

Eckelmann

MOTION AND PROPULSION



E°SL synchronous compact motors

Technical catalogue

IMPORTANT!

READ CAREFULLY BEFORE USE!

KEEP FOR FUTURE REFERENCE!

Document ID: E°SL motors: Technical catalogue

Please indicate when placing reorder

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Version 1.9

English

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CHANGE LOG

Version	Chapter	Date	Editor	Change
1.0	all	June 2020	A. Litschel	Document created
1.1	3.6	December 2020	A. Litschel	Corrections: Motor length, cable diameter
1.2	3.5, 3.6	December 2020	A. Litschel	New motor types added
1.3	all; 3.3, 3.4	July 2021	A. Litschel	Conversion to Eckelmann FCS, new motor types added
1.4	1	November 2021	A. Litschel	Minor corrections to ch. 1
1.5	1.1, 3.2	December 2021	A. Litschel	New designation code, feedback connection added
1.6	2.4	May 2022	A. Litschel	New motor added
1.7	2	January 2023	A. Litschel	Length measurements added for all motors
1.8	1.6, 2.2, 2.4	June 2023	A. van den Brink-Litschel	New motor lengths added, new CE declaration
1.9	2.2, 2.6	January 2024	A. van den Brink-Litschel	New motor types added

1 About this document	1
1.1 About the product	1
1.1.1 Manufacturer and designations	1
1.1.2 Performance specification	2
1.1.3 Designation code for E°Motors	3
1.1.4 Overview of the motor series	4
1.2 Contents of this document	5
1.3 Target audience	5
1.4 Disclaimer of liability	5
1.5 Additional documents of reference	6
1.6 Standards compliance and conformity	7
1.6.1 EU declaration of conformity	7
1.6.2 UL listing and compliance	9
2 Technical data: E°SL motors	11
2.1 General technical data (E°SL motors)	11
2.2 E°SL-028... ..	12
2.2.1 Dimensions	12
2.2.2 Technical data	13
2.3 E°SL-036... ..	14
2.3.1 Dimensions	14
2.3.2 Technical data	15
2.4 E°SL-056... ..	16
2.4.1 Dimensions	16
2.4.2 Technical data	17

2.5 E°SL-063...	19
2.5.1 Dimensions	19
2.5.2 Technical data	20
2.6 E°SL-071...	22
2.6.1 Dimensions	22
2.6.2 Technical data	23
2.7 E°SL-100...	24
2.7.1 Dimensions	24
2.7.2 Technical data	25
3 Connections	26
3.1 Power connections	26
3.2 Feedback connections	27
4 Decommissioning and disposal	29
4.1 Disassembly	29
4.2 Disposal	29

1 About this document

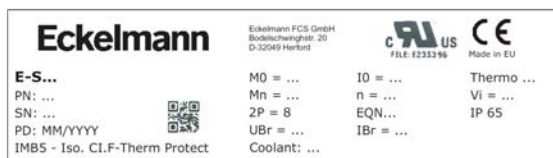
1.1 About the product

1.1.1 Manufacturer and designations

- Manufacturer: Eckelmann FCS GmbH
- Designation: E°SL synchronous compact motors

This catalogue applies to all E°SL synchronous compact motors built from 2024 onwards.

- Type plate: The type plate is always attached to the left side of the motor and contains the following data:



Position (marking)	Item/meaning
E-S...	Type designation
PN: ...	Item number
SN: ...	Serial number
PD: MM/YYYY	Year/month of production
(mouning code, insulation class)	(as entered)
M0 = ...	Stall torque
Mn = ...	Rated torque
2P =	Pole number
UBr = ...	Voltage (brake)
Coolant: ...	Cooling: NO or voltage
IO = ...	Stall current
n = ...	Rated speed
(Type of encoder)	(as entered)
IBr = ...	Current consumption (brake)
Thermo ...	Temperature sensor
Vi = ...	Induced reverse voltage
(Protection class)	(as entered)

Tab. 1: Type plate

1.1.2 Performance specification

Together with the servo drives of the E°Darc product family, Eckelmann FCS's E°SL synchronous compact motors form very precise and highly dynamic servo drive units.

Electronic commutation

These motors are permanently excited motors with sinusoidal electronic commutation. Feedback systems used include high-resolution sine/cosine encoders in single- or multiturn design.

Holding brake

All motors are also available with holding brake. This enables backlash-free clamping of the drive shaft at standstill. The holding force of the brake is designed according to the standstill torque of the motors.

Very high operational reliability

The brushless design and the use of grease-lubricated bearings (for the entire service life) ensure very high operational reliability.

1.1.3 Designation code for E°Motors

Motor (example):

E°SM - 063 - 06 - 60 - 37 - B N 0 1

Type:

E°SL	Synchronous compact motor (low-pole)	400 V
E°SX	Synchronous compact motor (multi-pole)	400 V
E°SM	Synchronous motor (low-pole)	400 V
E°SY	Synchronous motor (multi-pole)	400 V
E°SZ	Ultra-compact motor	400 V
E°SU3	Synchronous compact motor (UL listed)	230 V
E°SC3	Synchronous compact motor	230 V
E°SL3	Synchronous compact motor	230 V
E°SM3	Synchronous motor	230 V
E°SCL	Low-voltage synchronous motor (low-pole)	48 V
E°SCX	Low-voltage synchronous motor (multi-pole)	48 V

Flange size:

020 = flange 40 mm	056 = flange 92 mm
028 = flange 58 mm	063 = flange 115 mm
030 = flange 60 mm	065 = flange 130 mm
036 = flange 70 mm	071 = flange 142 mm
040 = flange 80 mm	100 = flange 190 mm
055 = flange 110 mm	

Stall torque:

(if < 3 Nm, classified as follows:

- D < 1 Nm
- E < 2 Nm
- F < 3 Nm)

Examples: "06" = 6.0 Nm; "E4" = 1.4 Nm.

Rated speed:

- 30 = 3000 rpm
- 40 = 4000 rpm
- 45 = 4500 rpm
- 50 = 5000 rpm
- 60 = 6000 rpm

Feedback:

01 = Resolver	37 = EQN1337-S
04 = SKS36	38 = EQH1331-S
05 = SKM36	39 = EQH1131-S
06 = SRS50	40 = MAR ST
07 = SRM50	41 = SROA35/46
19 = SEK37	
20 = SEL37	
21 = OIH35/AR38	
23 = S35	
24 = MAR MT	
29 = ECN1123-S(1)	

* safety encoder (SIL 2)

(1) non-standard

Holding brake:

- N = no holding brake
- B = with holding brake
- M = added moment of inertia

Shaft:

- N = smooth shaft
- K = keyway
- S = special shaft
- G = gear system

Connection/terminal box:

- 0 = no terminal box
- 1 = with terminal box
- 3 = - E°SC3/E°SU3/E°SCL/E°SCX motors: flange-mounted power supply
- all other motors with EnDat 2.2 encoders: Shield of encoder cable on pin 9
- 4 = separate cable outlet - circular connector
- 5 = HFO connector
- 6 = encoder connection: M23, 17-pole (option for motors with feedback codes 24, 40 or 41)
- 7 = separate cable outlet with custom length, pre-assembled for connection to drive

Cooling fan:

- 1 = with 24 V fan
- 2 = with 230 V fan

1.1.4 Overview of the motor series

	Motor series	Designated servo drive: E°Darc	Properties	Encoders/feedback
400 V motors	E°SL	Cxxi	8- to 10-pole synchronous compact motor (low mass inertia)	Resolvers, incremental and absolute encoders (Hiperface®), safety encoders (EnDat 2.2)
		K313		Incremental and absolute encoders
	E°SM	Cxxi	4- to 6-pole synchronous motor (high mass inertia)	Resolvers, incremental and absolute encoders (Hiperface®), safety encoders (EnDat 2.2)
	E°SX	Cxxi	10-pole synchronous compact motor (low mass inertia)	Resolvers, incremental and absolute encoders (Hiperface®), safety encoders (EnDat 2.2)
		K313		Incremental and absolute encoders
	E°SY	Cxxi	10-pole synchronous compact motor (high mass inertia)	Resolvers, incremental and absolute encoders (Hiperface®), safety encoders (EnDat 2.2)
E°SZ	Cxxi	Ultra-compact motor	Resolvers, incremental and absolute encoders (Hiperface®), safety encoders (EnDat 2.2)	
230 V motors	E°SL3	Kxx	Synchronous compact motor for wide speed range (low mass inertia)	Incremental and absolute encoders
	E°SM3	Kxx	Synchronous motor (high mass inertia)	Incremental and absolute encoders
	E°SU3	Kxx	Synchronous compact motor for the low price segment	Incremental and absolute encoders
48 V motors	E°SCL	Sxx	Low-voltage synchronous motor (6-pole)	Absolute encoders
	E°SCX	Sxx	Low-voltage synchronous motor (10-pole)	Absolute encoders

1.2 Contents of this document

This technical catalogue contains information about Eckelmann FCS E°SL synchronous compact motors, including dimensional drawings, technical data and connection specifications. The catalogue is intended for all persons who carry out assembly, installation, commissioning, parameterization, maintenance and service work related to E°SL synchronous compact motors.

In order to avoid handling mistakes, this document must be kept available for operating and maintenance personnel at all times.

Keep it for future reference when operating the machine or machining line in which E°SL synchronous compact motors are integrated!

1.3 Target audience

The target audience for this technical catalogue consists of technicians and skilled workers who are familiar with the functional principles of automation systems in an industrial environment.

The information given in this catalogue requires the level of knowledge of trained personnel. Make sure that your relevant personnel have read and understood this document.

1.4 Disclaimer of liability

In order to handle and operate E°SL synchronous compact motors safely and without failure, it is necessary to adhere strictly to the information given in this catalogue and adequately train all personnel. The manufacturer accepts no liability for any damage resulting from disregard of this information or employment of untrained personnel.

1.5 Additional documents of reference

See [Eckelmann E°EDP: Zuordnung E°Darc C <-> Motoren ...](#) for available combinations of motors and drives.

1.6 Standards compliance and conformity

1.6.1 EU declaration of conformity

EU-Konformitätserklärung EU Declaration of Conformity

Hersteller: Manufacturer:	Eckelmann FCS GmbH
Anschrift: Address:	Bodelschwingstr. 20, 32049 Herford
Produktbezeichnung: Product designation:	E°SL-/E°SM-/E°SL3-/E°SM3-/E°SX-/E°SY-/E°SZ-Motoren E°SL/E°SM/E°SL3/E°SM3/E°SX/E°SY/E°SZ motors
<p>Oben genannte Produkte entsprechen den wesentlichen Schutzanforderungen, die in der Richtlinie des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über die elektromagnetische Verträglichkeit 2014/30/EU, in der Niederspannungsrichtlinie 2014/35/EU und in der RoHS-Richtlinie 2011/65/EU festgelegt sind.</p> <p>This is to confirm that the specified equipment conforms to the safety regulations determined by the Council for the Approximation of the Legislation amongst the Member Countries in the directives 2014/30/EU – EMC Directive, 2014/35/EU – LVD Directive and 2011/65/EU – RoHS Directive.</p>	

Die Übereinstimmung der bezeichneten Produkte mit den Vorschriften der Richtlinien wird begründet durch die Einhaltung folgender Normen:
The conformity of the specified equipment with the applicable regulations is established by compliance with the following standards:

Norm	Titel/Title
EN 60204-1: 2006+A1:2009+AC:2010	Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen Safety of machinery - Electrical equipment of machines - Part 1: General requirements
EN 60034-1: 2010+AC:2010	Drehende elektrische Maschinen - Teil 1: Bemessung und Betriebsverhalten Rotating electrical machines - Part 1: Rating and performance
EN 60034-5: 2001+A1:2007	Drehende elektrische Maschinen - Teil 5: Schutzarten aufgrund der Gesamtkonstruktion von drehenden elektrischen Maschinen Rotating electrical machines - Part 5: Degrees of protection provided by the integral design of rotating electrical machines
EN 60034-6:1993	Drehende elektrische Maschinen - Teil 6: Einteilung der Kühlverfahren Rotating electrical machines - Part 6: Methods of cooling
EN 60034-7: 1993+A1:2001	Drehende elektrische Maschinen - Teil 7: Klassifizierung für Bauarten, der Aufstellungsarten und der Klemmkasten-Lage Rotating electrical machines - Part 7: Classification of types of construction, mounting arrangements and terminal box position
EN 60034-8: 2007+A1:2014	Drehende elektrische Maschinen - Teil 8: Anschlussbezeichnungen und Drehsinn Rotating electrical machines - Part 8: Terminal markings and direction of rotation
EN 60034-9: 2005+A1:2007	Drehende elektrische Maschinen - Teil 9: Geräuschgrenzwerte Rotating electrical machines - Part 9: Noise limits
EN 60034-11:2004	Drehende elektrische Maschinen - Teil 11: Thermischer Schutz Rotating electrical machines - Part 11: Thermal protection
EN 60034-14: 2004+A1:2007	Drehende elektrische Maschinen - Teil 14: Mechanische Schwingungen von bestimmten Maschinen mit einer Achshöhe von 56 mm und höher Rotating electrical machines - Part 14: Mechanical vibration of certain machines with shaft heights 56 mm and higher

Weitere Angaben über die Einhaltung dieser Normen sind im Technischen Katalog zum Produkt zu finden.

You will find further data concerning the compliance with these standards in the Technical Catalogue for the product.

Ort, Datum: Place, date:	Herford, den 26.06.2023
Rechtsverbindliche Unterschriften: Legally binding signatures:	 Leo Schacke (Geschäftsführer/Managing Director)
	 Dr. Andreas Potttharst (Entwicklungsleiter/Director R&D)

1.6.2 UL listing and compliance

The motor's type plate indicates the device's UL listing and compliance via the UL file number:

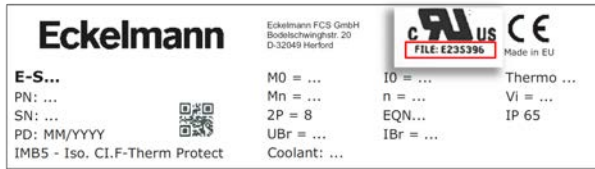


Abb. 1: Display of UL file number (example)

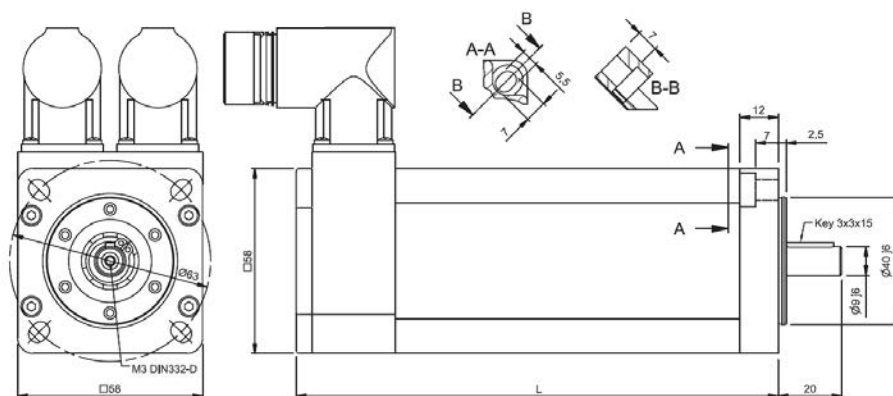
2 Technical data: E°SL motors

2.1 General technical data (E°SL motors)

E°SL motors		
Mounting form	IM B5	horizontal mounting position
IP code	IP 65	surface cooled, without fan (motors \geq type E°SL-063...: optional w/ fan), with shaft seal
Connections		
Power connection	U V W	turnable connector, 8 poles
Brake connection		inside power connection
Temperature sensor	KTY 84-130 or PTO	depending on intended use: <ul style="list-style-type: none"> Motor w/ safety encoder: KTY 84-130 Motor w/o safety encoder: PTO (trip threshold: 140 °C)
Temperature sensor connection		inside power connection
Feedback connection		turnable connector, 12 poles, 8-pole connector for Endat 2.2
Ambient conditions and properties		
Cooling type	IC 410	completely enclosed machine, surface cooled, no fan (motors \geq type E°SL-063...: optional w/ fan)
Temperature rise	$\Delta\vartheta = 105$ K	insulation class F
Temperature range	-15° ... 40° C	
Storage	-30° ... +60° C	
Bearing service life	20,000 h	standard value, rolling bearings with permanent grease lubrication
Flange	according to IEC 60072-1	b1 size: fit j6
Diameter of shaft end	9 - 30 mm 32 - 48 mm 55 - 100 mm	j6 or k6 k6 m6
Width of feather key	according to IEC 60072-1	fit h9
Holding brake		optional
Position feedback		see E°Motoren: Geberinformationen

2.2 E°SL-028...

2.2.1 Dimensions



All dimensions indicated in mm

Motor type	Length (L)
E°SL-028-D8-60-01-BN0	110.5
E°SL-028-D8-60-01-NN0	110.5
E°SL-028-D8-60-20-BK0	140.5
E°SL-028-D8-60-20-BN0	140.5
E°SL-028-D8-60-20-NK0	110.5
E°SL-028-D8-60-20-NN0	110.5
E°SL-028-E3-60-01-BN0	164.5
E°SL-028-E3-60-01-NN0	134.5
E°SL-028-E3-60-05-NN0	150.5
E°SL-028-E3-60-20-BN0	165
E°SL-028-E3-60-20-NN0	135
E°SL-028-E3-60-39-BN0	180.5

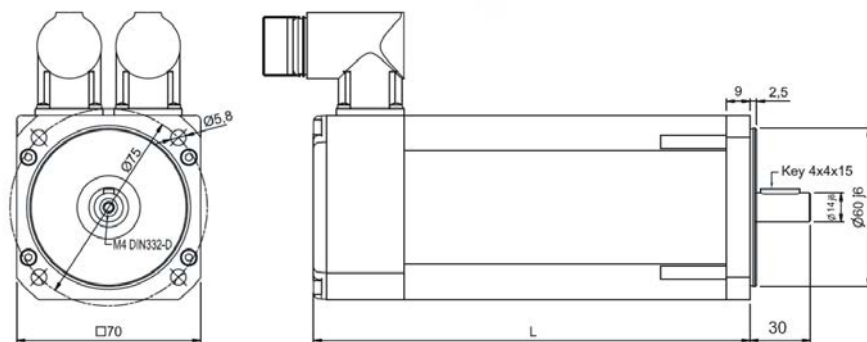
Tab. 2: Measure of length

2.2.2 Technical data

Motor type			E°SL-028-D8-60...	E°SL-028-E3-60...
Recommended servo drive: E°Darc			C04	C04
M_0	Stall torque	Nm	0.75	1.25
M_{max}	Peak torque	Nm	3	5
M_N	Rated torque	Nm	0.7	1.16
n_N	Rated speed	rpm	6000	6000
n_k	Cutoff speed (at operating temperature)	rpm	6000	6000
J	Rotor moment of inertia	kgcm ²	0.19	0.31
F_r	Max. radial force	N	110	130
F_a	Max. axial force	N	11	13
m	Weight (w/o brake)	kg	1.5	2.0
p	Number of pole pairs		4	4
k_T	Torque constant	Nm/A _{RMS}	0.73	0.73
k_E	Voltage constant	Vs	0.42	0.42
I_0	Stall current	A _{RMS}	1.03	1.72
I_N	Rated current	A _{RMS}	0.96	1.59
P_N	Rated power	W	440	729
RW	Phase resistance	Ohm	12.1	5.1
LW	Phase inductance	mH	19.4	7.7
t_a	Thermal time constant	min	36	40
U	Supply voltage	V AC	400	400
Brake				
M	Holding torque at 100 °C	Nm	2.1	
J	Moment of inertia	kgcm ²	0.12	
m	Weight	kg	0.5	
U	Voltage DC +/- 10 %	V DC	24	
I_B	Power consumption	A DC	0.34	
R	Resistance	Ohm	70.6	
Cable				
Q	Cross section (at cable length < 50 m)	mm ²	0.75	

2.3 E°SL-036...

2.3.1 Dimensions



All dimensions indicated in mm

Motor type	Length(L)
E°SL-036-03-30-39-BN0	215
E°SL-036-03-60-20-BN0	213
E°SL-036-F4-30-20-BN0	198
E°SL-036-F4-30-31-NN0	185
E°SL-036-F4-60-01-BN0	192
E°SL-036-F4-60-01-NN0	167
E°SL-036-F4-60-20-NN0	167
E°SL-036-F4-60-31-NN0	184.5

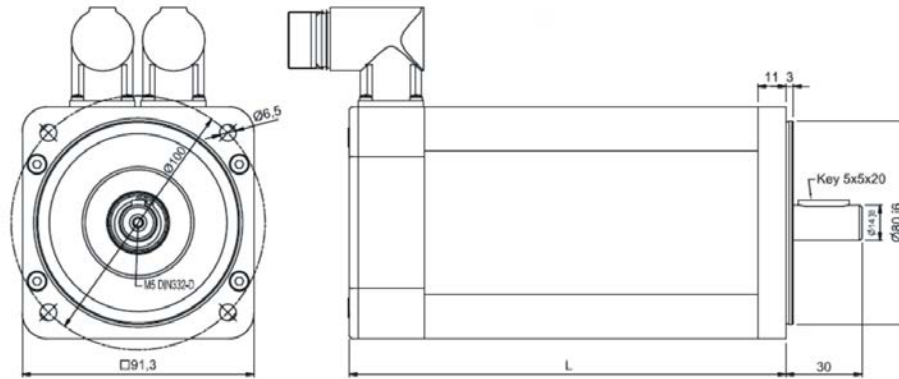
Tab. 3: Measure of length

2.3.2 Technical data

Motor type			E°SL-036-F4-30...	E°SL-036-F4-60...	E°SL-036-03-30...	E°SL-036-03-60...
Recommended servo drive: E°Darc			C04	C04	C04	C08/C16
M_0	Stall torque	Nm	2.4	2.4	3.0	3.0
M_{max}	Peak torque	Nm	8.5	8.5	10.5	10.5
M_N	Rated torque	Nm	2.2	2.0	2.7	2.4
n_N	Rated speed	rpm	3000	6000	3000	6000
n_k	Cutoff speed (at operating temperature)	rpm	3000	6000	3000	6000
J	Rotor moment of inertia	kgcm ²	1.05	1.05	1.22	1.22
F_r	Max. radial force	N	185	178	tbd	188
F_a	Max. axial force	N	19	18	tbd	19
m	Weight (w/o brake)	kg	3.6	3.6	3.8	3.8
p	Number of pole pairs		4	4	4	4
k_T	Torque constant	Nm/A _{RMS}	1.45	0.73	1.45	0.73
k_E	Voltage constant	Vs	0.84	0.42	0.84	0.42
I_0	Stall current	A _{RMS}	1.7	3.3	2.1	4.1
I_N	Rated current	A _{RMS}	1.5	2.7	1.9	3.3
P_N	Rated power	W	691	1225	848	1508
RW	Phase resistance	Ohm	7.5	1.9	5.55	1.4
LW	Phase inductance	mH	18	4.5	14	3.5
t_a	Thermal time constant	min	36	36	38	38
U	Supply voltage	V AC	400	400	400	400
Brake						
M	Holding torque at 100 °C	Nm	3.2			
J	Moment of inertia	kgcm ²	0.38			
m	Weight	kg	0.35			
U	Voltage DC +/- 10 %	V DC	24			
I_B	Power consumption	A DC	0.45			
R	Resistance	Ohm	53.2			
Cable						
Q	Cross section (at cable length < 50 m)	mm ²	0.75			

2.4 E°SL-056...

2.4.1 Dimensions



All dimensions indicated in mm

Motor type	Length (L)
E°SL-056-03-60-01-BN0	180
E°SL-056-03-60-01-NN0	145
E°SL-056-03-60-01-NN0	179.5
E°SL-056-03-60-01-NN0	194.5
E°SL-056-05-45-24-BN0	214.5
E°SL-056-05-45-24-NN0	179.5
E°SL-056-05-60-01-BN0	215
E°SL-056-05-60-01-NN0	180
E°SL-056-05-60-20-BK0	214.5
E°SL-056-05-60-20-BN0	214
E°SL-056-05-60-20-NK0	179.5
E°SL-056-05-60-20-NN0	179.5
E°SL-056-05-60-38-BN0	244

Tab. 4: Measure of length

Motor type	Length (L)
E°SL-056-05-60-38-NN0	209
E°SL-056-E4-30-20-BK0	158
E°SL-056-E4-60-01-BN0	157
E°SL-056-E4-60-20-BK0	157

Tab. 4: Measure of length

2.4.2 Technical data

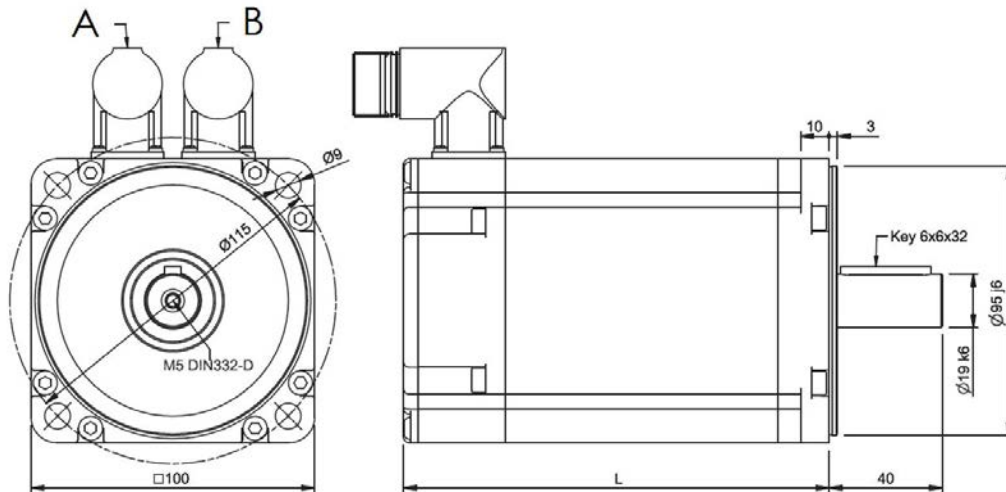
Motor type			E°SL-056- E4-30...	E°SL-056- E4-60...	E°SL-056- 03-60...	E°SL-056- 04-60...	E°SL-056- 05-45...	E°SL-056- 05-60...
Recommended servo drive: E°Darc			C04	C04	C04/C08	C08/K313	C08/K313	C08
M_0	Stall torque	Nm	1.35	1.35	2.6	3.5	4.5	4.5
M_{max}	Peak torque	Nm	5	5	10	14	18	18
M_N	Rated torque	Nm	1.3	1.0	1.7	2.0	3.2	2.3
n_N	Rated speed	rpm	3000	6000	6000	6000	4500	6000
n_k	Cutoff speed (at operating temperature)	rpm	3000	6000	6000	6000	4500	6000
J	Rotor moment of inertia	kgcm ²	0.47	0.47	0.88	1.09	1.40	1.40
F_r	Max. radial force	N	220	213	228	238	tbd	248
F_a	Max. axial force	N	22	21	23	24	tbd	25
m	Weight (w/o brake)	kg	3.5	3.5	4.4	5.0	5.8	5.8
p	Number of pole pairs		4	4	4	4	4	4
k_T	Torque constant	Nm/A _{RMS}	1.63	0.81	0.81	0.81	1.09	0.81
k_E	Voltage constant	Vs	0.94	0.47	0.47	0.47	0.63	0.47
I_0	Stall current	A _{RMS}	0.8	1.7	3.2	4.3	4.1	5.6
I_N	Rated current	A _{RMS}	0.8	1.2	2.1	2.5	2.93	2.8
P_N	Rated power	kW	0.4	0.6	1.1	1.3	1.51	1.4
RW	Phase resistance	Ohm	18.7	4.7	1.6	1.35	1.55	0.9
LW	Phase inductance	mH	68.5	16.9	9.1	6.75	9.7	5.4
t_a	Thermal time constant	min	31	31	34	36	39	39
U	Supply voltage	V AC	400	400	400	400	400	400
Brake								
M	Holding torque at 100 °C	Nm	3.5					
J	Moment of inertia	kgcm ²	0.38					
m	Weight	kg	0.6					
U	Voltage DC +/- 10 %	V DC	24					
I_B	Power consumption	A DC	0.45					
R	Resistance	Ohm	53.2					
Cable								

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Motor type			E°SL-056- E4-30...	E°SL-056- E4-60...	E°SL-056- 03-60...	E°SL-056- 04-60...	E°SL-056- 05-45...	E°SL-056- 05-60...
Recommended servo drive: E°Darc			C04	C04	C04/C08	C08/K313	C08/K313	C08
Q	Cross section (at cable length < 50 m)	mm ²	0.75					

2.5 E°SL-063...

2.5.1 Dimensions



A: Feedback connection B: Power connection

All dimensions indicated in mm

Motor type	Length (L)
E°SL-063-04-30-38-BN0	195
E°SL-063-04-45-03-BN0	182,5
E°SL-063-04-45-07-BN0	193
E°SL-063-04-45-07-NN0	161
E°SL-063-04-45-20-BN0	182,5
E°SL-063-04-45-38-BN0	200
E°SL-063-06-45-01-BN0	202
E°SL-063-06-60-01-BN0	202
E°SL-063-06-60-01-NN0	170
E°SL-063-06-60-03-BN0	202
E°SL-063-06-60-03-NN0	170,5
E°SL-063-06-60-38-NN0	183
E°SL-063-08-45-05-BN0	237

Tab. 5: Measure of length

Motor type	Length (L)
E°SL-063-08-45-07-NN0	205
E°SL-063-08-45-37-BN3	250,5
E°SL-063-08-45-37-BN3	250
E°SL-063-08-45-38-BN3	239,5
E°SL-063-08-45-38-NN0	207,5
E°SL-063-10-30-06-NN0	225
E°SL-063-10-30-38-NN0	227,5
E°SL-063-10-60-01-BN0	246
E°SL-063-10-60-01-NN0	215

Tab. 5: Measure of length

2.5.2 Technical data

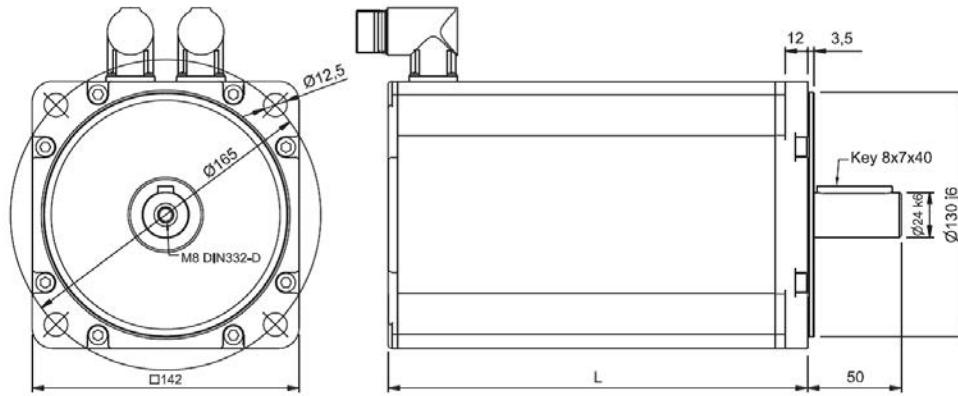
Motor type			E°SL-063-04-30...	E°SL-063-04-45...	E°SL-063-06-45...	E°SL-063-06-60...	E°SL-063-08-45...	E°SL-063-10-30...	E°SL-063-10-45...	E°SL-063-10-60...
Recommended servo drive: E°Darc			C04	C04	C08	C08/C16	C08	C16	C16	C16
M ₀	Stall torque	Nm	4.0	4.0	6.0	6.0	8.0	10.0	10.0	10.0
M _{max}	Peak torque	Nm	12	12	18	18	24	30	30	30
M _N	Rated torque	Nm	3.50	3.10	4.65	3.6	6.20	8.75	7.70	6.0
n _N	Rated speed	rpm	3000	4500	4500	6000	4500	3000	4500	6000
n _k	Cutoff speed (at operating temperature)	rpm	2700	4100	4000	5500	4100	2700	4300	6000
J	Rotor moment of inertia	kgcm ²	1.87	1.87	2.67	2.67	3.47	4.27	4.27	4.27
F _r	Max. radial force	N	560	450	470	395	485	620	495	420
F _a	Max. axial force	N	56	45	47	40	49	62	50	42
m	Weight (w/o brake)	kg	4.7	4.7	5.3	5.3	6.2	7.2	7.2	7.2
p	Number of pole pairs		4	4	4	4	4	4	4	4
k _T	Torque constant	Nm/A _{RMS}	1.63	1.09	1.09	0.81	1.09	1.63	1.09	0.81
k _E	Voltage constant	Vs	0.94	0.63	0.63	0.47	0.63	0.94	0.63	0.47
I ₀	Stall current	A _{RMS}	2.5	3.7	5.5	7.4	7.4	6.1	9.2	12.3
I _N	Rated current	A _{RMS}	2.1	2.9	4.3	4.4	5.7	5.4	7.1	7.4
P _N	Rated power	kW	1.1	1.5	2.2	2.3	2.9	2.7	3.6	3.8
R _W	Phase resistance	Ohm	2.7	1.3	0.75	0.44	0.55	0.95	0.42	0.24
L _W	Phase inductance	mH	18.3	8.3	5.4	3.0	4.9	8.7	3.9	2.2
t _a	Thermal time constant	min	25	25	30	30	30	35	35	35
U	Supply voltage	V AC	400	400	400	400	400	400	400	400
Brake										
M	Holding torque at 100 °C	Nm	8	8	8	8	8	8	8	8
J	Moment of inertia	kgcm ²	0.69	0.69	0.69	0.69	0.69	0.69	0.69	0.69
m	Weight	kg	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
U	Voltage DC +/- 10 %	V DC	24	24	24	24	24	24	24	24
I _B	Power consumption	A DC	0.83	0.83	0.83	0.83	0.83	0.83	0.83	0.83
R	Resistance	Ohm	29	29	29	29	29	29	29	29
Cable										

Eckelmann

Motor type			E°SL-063-04-30...	E°SL-063-04-45...	E°SL-063-06-45...	E°SL-063-06-60...	E°SL-063-08-45...	E°SL-063-10-30...	E°SL-063-10-45...	E°SL-063-10-60...
Recommended servo drive: E°Darc			C04	C04	C08	C08/C16	C08	C16	C16	C16
Q	Cross section (at cable length < 50 m)	mm ²	0.75	0.75	1.5	1.5/2.5	1.5	2.5	2.5	2.5

2.6 E°SL-071...

2.6.1 Dimensions



All dimensions indicated in mm

Motor type	Length (L)
E°SL-071-12-45-01-NN0	198
E°SL-071-12-45-03-NK0	198
E°SL-071-12-45-03-NN0	199
E°SL-071-12-45-05-BN0	239,5
E°SL-071-12-45-20-NN0	198,5
E°SL-071-12-45-24-BN0	228,5
E°SL-071-12-45-38-BN0	229
E°SL-071-12-45-38-NN0	199
E°SL-071-12-60-37-BN31	328
E°SL-071-12-60-37-BN31	327
E°SL-071-20-45-01-BN0	273
E°SL-071-20-45-01-NK0	249
E°SL-071-20-45-01-NN0	248
E°SL-071-20-45-24-NN0	248,5
E°SL-071-26-45-01-BN0	318
E°SL-071-26-45-01-NN0	298

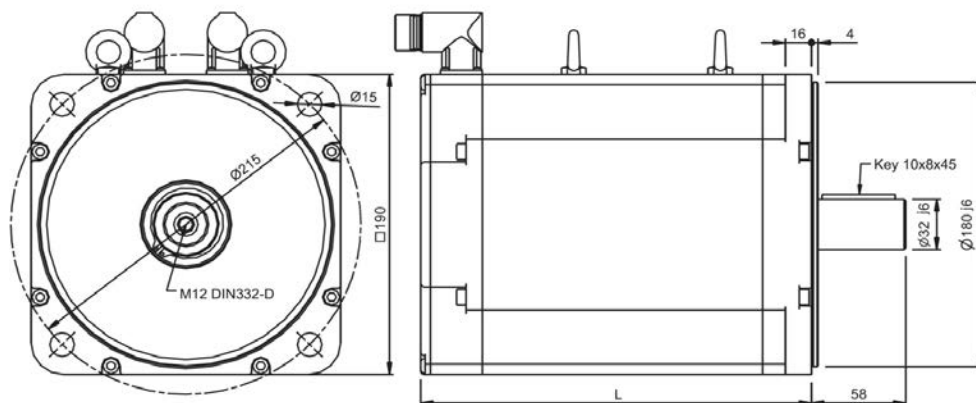
Tab. 6: Measure of length

2.6.2 Technical data

Motor type			E°SL-071-12-45...	E°SL-071-20-30...	E°SL-071-20-45...	E°SL-071-26-30...	E°SL-071-26-45...
Recommended servo drive: E°Darc			C16	C16/C32	C16/C32	C16/32	C32
M ₀	Stall torque	Nm	12.5	20.0	20.0	26	26.0
M _{max}	Peak torque	Nm	41.4	69.0	69.0	96.6	96.6
M _N	Rated torque	Nm	9.5	17.5	14.6	18.9	14.7
n _N	Rated speed	rpm	4500	3000	4500	3000	4500
n _k	Cutoff speed (at operating temperature)	rpm	4500	3000	4500	3000	4500
J	Rotor moment of inertia	kgcm ²	8.2	13.1	13.1	18.4	18.4
F _r	Max. radial force	N	590	720	630	740	560
F _a	Max. axial force	N	59	72	63	74	56
m	Weight (w/o brake)	kg	11.5	15.5	15.5	19.5	19.5
p	Number of pole pairs		4	4	4	4	4
k _T	Torque constant	Nm/A _{RMS}	1.09	1.63	1.09	1.63	1.09
k _E	Voltage constant	Vs	0.63	0.94	0.63	0.94	0.63
I ₀	Stall current	A _{RMS}	11.5	12.3	18.4	16.0	23.9
I _N	Rated current	A _{RMS}	8.7	10.7	13.4	11.6	13.5
P _N	Rated power	kW	4.5	5.5	6.9	5.9	6.9
R _W	Phase resistance	Ohm	0.26	0.33	0.15	0.21	0.1
L _W	Phase inductance	mH	3	3.2	1.6	2.5	1.2
t _a	Thermal time constant	min	40	46	46	49	49
U	Supply voltage	V AC	400	400	400	400	400
Brake							
M	Holding torque at 100 °C	Nm	15	15	15	15	15
J	Moment of inertia	kgcm ²	1.66	1.66	1.66	1.66	1.66
m	Weight	kg	1.5	1.5	1.5	1.5	1.5
U	Voltage DC +/- 10 %	V DC	24	24	24	24	24
I _B	Power consumption	A DC	1.0	1.0	1.0	1.0	1.0
R	Resistance	Ohm	24	24	24	24	24
Cable							
Q	Cross section (at cable length < 50 m)	mm ²	2.5	2.5	2.5	2.5	4

2.7 E°SL-100...

2.7.1 Dimensions



All dimensions indicated in mm

Motor type	Length (L)
E°SL-100-36-30-07-NN0	267
E°SL-100-36-30-38-NN0	257
E°SL-100-42-30-01-BN0	293
E°SL-100-42-30-01-NN0	279

Tab. 7: Measure of length

2.7.2 Technical data

Motor type			E°SL-100-36-30...	E°SL-100-42-30...
Recommended servo drive: E°Darc			C32	C32
M_0	Stall torque	Nm	36	42
M_{max}	Peak torque	Nm	144	180
M_N	Rated torque	Nm	28.0	32.5
n_N	Rated speed	rpm	3000	3000
n_k	Cutoff speed (at operating temperature)	rpm	3000	3000
J	Rotor moment of inertia	kgcm ²	60	74
F_r	Max. radial force	N	1000	1070
F_a	Max. axial force	N	100	107
m	Weight (w/o brake)	kg	25	30
p	Number of pole pairs		5	5
k_T	Torque constant	Nm/A _{RMS}	1.63	1.63
k_E	Voltage constant	Vs	0.94	0.94
I_0	Stall current	A _{RMS}	22.1	25.8
I_N	Rated current	A _{RMS}	17.2	19.9
P_N	Rated power	kW	8.8	10.2
RW	Phase resistance	Ohm	0.14	0.11
LW	Phase inductance	mH	2.5	2.0
t_a	Thermal time constant	min	41	46
U	Supply voltage	V AC	400	400
Brake				
M	Holding torque at 20 °C	Nm	48	48
J	Moment of inertia	kgcm ²	32	32
m	Weight	kg	3.8	3.8
U	Voltage DC +/- 10 %	V DC	24	24
I_B	Power consumption	A DC	0.85	0.85
R	Resistance	Ohm	28.3	28.3
Cable				
Q	Cross section (at cable length < 50 m)	mm ²	6	6

3 Connections

3.1 Power connections

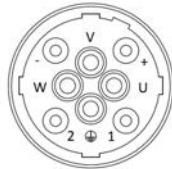
E°SL-028...-071...




Thread size: M23

Pin	Assignment
1	Phase U
2	PE
3	Phase V
4	Phase W
A	Temperature sensor T1
B	Temperature sensor T2
C	Brake B+
D	Brake B-

E°SL-100...



Thread size: M40

Pin	Assignment
U	Phase U
V	Phase V
W	Phase W
-	Brake B-
+	Brake B+
1	Temperature sensor +
2	Temperature sensor -
	PE

3.2 Feedback connections

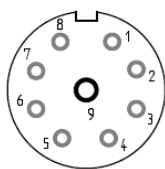


NOTE

The feedback type of a particular motor is determined by the two-digit type code at the following position of the type designation: E°Sx-0xx-xx-xx-**XX**-...

EnDat 2.2

Type codes: 31, 37, 38, 39

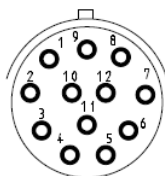


Thread size: M23

Pin	Assignment
1	Clock+
2	Clock-
3	U+
4	U-
5	Data+
6	Data-
7	U+
8	U-
9	Shield

Resolver

Type code: 01

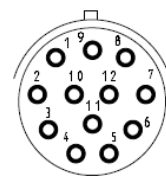


Thread size: M23

Pin	Assignment
1	COS-
2	SIN-
3	NC
4	NC
5	REF+
6	NC
7	REF-
8	NC
9	NC
10	COS+
11	SIN+
12	NC

Hiperface®

Type codes: 04, 05, 06, 07, 20



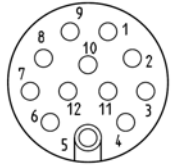
Thread size: M23

Pin	Assignment
1	REFCOS
2	+RS485
3	NC
4	NC
5	+SIN
6	REFSIN
7	-RS485
8	+COS
9	NC
10	GND (0V)
11	NC
12	Us (7-12 V)

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Absolute encoder

Type code: 24
(w/ final figures ...-xx0)

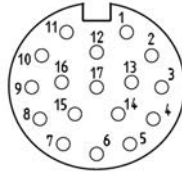


Thread size: M17

Pin	Assignment
1	DC + 5 V
2	GND_5V
3	SD
4	/SD
5	Shield
6	NC
7	Temp. +
8	Temp. -
9	V_batt
10	GND_batt
11	NC
12	NC

Absolute encoder

Type code: 24
(w/ final figures ...-xx6)



Thread size: M23

Pin	Assignment
1	DC + 5 V
2	GND_5V
3	SD
4	/SD
5	Shield
6	NC
7	Temp. +
8	Temp. -
9	V_batt
10	GND_batt
11	NC
12	NC
13	NC
14	NC
15	NC
16	NC
17	NC

4 Decommissioning and disposal

4.1 Disassembly

Only trained and authorised personnel are permitted to disassemble the device. When disassembling the device, follow the same safety instructions as during maintenance.

4.2 Disposal

Eckelmann FCS exclusively delivers components for machine equipment. We do not carry out measures for recovery or municipal waste management.



NOTE

The client is obliged in accordance with contractual agreements to carry out the disposal of waste electrical and electronical equipment in compliance with legal requirements based on EC directive 2012/19/EU.

