluted acids, alkalis, cleaning agents and dusts	–
Flame retardance	✓	IEC 60332-1-2
Halogen free	✓	EN 60754-1
Hydrolysis resistance	Requirement according to EN 50363-10-2	EN 50396
Microbe resistance	Mean maximum value of 200 mgKOH/g according to EN 50363-10-2	EN 50396
Free of paint-wetting impairment substances	✓	VW PV 3.10.7

Other properties

Property	Description
RoHS conformity	Directive 2011/65/EU
REACH	Regulation (EG) No. 1907/2006
CE marking	On the drum label
Approval	UL758 (AWM) style 21209 (sheath) and style 11657 (core)
Mass	1.5 mm ² : 219 kg/km 2.5 mm ² : 283 kg/km 4.0 mm ² : 348 kg/km 10.0 mm ² : 700 kg/km

7 Startup

7.1 General information

The interfaces described in this document cannot be evaluated by inverters by SEW-EURODRIVE. For startup and other activities, refer to the documentation of the inverter used or contact SEW-EURODRIVE.

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.

- The CM3G.. motors with the BKB.. brake and the CM3C.. and CM3P.. motors with the /BK.. and /BZ.. brakes in combination with the /.H1E, /.H4F, or /.H1Q encoders may only be operated with motor-external inertia.
- A maximum acceleration applies to CM3G.. motors with the BKB.. brake, and to CM3C.. and CM3P.. motors with the BZ.. brake in combination with the .K0J or .K0H encoders.
- The drive is not permitted to come to a hard stop.

Motor type	Required external inertia in gm^2
CM3C63S /BZ05 /.H1E	0.05
CM3C63S /BZ05 /.H4F	0.05
CM3C63S /BZ05 /.H1Q	0.05
CM3C63S /BK06 /.H1E	0.1
CM3C63S /BK06 /.H4F	0.1
CM3C63S /BK06 /.H1Q	0.1
CM3P63S /BZ05 /.H1E	0.05
CM3P63S /BZ05 /.H4F	0.05
CM3P63S /BZ05 /.H1Q	0.05
CM3P63S /BK06 /.H1E	0.1
CM3P63S /BK06 /.H4F	0.1
CM3P63S /BK06 /.H1Q	0.1
CM3P63M /.H1E	0.021
CM3P63M /.H4F	0.021
CM3P63M /.H1Q	0.021
CM3P63M /BK06 /.H1E	0.006
CM3P63M /BK06 /.H4F	0.006
CM3P63M /BK06 /.H1Q	0.006
CM3P63L /.H1E	0.048
CM3P63L /.H4F	0.048
CM3P63L /.H1Q	0.048
CM3P71S /BZ1 /.H1E	0.21
CM3P71S /BZ1 /.H4F	0.21

Motor type	Required external inertia in gm^2
CM3P71S /BZ1 /.H1Q	0.21
CM3P71S /BK1 /.H1E	0.24
CM3P71S /BK1 /.H4F	0.24
CM3P71S /BK1 /.H1Q	0.24
CM3P71M /BZ1 /.H1E	0.11
CM3P71M /BZ1 /.H4F	0.11
CM3P71M /BZ1 /.H1Q	0.11
CM3P71M /BK1 /.H1E	0.14
CM3P71M /BK1 /.H4F	0.14
CM3P71M /BK1 /.H1Q	0.14
CM3G71S/BKB /.H1E	0.014
CM3G71S/BKB /.H4F	0.014
CM3G71S/BKB /.H1Q	0.014

Motor type	Maximum permitted acceleration in rad/s^2
CM3C.. /BZ /.K0J	290000
CM3C.. /BZ /.K0H	290000
CM3P.. /BZ /.K0J	290000
CM3P.. /BZ /.K0H	290000
CM3G../BKB /.H1E	100000
CM3G../BKB /.H4F	100000
CM3G../BKB /.H1Q	100000
CM3G../BKB /.K0J	500000
CM3G../BKB /.K0H	500000

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 on inverters

Always observe the notes and information in the valid documentation of the inverter manufacturer when starting up the encoders with EnDat 2.2, EnDat 3, HIPERFACE DSL®, or DRIVE-CLiQ.

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.

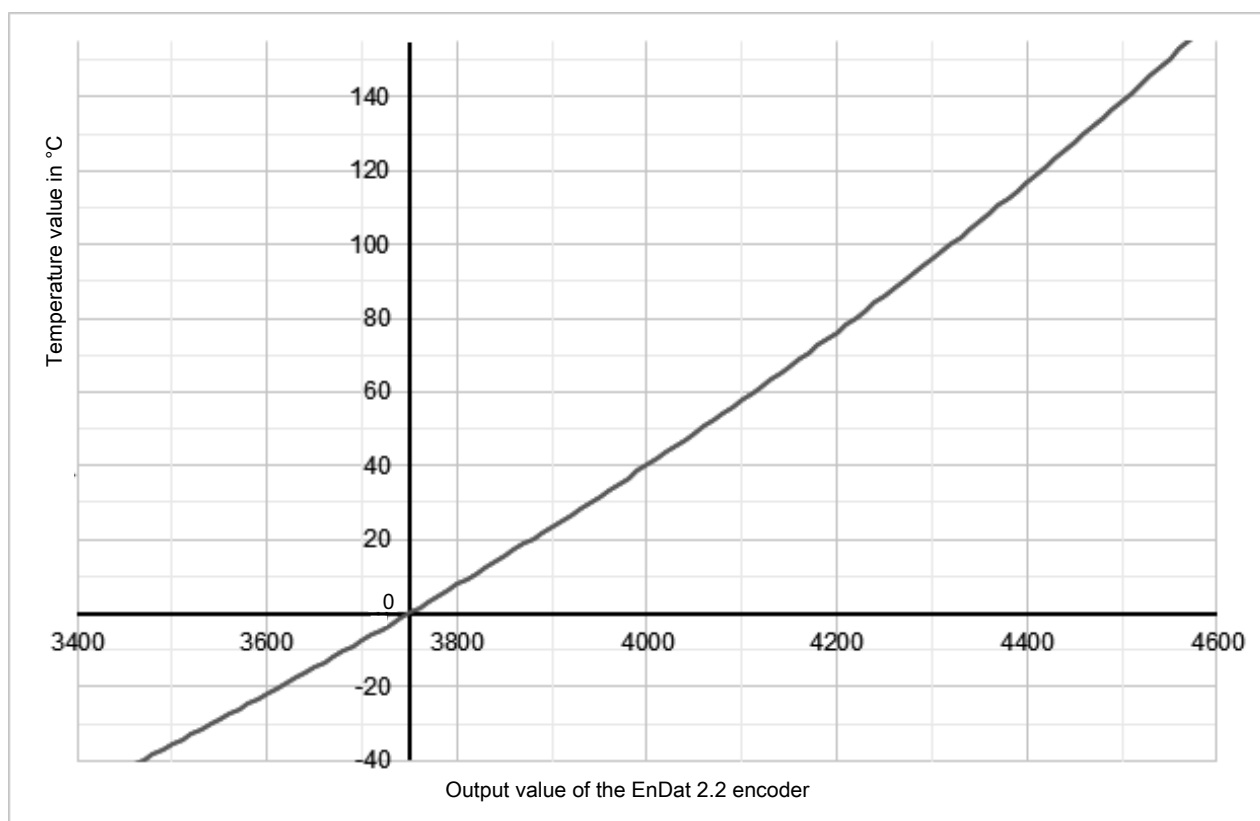
The following polynomials can be used for the calculation of the temperature value T_{PK} :

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

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

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.

7.6 Evaluation of the PK motor temperature sensor for encoders with DRIVE-CLiQ interface

The AH1Q encoder with DRIVE-CLiQ interface evaluates the PK motor temperature sensor of CM3. motors and provides the temperature values without additional cabling.

When the AH1Q is started up on a third-party inverter, the motor protection is not set automatically. Therefore, monitoring of the motor temperature by the user should always be activated.

Use the setting options of the inverter to parameterize the motor temperature monitoring. The PK sensor type to be set is the Pt1000.

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
EK0J	HIPERFACE® DSL	Single-turn	High class	On request	–
AK0J	HIPERFACE® DSL	Multi-turn	High class	On request	–
AH1Q	DRIVE-CLiQ	Multi-turn	High class	✓	–
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
EK0J	HIPERFACE® DSL	20 bit	–	$\pm 100''$	$-20 - 60 \text{ }^{\circ}\text{C}$	BK, BKB, BZ..D
AK0J	HIPERFACE® DSL	20 bit	12 bit	$\pm 100''$	$-20 - 60 \text{ }^{\circ}\text{C}$	BK, BKB, BZ..D
AH1Q	DRIVE-CLiQ	19 bit	12 bit	$\pm 65''$	$-20 - 60 \text{ }^{\circ}\text{C}$	BK, BKB, BZ..D
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
EK0J	HIPERFACE® DSL	–	63 – 100	63 – 100	63 – 100	–
AK0J	HIPERFACE® DSL	–	63 – 100	63 – 100	63 – 100	–
AH1Q	DRIVE-CLiQ	–	63 – 100	63 – 100	63 – 100	–
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
EK0J	HIPERFACE® DSL	–	–	✓
AK0J	HIPERFACE® DSL	–	–	✓
AH1Q	DRIVE-CLiQ	–	–	✓
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
EK0J	HIPERFACE® DSL	✓	✓	–	–	–
AK0J	HIPERFACE® DSL	✓	✓	–	–	–
AH1Q	DRIVE-CLiQ	✓	✓	–	–	–
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
EK0J	HIPERFACE® DSL	ET4001
AK0J	HIPERFACE® DSL	ET4001
AH1Q	DRIVE-CLiQ	–
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	$I_{btyp} (V_B = 5 V)$	n.s.	n.s.
	$I_{btyp} (V_B = 12 V)$	25 mA	33 mA
	$I_{btyp} (V_B = 24 V)$	–	–
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	$P_{max} (V_B = 28.8 V)$	–	–
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.

8.5 Technical data of HIPERFACE DSL® – EK0J, AK0J

Encoders		EK0J	AK0J
Manufacturer		SICK	
Manufacturer's designation		EKS36	EKM36
Interface		HIPERFACE DSL®	
Supply voltage	V_B	DC 7 to 12 V (typically DC 8 V)	
Current consumption after initialization	$I_{btvp} (V_B = 5 \text{ V})$	n.s.	n.s.
	$I_{btvp} (V_B = 12 \text{ V})$	150 mA	
	$I_{btvp} (V_B = 24 \text{ V})$	–	–
Current consumption on initialization	$I_{init_max} (t_{init})$	$\leq 3.5 \text{ A}$ (400 μs)	
Power consumption	$P_{max} (V_{B_min} - V_{B_max})$	n.s.	n.s.
Power consumption	$P_{max} (V_B = 28.8 \text{ V})$	n.s.	n.s.
Processing time (delay)	t_{cal}	n.s.	n.s.
Clock frequency		n.s.	n.s.
Output frequency for position value		0 – 75 kHz	
Resolution	Incremental, periods/revolutions	–	–
	Single-turn	20 bits (1 048 576 position values/revolution)	
	Multi-turn	–	12 bits (4096 revolutions)
Accuracy	Encoder system	$\pm 100''$	
speed	n_{max}	$\leq 9000 \text{ min}^{-1}$	
	n_{max_Reset} (when switching on after a reset)	$\leq 6000 \text{ min}^{-1}$	
Angular acceleration	a_{max}	$\leq 5 \times 10^5 \text{ rad/s}^2$	
Vibrations EN 60068-2-6		$\leq 50 \text{ g}$ (10 – 2000 Hz)	
Shocks EN 60068-2-27 (6 ms)		$\leq 100 \text{ g}$	
Installation altitude		$\leq 5000 \text{ m}$	
Working temperature ¹⁾	T_A (motor with encoder)	-20 to 60 °C	
	T_E (encoder)	-20 to 115 °C	
	T_{E_max} (encoder error message)	128 °C $\pm 3\text{K}$	
Storage temperature	T_S (encoder)	-40 to 115 °C	
Service life ²⁾	t_{LT}	3.6 $\times 10^9$ revolutions (service life, storage) Maximum 2000 emergency stop braking actions	
Connection technology ³⁾		Hybrid connector (single-cable technology) SJ1: M23 EK0J, AK0J with BK, BKB, BZ..D SJB: M40 EK0J, AK0J with BK, BZ..D	
Cable length		$\leq 100 \text{ m}$	
Functional safety		SIL 2/PL d (optional)	
Explosion protection		–	
Electronic nameplate		ET4001	

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) Note that SEW-EURODRIVE does not offer prefabricated cables for AK0J, EK0J and AH1Q encoders.

8.6 Technical data of DRIVE-CLiQ – AH1Q

Encoders		AH1Q
Manufacturer		Heidenhain
Manufacturer's designation		EQI 1331 S
Interface		DRIVE-CLiQ
Supply voltage	V_B	DC 10 to 28.8 V (max. DC 36 V)
Current consumption after initialization	$I_{btyp} (V_B = 5 \text{ V})$	–
	$I_{btyp} (V_B = 12 \text{ V})$	n.s.
	$I_{btyp} (V_B = 24 \text{ V})$	45 mA
Current consumption on initialization	$I_{init_max} (t_{init})$	n.s.
Power consumption	$P_{max} (V_{B_min} - V_{B_max})$	n.s.
Power consumption	$P_{max} (V_B = 28.8 \text{ V})$	≤ 1350 mW
Processing time (delay)	t_{cal}	≤ 12 μs
Clock frequency		n.s.
Output frequency for position value		n.s.
Resolution	Incremental, periods/revolutions	–
	Single-turn	19 bits (524 288 position values/revolution)
	Multi-turn	12 bits (4096 revolutions)
Accuracy	Encoder system	± 65"
speed	n_{max}	≤ 12 000 min ⁻¹
	n_{max_Reset} (when switching on after a reset)	n.s.
Angular acceleration	a_{max}	≤ 1 × 10 ⁵ rad/s ²
Vibrations EN 60068-2-6		≤ 400 m/s ² (55 – 2000 Hz)
Shocks EN 60068-2-27 (6 ms)		≤ 2000 m/s ²
Installation altitude		≤ 6000 m
Working temperature ¹⁾	T_A (motor with encoder)	-20 to 60 °C
	T_E (encoder)	-40 to 100 °C
	T_{E_max} (encoder error message)	120°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⁾		Connector (double-cable technology) SQ1: M23 power, M23 signal SQB: M40 power, M23 signal
Cable length		≤ 45 m 75 m on request
Functional safety		SIL 2/PL d (optional)
Explosion protection		–
Electronic nameplate		–

- 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) Note that SEW-EURODRIVE does not offer prefabricated cables for AK0J, EK0J and AH1Q encoders.

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.

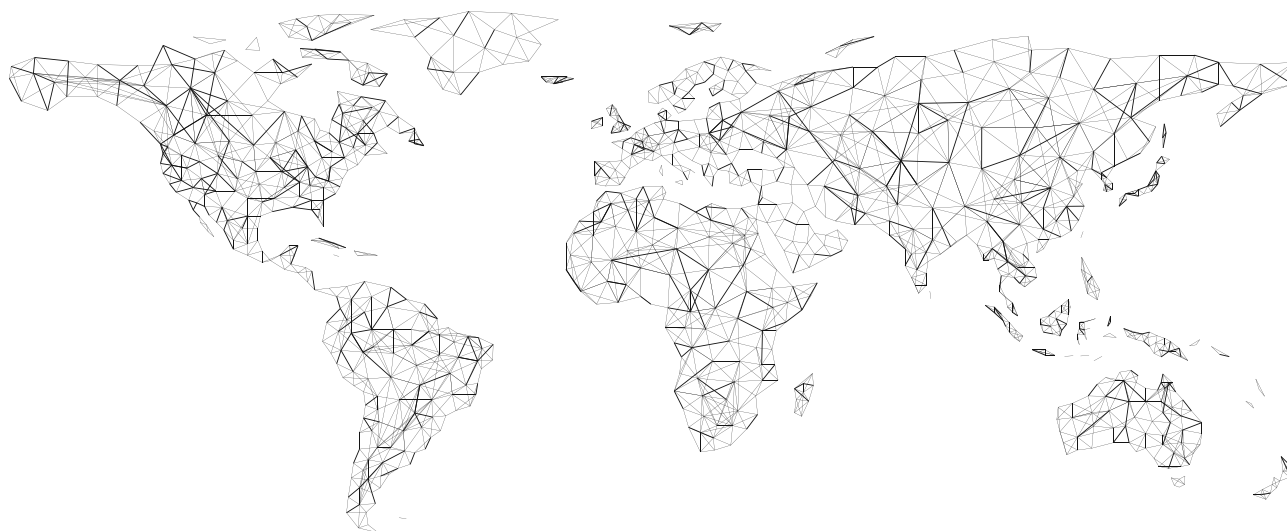
9 Contacting SEW-EURODRIVE

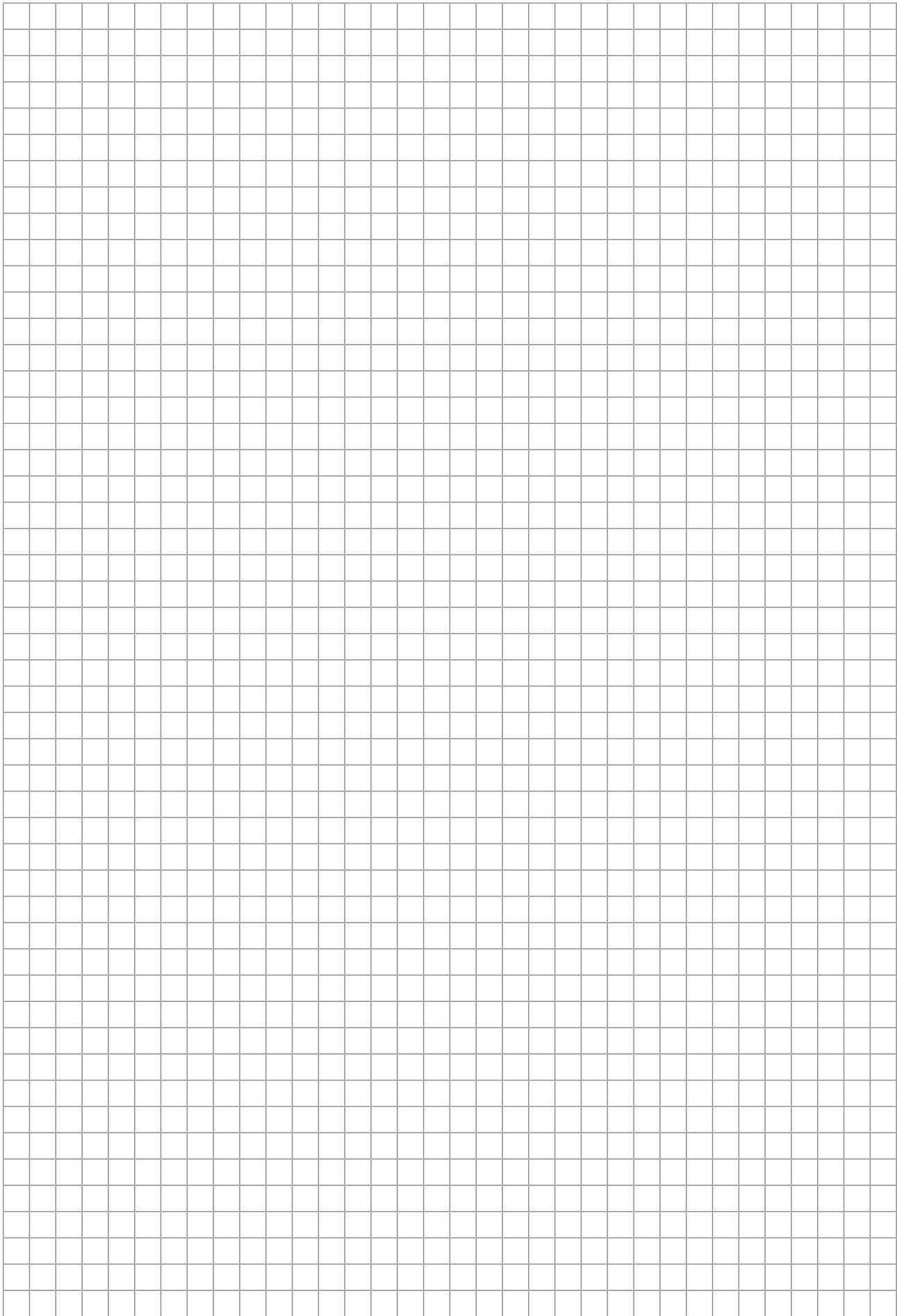
You can find the worldwide contact data and locations on the **SEW-EURODRIVE website** via the following link or the QR code shown below.

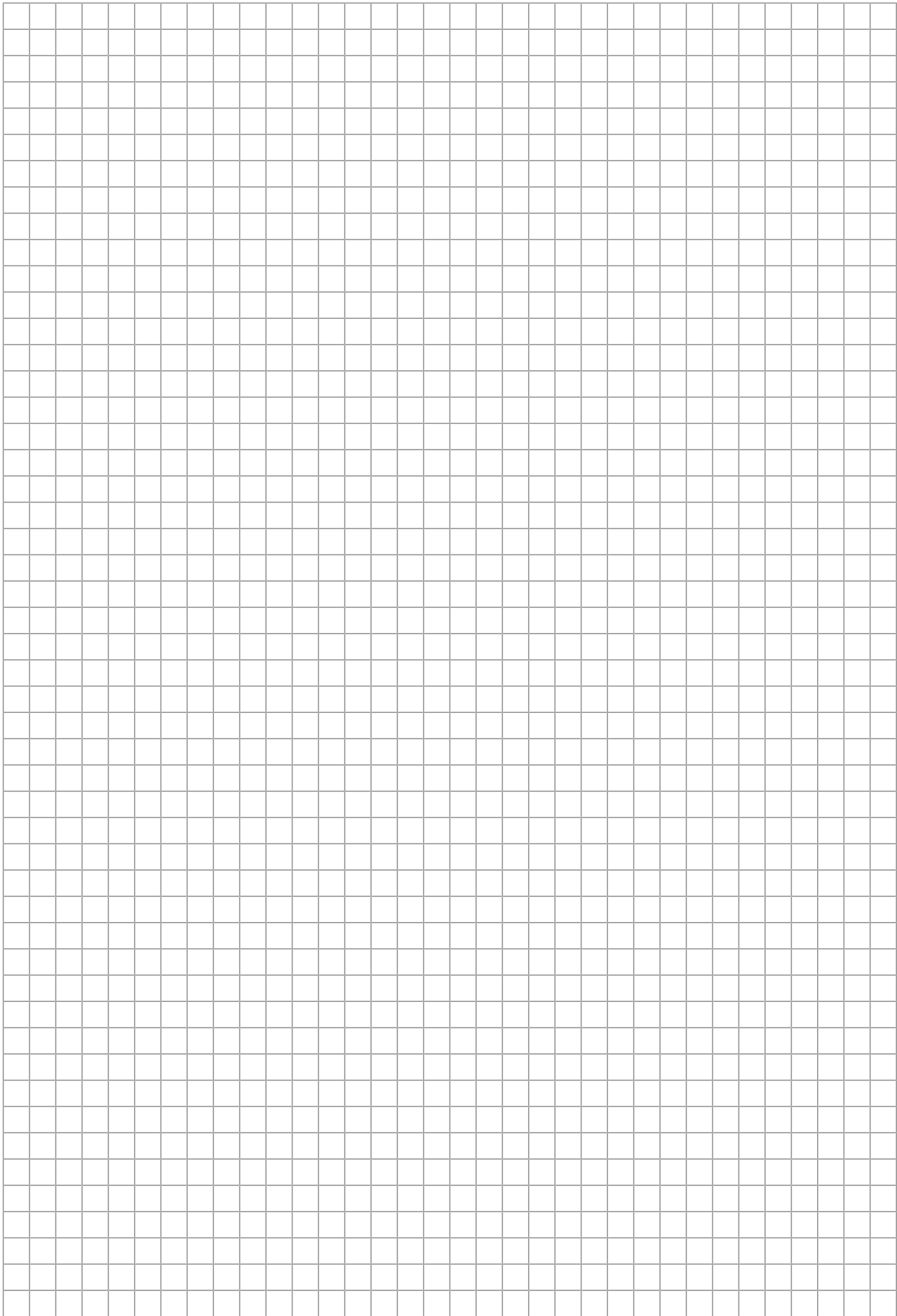
<https://www.sew-eurodrive.de/contacts-worldwide>

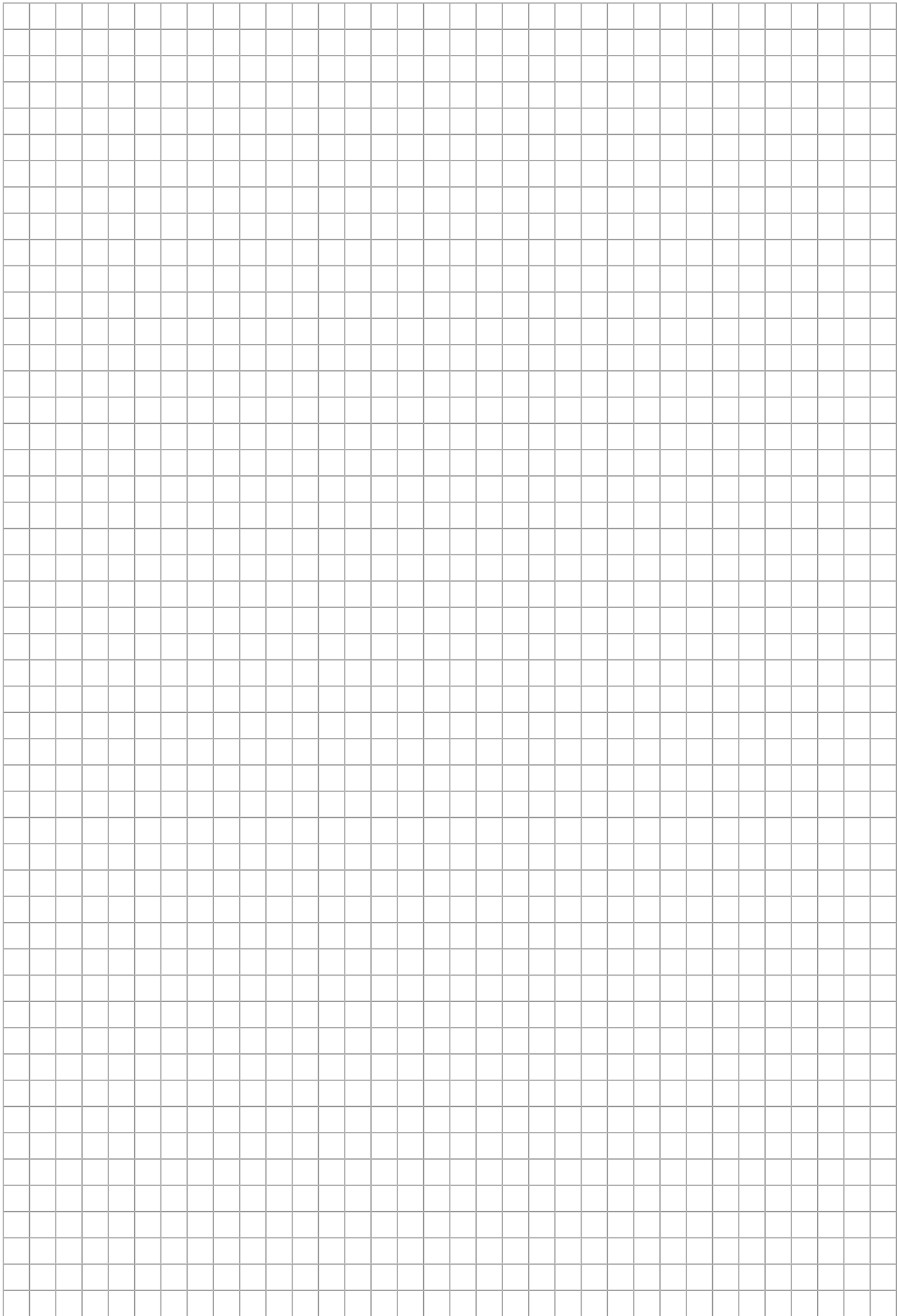


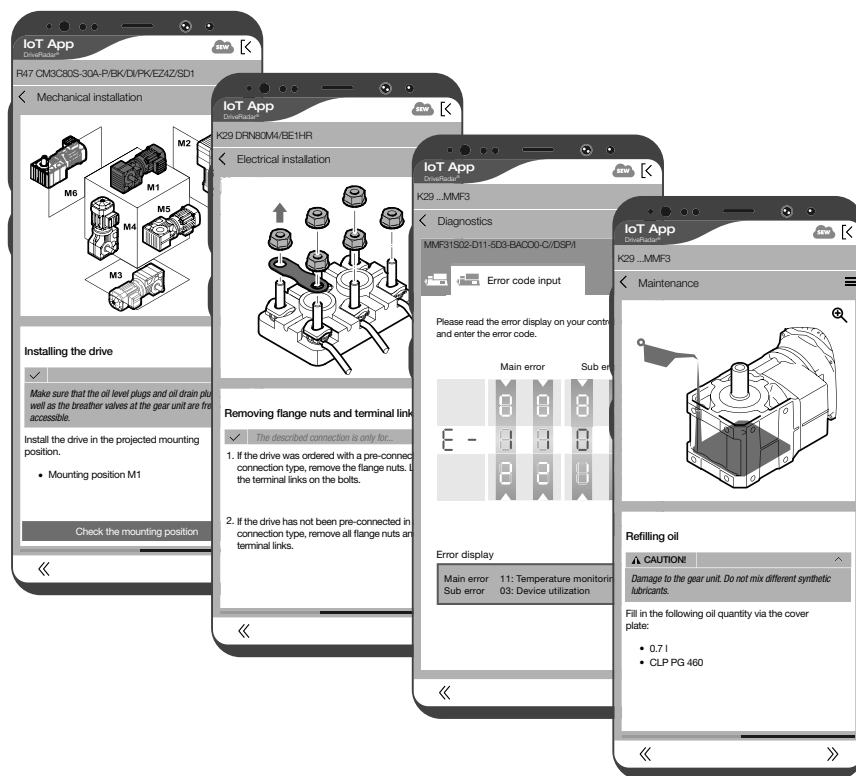
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