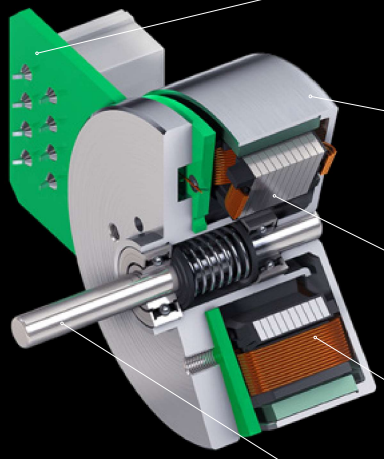
maxon EC flat

maxon EC flat

maxon flat motors are especially suitable for installation in confined spaces. The brushless motors are designed as internal and external rotors and can reach speeds of up to 20 000 rpm. The simple design makes it possible to automate the manufacturing – which is reflective in the price. maxon's EC flat motors are available with hall sensors, sensorless or with integrated electronics. These motors can also be combined with gearheads and encoders.

Key data

Motor ∅	9.2 ... 90 mm
Motor length	8 ... 39.9 mm
Power	0.5 ... 600 W
Nominal torque	up to 1610 mNm
Max. permissible speed	up to 25 000 rpm



Printed circuit board with cable or connector. Some sizes available with integrated encoder. This does not affect the motor's length. An integrated speed controller is also available.

External, multi-pole rotor for high torques. Versions with open rotor and integrated fan are available.

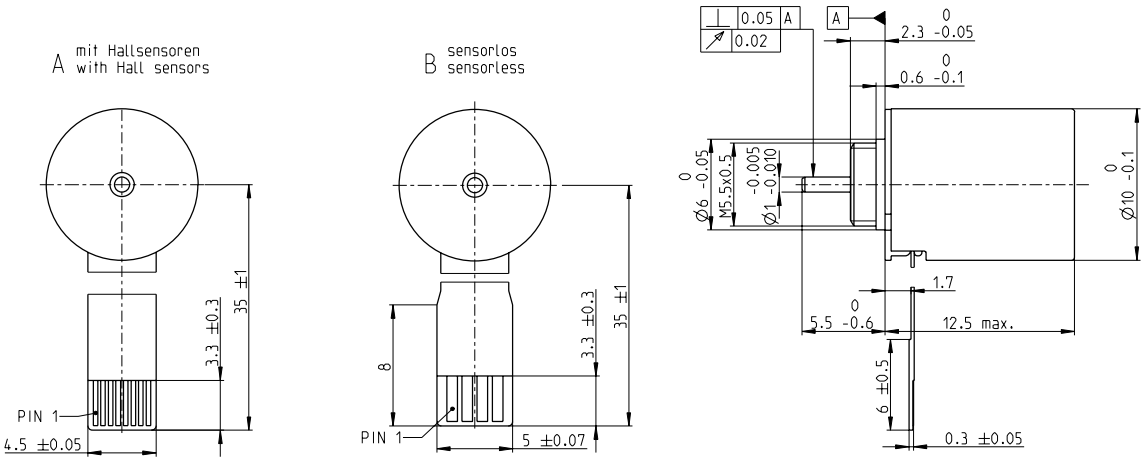
Stator packet optimally connected to the aluminum flange, for ideal heat dissipation.

Precision-manufactured winding for optimal fill factors.

Grooveless shaft ensures smooth running and extremely high torsional rigidity.

- → Attractive price/performance ratio
- → External, multi-pole rotor for high torques
- → Open design, for excellent heat dissipation at higher speeds

EC 9.2 flat ∅10 mm, brushless, 0.5 Watt



M 2:1

Stock program
Standard program
Special program (on request)

Part Numbers

A with Hall sensors	624161	624162	624163
B sensorless	371119	371120	371122

Motor Data (provisional)				
	Values at nominal voltage			
1	Nominal voltage	V	3	4.5	6
2	No load speed	rpm	14500	15100	15600
3	No load current	mA	53.9	38.3	30.9
4	Nominal speed	rpm	4830	5260	5240
5	Nominal torque	mNm	0.764	0.809	0.684
6	Nominal current	A	0.447	0.327	0.222
7	Stall torque[1]	mNm	1.22	1.32	1.1
8	Stall current	A	0.675	0.507	0.332
9	Max. efficiency	%	53	54	50
	Characteristics			
10	Terminal resistance phase to phase	Ω	4.44	8.88	18.1
11	Terminal inductance phase to phase	mH	0.12	0.25	0.4
12	Torque constant	mNm/A	1.81	2.61	3.3
13	Speed constant	rpm/V	5270	3660	2890
14	Speed/torque gradient	rpm/mNm	12900	12500	15800
15	Mechanical time constant	ms	32.1	30.9	39.3
16	Rotor inertia	gcm²	0.237	0.237	0.237

Specifications

Thermal data

17	Thermal resistance housing-ambient	49.2 K/W
18	Thermal resistance winding-housing	13.2 K/W
19	Thermal time constant winding	1.47 s
20	Thermal time constant motor	73.8 s
21	Ambient temperature	-20...+85°C
22	Max. winding temperature	+100°C

Mechanical data (preloaded ball bearings)

23	Max. speed		25000 rpm
24	Axial play at axial load	< 0.35 N	0 mm
		> 0.35 N	0.1 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		0.15 N
27	Max. force for press fits (static)		15 N
	(static, shaft supported)		70 N
28	Max. radial load, 4 mm from flange		0.4 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	3 g

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	Motor winding 1	Motor winding 1
Pin 2	Motor winding 2	Motor winding 2
Pin 3	Motor winding 3	Motor winding 3
Pin 4	V_{Hall} 3.8...24 VDC	Y
Pin 5	GND	
Pin 6	Hall sensor 1	
Pin 7	Hall sensor 2	
Pin 8	Hall sensor 3	

Output signals: CMOS compatible push-pull stage.

Compatible connector:

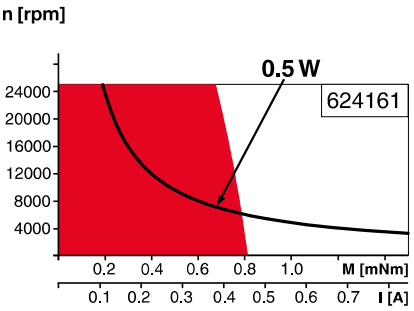
Type	Part number	Part number
Molex	52745-0897	52207-0460
FCI	SFV8R-2STBE1HLF	SFW4R-2STGE1LF

Pin for design with Hall sensors:
FPC, 8-pol, Pitch 0.5 mm, top contact style

Option: Sleeve bearings in place of ball bearings

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

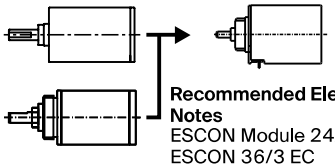
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅10 mm
0.005 - 0.1 Nm
Page 360

Planetary Gearhead
∅10 mm
0.01 - 0.15 Nm
Page 361

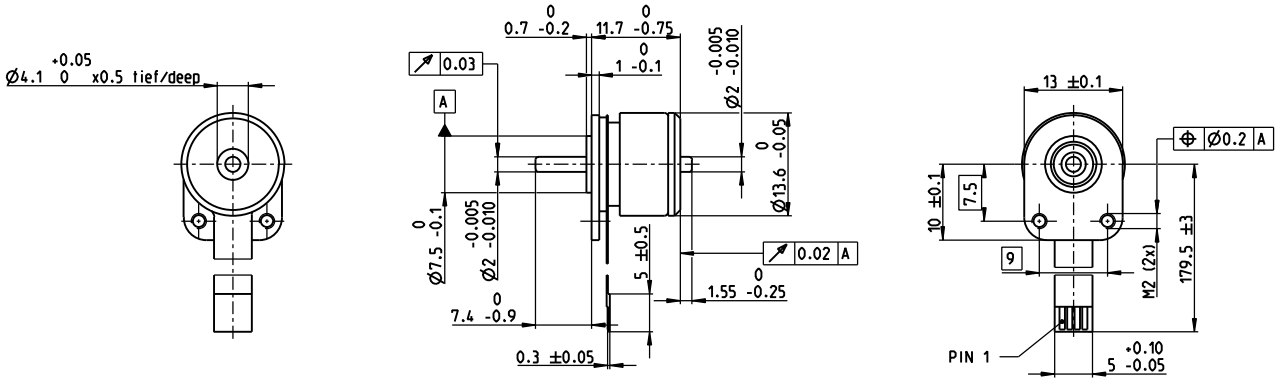


Recommended Electronics:

Notes	Page 38
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
DEC Module 24/2	491
EPOS4 Mod./Comp. 24/1.5	496

EC 14 flat ∅13.6 mm, brushless, 1.5 Watt

EC flat



M 1:1

Stock program
Standard program
Special program (on request)

Part Numbers

	sensorless	339251	339252	236679	339253
Motor Data					
	Values at nominal voltage				
1	Nominal voltage	V	6	12	18	24
2	No load speed	rpm	20000	20100	19900	20000
3	No load current	mA	156	78.1	51.7	38.9
4	Nominal speed	rpm	9600	9680	9390	9590
5	Nominal torque (max. continuous torque)	mNm	1.8	1.83	1.74	1.81
6	Nominal current (max. continuous current)	A	0.794	0.402	0.256	0.199
7	Stall torque[1]	mNm	3.79	3.87	3.6	3.8
8	Stall current	A	1.5	0.764	0.474	0.374
9	Max. efficiency	%	49	49	48	49
	Characteristics					
10	Terminal resistance phase to phase	Ω	4.01	15.7	38	64.1
11	Terminal inductance phase to phase	mH	0.107	0.428	0.962	1.71
12	Torque constant	mNm/A	2.53	5.06	7.6	10.1
13	Speed constant	rpm/V	3770	1890	1260	942
14	Speed/torque gradient	rpm/mNm	5980	5860	6270	5960
15	Mechanical time constant	ms	68.9	67.5	72.3	68.6
16	Rotor inertia	gcm²	1.1	1.1	1.1	1.1

Specifications

	Thermal data		
17	Thermal resistance housing-ambient		11.6 K/W
18	Thermal resistance winding-housing		11.3 K/W
19	Thermal time constant winding		1.37 s
20	Thermal time constant motor		49.2 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+125°C
	Mechanical data (preloaded ball bearings)		
23	Max. speed		22000 rpm
24	Axial play at axial load	< 1.5 N	0 mm
		> 1.5 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1.3 N
27	Max. force for press fits (static)		18 N
	(static, shaft supported)		200 N
28	Max. radial load, 5 mm from flange		3.4 N
	Other specifications		
29	Number of pole pairs		4
30	Number of phases		3
31	Weight of motor		8 g

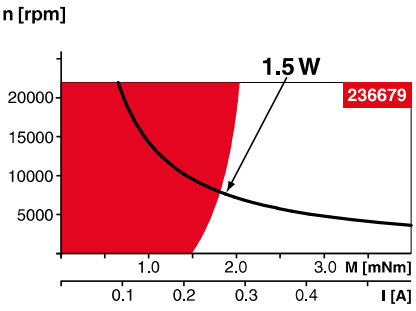
Values listed in the table are nominal.

Connection

Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	⅄ neutral point
Adapter	**Part number**
see p. 514	220310
Connector	**Part number**
TE	84953-4
Molex	52207-0433

[1]Calculation does not include saturation effect (p. 61/168)

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

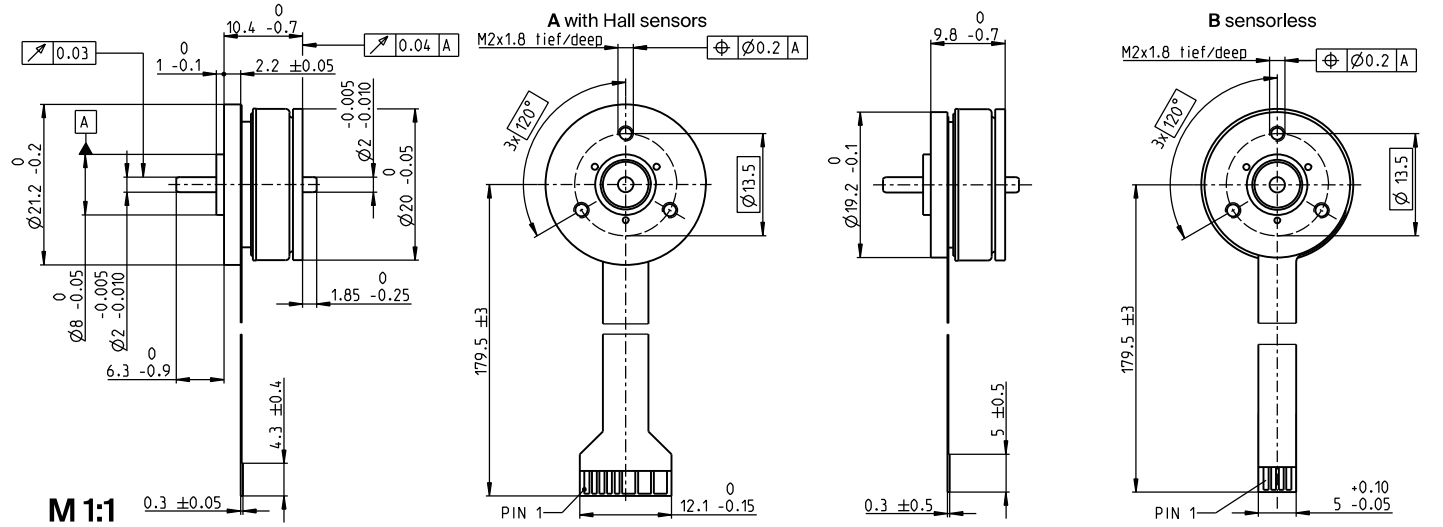
Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System Details on catalog page 38

Recommended Electronics:
Notes Page **38**
ESCON Mod. 50/4 EC-S 487

EC 20 flat ∅20 mm, brushless, 3 Watt



Stock program
Standard program
Special program (on request)

Part Numbers

A with Hall sensors	351098	351099	351100	351101
B sensorless	339255	241916	339257	339258

Motor Data									
	Values at nominal voltage								
1	Nominal voltage	V	6	9	12	24			
2	No load speed	rpm	9070	9760	9540	9450			
3	No load current	mA	53.6	35.1	25.8	12.6			
4	Nominal speed	rpm	3030	4140	3490	3830			
5	Nominal torque (max. continuous torque)	mNm	3.22	4.08	3.28	3.78			
6	Nominal current (max. continuous current)	A	0.56	0.478	0.294	0.163			
7	Stall torque[1]	mNm	5.29	8.04	5.67	7.12			
8	Stall current	A	0.9	0.957	0.503	0.309			
9	Max. efficiency	%	59	66	61	65			
	Characteristics								
10	Terminal resistance phase to phase	Ω	6.67	9.4	23.9	77.7			
11	Terminal inductance phase to phase	mH	0.639	1.3	2.35	9.8			
12	Torque constant	mNm/A	5.88	8.4	11.3	23			
13	Speed constant	rpm/V	1620	1140	847	414			
14	Speed/torque gradient	rpm/mNm	1840	1270	1790	1400			
15	Mechanical time constant	ms	74.1	51.2	72.1	56.2			
16	Rotor inertia	gcm²	3.84	3.84	3.84	3.84			

Specifications

Thermal data

17	Thermal resistance housing-ambient	19.2 K/W
18	Thermal resistance winding-housing	8.41 K/W
19	Thermal time constant winding	3.69 s
20	Thermal time constant motor	31.8 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	15000 rpm
24	Axial play at axial load < 2.0 N	0 mm
	> 2.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	1.8 N
27	Max. force for press fits (static)	18 N
	(static, shaft supported)	200 N
28	Max. radial load, 5 mm from flange	1.9 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	15 g

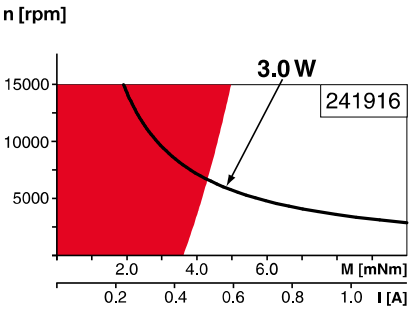
Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	V_{Hall} 4.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	⅄ neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	
Adapter	**Part number**	**Part number**
see p. 514	220300	220310
Connector	**Part number**	**Part number**
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 49

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

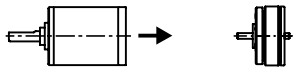
Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

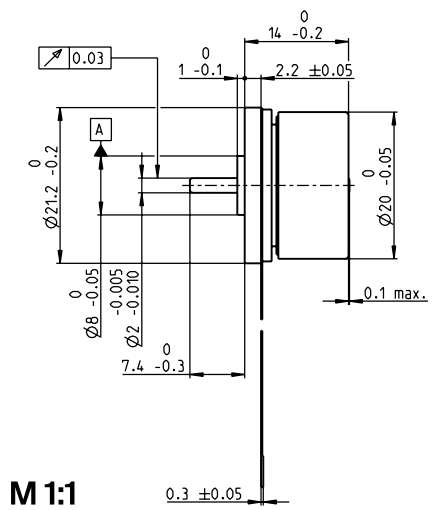
Planetary Gearhead
∅22 mm
0.5 - 2.0 Nm
Page 374/377



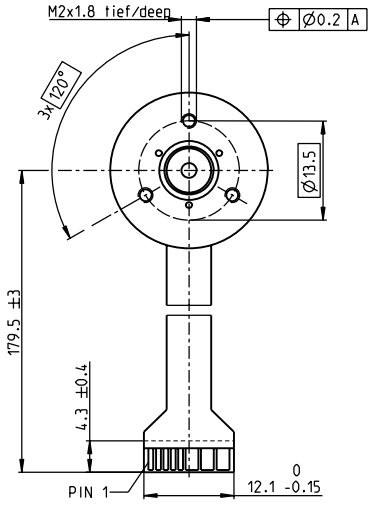
Recommended Electronics:

Notes	Page 38
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
DEC Module 24/2	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Comp. 24/5 3-axes	497

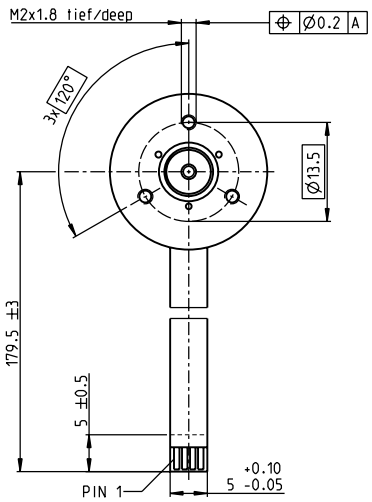
EC 20 flat ∅20 mm, brushless, 5 Watt



A with Hall sensors



B sensorless



Stock program
Standard program
Special program (on request)

Part Numbers

A with Hall sensors	351005	351006	351007	**351008**
B sensorless	351054	351055	351056	351057

Motor Data (provisional)						
	Values at nominal voltage					
1	Nominal voltage	V	6	9	12	24
2	No load speed	rpm	9350	9430	9380	9300
3	No load current	mA	102	68.3	51.1	25.1
4	Nominal speed	rpm	4780	5310	5170	5220
5	Nominal torque (max. continuous torque)	mNm	7.59	8.58	7.59	7.74
6	Nominal current (max. continuous current)	A	1.31	0.974	0.655	0.329
7	Stall torque[1]	mNm	17.2	22.4	18.9	19.9
8	Stall current	A	2.93	2.54	1.61	0.838
9	Max. efficiency	%	67	71	68	69
	Characteristics					
10	Terminal resistance phase to phase	Ω	2.05	3.54	7.45	28.6
11	Terminal inductance phase to phase	mH	0.189	0.424	0.754	3.09
12	Torque constant	mNm/A	5.88	8.82	11.8	23.8
13	Speed constant	rpm/V	1620	1080	812	402
14	Speed/torque gradient	rpm/mNm	567	435	515	484
15	Mechanical time constant	ms	30.3	23.2	27.5	25.8
16	Rotor inertia	gcm²	5.1	5.1	5.1	5.1

Specifications

Thermal data

17	Thermal resistance housing-ambient	16.5 K/W
18	Thermal resistance winding-housing	2.66 K/W
19	Thermal time constant winding	1.77 s
20	Thermal time constant motor	27.5 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		15 000 rpm
24	Axial play at axial load	< 2.0 N	0 mm
		> 2.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1.8 N
27	Max. force for press fits (static)		26 N
	(static, shaft supported)		200 N
28	Max. radial load, 5 mm from flange		5.3 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	22 g

Values listed in the table are nominal.

Connection	**with Hall sensors**	**sensorless**
Pin 1	V_{Hall} 4.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	⅄ neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

Adapter	**Part number**	**Part number**
see p. 514	220300	220310

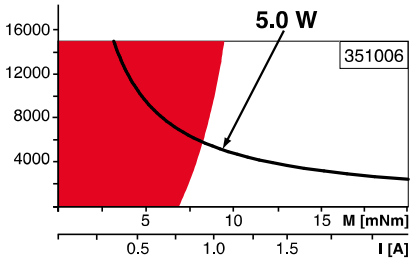
Connector	**Part number**	**Part number**
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 49

[1]Calculation does not include saturation effect

Operating Range

n [rpm]



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

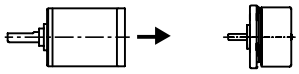
Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅22 mm
0.5 - 2.0 Nm
Page 374/377

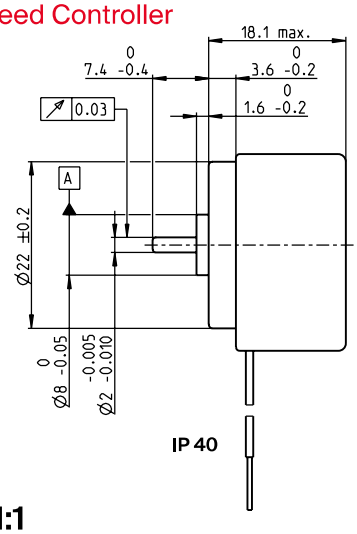


Recommended Electronics:

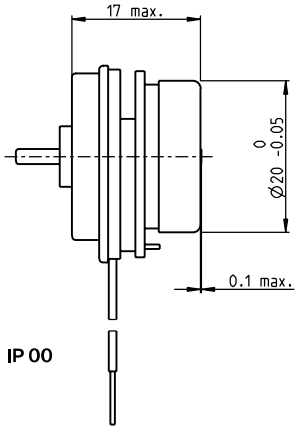
Notes	Page **38**
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
DEC Module 24/2	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Comp. 24/5 3-axes	497

EC 20 flat brushless, 2 Watt, with integrated electronics

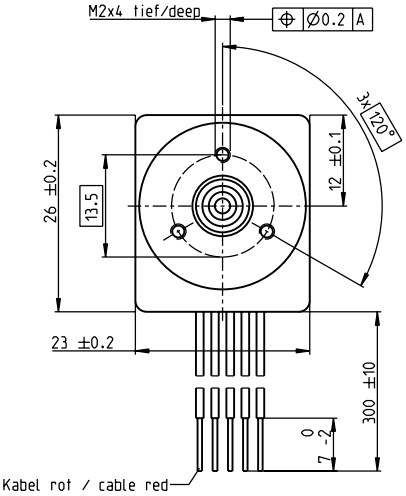
1-Q-Speed Controller



IP 40



IP 00



M 1:1

EC flat

Stock program
Standard program
Special program (on request)

Part Numbers	5 wire version	
	Enable	Direction
IP 40 (with cover)	688690	688691
IP 00 (without cover)	688710	688711

Motor Data									
	Values at nominal voltage								
1	Nominal voltage	V	24	24					
2	No load speed	rpm	6000	6000					
3	No load current	mA	14.7	14.7					
4	Nominal speed	rpm	6000	6000					
5	Nominal torque (max. continuous torque)	mNm	3.55	3.55					
6	Nominal current (max. continuous current)	A	0.208	0.208					
33	Max. torque	mNm	6.13	6.13					
34	Max. current	A	0.73	0.73					
9	Max. efficiency	%	52	52					
	Characteristics								
35	Type of control		Speed	Speed					
36	Supply voltage $+V_{CC}$	V	10...28	10...28					
37	Speed set value input	V	0.33...10.8	0.33...10.8					
38	Scale speed set value input	rpm/V	600	600					
39	Speed range	rpm	200...6480	200...6480					
40	Max. acceleration	rpm/s	6000	6000					

Specifications

Thermal data

17	Thermal resistance housing-ambient	17.2 K/W
18	Thermal resistance winding-housing	7.98 K/W
19	Thermal time constant winding	2.37 s
20	Thermal time constant motor	132 s
21	Ambient temperature	-40...+85°C
22	Max. winding temperature	+125°C
41	Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16	Rotor inertia		3.84 gcm²
24	Axial play at axial load	< 2.0 N	0 mm
		> 2.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1.8 N
27	Max. force for press fits (static)		26 N
	(static, shaft supported)		200 N
28	Max. radial load, 5 mm from flange		11 N

Other specifications

31	Weight of motor	30 g
32	Direction of rotation	Clockwise (CW)

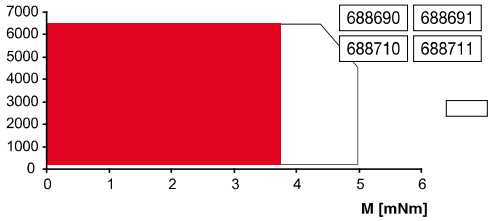
Values listed in the table are nominal.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 28)

red	$+V_{CC}$ 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range



Comments

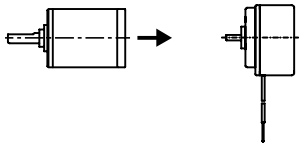
Continuous operation
The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

maxon Modular System

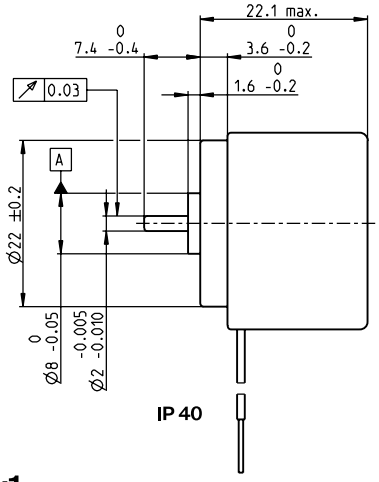
Details on catalog page 38

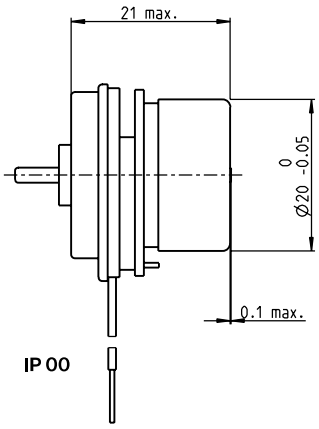
Planetary Gearhead
∅22 mm
0.5 - 2.0 Nm
Page 374/377

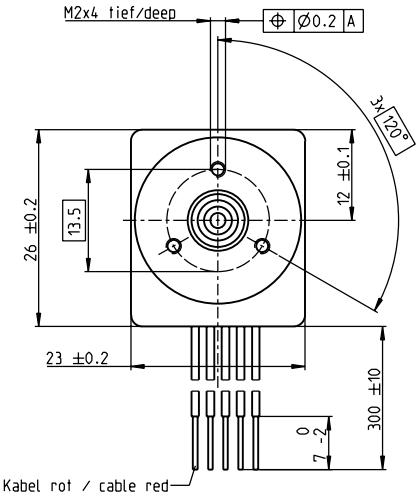


EC 20 flat brushless, 5 Watt, with integrated electronics

1-Q-Speed Controller







M 1:1

Stock program
Standard program
Special program (on request)

Part Numbers	5 wire version	
	Enable	Direction
IP 40 (with cover)	688692	688693
IP 00 (without cover)	688712	688713

Motor Data				
	Values at nominal voltage			
1	Nominal voltage	V	24	24
2	No load speed	rpm	6000	6000
3	No load current	mA	32.9	32.9
4	Nominal speed	rpm	6000	6000
5	Nominal torque (max. continuous torque)	mNm	7.31	7.31
6	Nominal current (max. continuous current)	A	0.377	0.377
33	Max. torque	mNm	13.2	13.2
34	Max. current	A	0.73	0.73
9	Max. efficiency	%	54	54
	Characteristics			
35	Type of control		Speed	Speed
36	Supply voltage $+V_{CC}$	V	10...28	10...28
37	Speed set value input	V	0.33...10.8	0.33...10.8
38	Scale speed set value input	rpm/V	600	600
39	Speed range	rpm	200...6480	200...6480
40	Max. acceleration	rpm/s	6000	6000

Specifications

	Thermal data		
17	Thermal resistance housing-ambient		10.6 K/W
18	Thermal resistance winding-housing		5.32 K/W
19	Thermal time constant winding		3.66 s
20	Thermal time constant motor		13.9 s
21	Ambient temperature		-40...+85°C
22	Max. winding temperature		+125°C
41	Max. temperature of electronics		+105°C
	Mechanical data (preloaded ball bearings)		
16	Rotor inertia		5.1 gcm²
24	Axial play at axial load	< 2.0 N	0 mm
		> 2.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		1.8 N
27	Max. force for press fits (static)		26 N
	(static, shaft supported)		200 N
28	Max. radial load, 5 mm from flange		12 N
	Other specifications		
31	Weight of motor		37 g
32	Direction of rotation		Clockwise (CW)

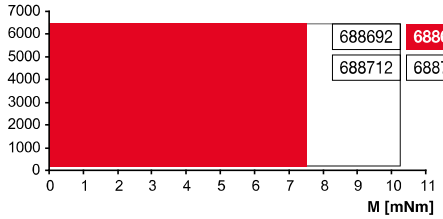
Values listed in the table are nominal.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 28)

red	$+V_{CC}$ 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range



Comments

Continuous operation
The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

maxon Modular System

Details on catalog page 38

Planetary Gearhead
Ø22 mm
0.5 - 2.0 Nm
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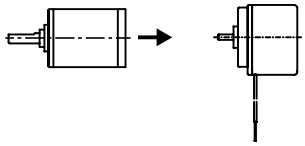
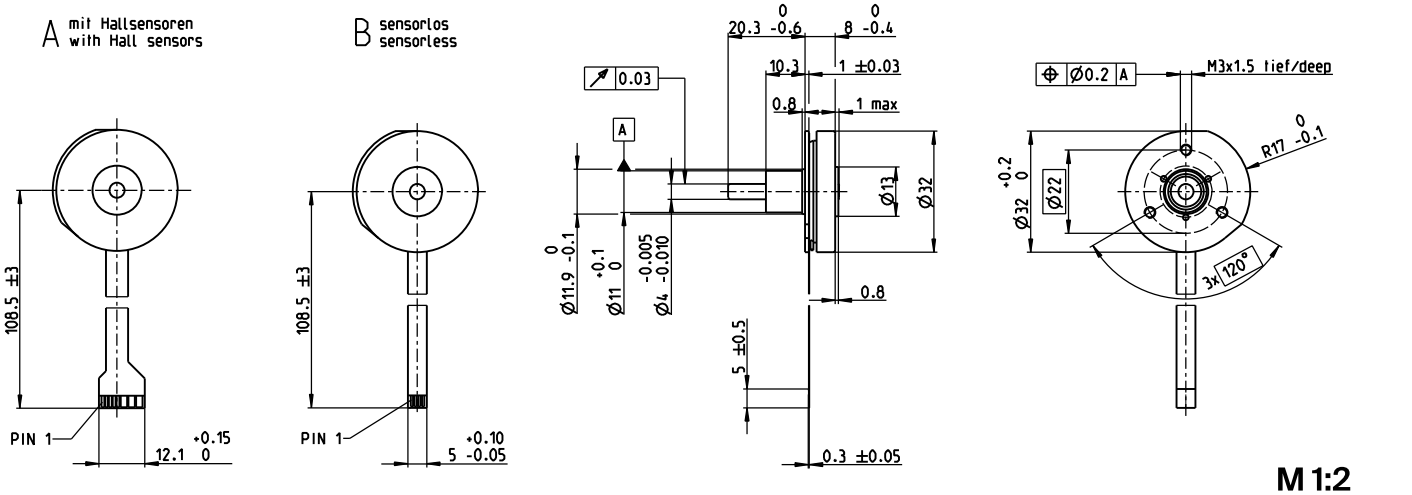


EC 32 flat ∅32 mm, brushless, 6 Watt



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

A with Hall sensors	339259	200187	339260	339261
B sensorless	339263	200138	339264	339265

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	6	9	12	24
2	No load speed	rpm	9210	8380	7970	9310
3	No load current	mA	186	107	75.6	46.2
4	Nominal speed	rpm	3860	3640	3210	4480
5	Nominal torque (max. continuous torque)	mNm	7.61	8.89	7.98	9.42
6	Nominal current (max. continuous current)	A	1.37	0.929	0.614	0.401
7	Stall torque[1]	mNm	15.5	19	15.7	22.8
8	Stall current	A	2.73	2	1.19	0.995
9	Max. efficiency	%	55	60	57	62
	Characteristics					
10	Terminal resistance phase to phase	Ω	2.2	4.5	10.1	24.1
11	Terminal inductance phase to phase	mH	0.378	1.06	2.04	6.19
12	Torque constant	mNm/A	5.67	9.5	13.2	23
13	Speed constant	rpm/V	1680	1010	724	416
14	Speed/torque gradient	rpm/mNm	651	476	551	437
15	Mechanical time constant	ms	94.8	69.3	80.3	63.6
16	Rotor inertia	gcm²	13.9	13.9	13.9	13.9

Specifications

	Thermal data		
17	Thermal resistance housing-ambient		8.25 K/W
18	Thermal resistance winding-housing		6.21 K/W
19	Thermal time constant winding		3.48 s
20	Thermal time constant motor		22.1 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+125°C
	Mechanical data (preloaded ball bearings)		
23	Max. speed		12000 rpm
24	Axial play at axial load	< 5.0 N	0 mm
		> 5.0 N	typ. 0.6 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		4.8 N
27	Max. force for press fits (static)		45 N
	(static, shaft supported)		1000 N
28	Max. radial load, 15 mm from flange		10.5 N
	Other specifications		
29	Number of pole pairs		4
30	Number of phases		3
31	Weight of motor		32 g

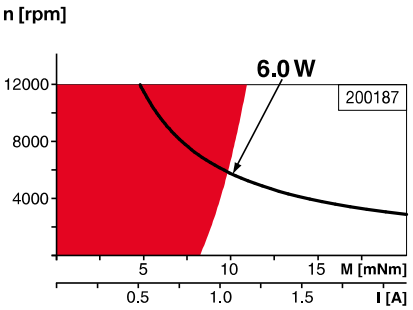
Values listed in the table are nominal.

Connection	**with Hall sensors**	**sensorless**
Pin 1	V_{Hall} 3.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	⅄ neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	
Adapter see p. 514	**Part number** 220300	**Part number** 220310
Connector	**Part number**	**Part number**
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 49

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

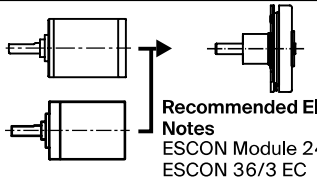
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅22 mm
0.5 - 1.0 Nm
Page 374

Planetary Gearhead
∅22 mm
0.5 - 2.0 Nm
Page 377

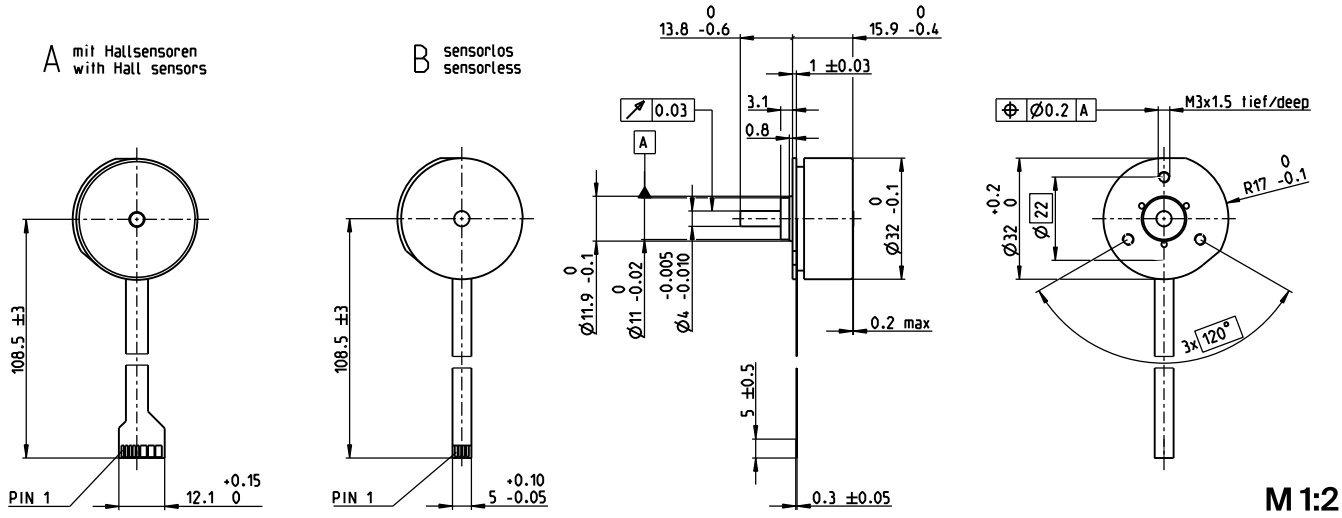


Recommended Electronics:

Notes	Page **38**
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
DEC Module 24/2	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Comp. 24/5 3-axes	497

EC 32 flat ∅32 mm, brushless, 15 Watt

EC flat



Stock program
Standard program
Special program (on request)

Part Numbers				
A with Hall sensors	339267	339268	**267121**	339269
B sensorless	339271	339272	226006	339273

Motor Data										
	Values at nominal voltage									
1	Nominal voltage	V	9	12	24	48				
2	No load speed	rpm	3720	4610	4530	4780				
3	No load current	mA	74.7	75.7	36.9	19.9				
4	Nominal speed	rpm	2060	2790	2760	2940				
5	Nominal torque (max. continuous torque)	mNm	24.5	25	25.5	24.7				
6	Nominal current (max. continuous current)	A	1.06	1	0.5	0.257				
7	Stall torque[1]	mNm	68.3	82.3	85.3	83.9				
8	Stall current	A	3.06	3.42	1.74	0.904				
9	Max. efficiency	%	71	73	73	73				
	Characteristics									
10	Terminal resistance phase to phase	Ω	2.95	3.51	13.8	53.1				
11	Terminal inductance phase to phase	mH	1.61	1.86	7.72	27.7				
12	Torque constant	mNm/A	22.4	24.1	49	92.8				
13	Speed constant	rpm/V	427	397	195	103				
14	Speed/torque gradient	rpm/mNm	56.3	57.8	54.8	58.8				
15	Mechanical time constant	ms	20.6	21.2	20.1	21.6				
16	Rotor inertia	gcm²	35	35	35	35				

Specifications

Thermal data

17	Thermal resistance housing-ambient	10.8 K/W
18	Thermal resistance winding-housing	4.99 K/W
19	Thermal time constant winding	8.78 s
20	Thermal time constant motor	120 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		10 000 rpm
24	Axial play at axial load	< 5.0 N	0 mm
		> 5.0 N	typ. 0.6 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		4.8 N
27	Max. force for press fits (static)		45 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		14 N

Other specifications

29	Number of pole pairs	4
30	Number of phases	3
31	Weight of motor	57 g

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	V_{Hall} 3.5...24 VDC	Motor winding 1
Pin 2	Hall sensor 3	Motor winding 2
Pin 3	Hall sensor 1	Motor winding 3
Pin 4	Hall sensor 2	⅄ neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

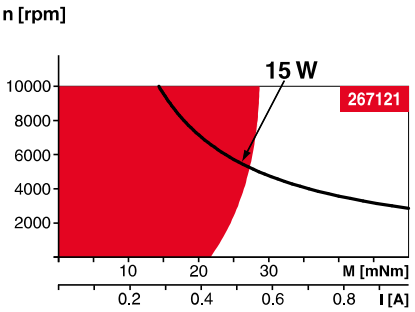
Adapter	Part number	Part number
see p. 514	220300	220310

Connector	Part number	Part number
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style
Wiring diagram for Hall sensors see p. 49

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅32 mm
0.75 - 6 Nm
Page 385/388

Spur Gearhead
∅38 mm
0.1 - 0.6 Nm
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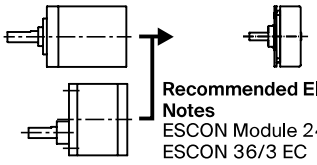
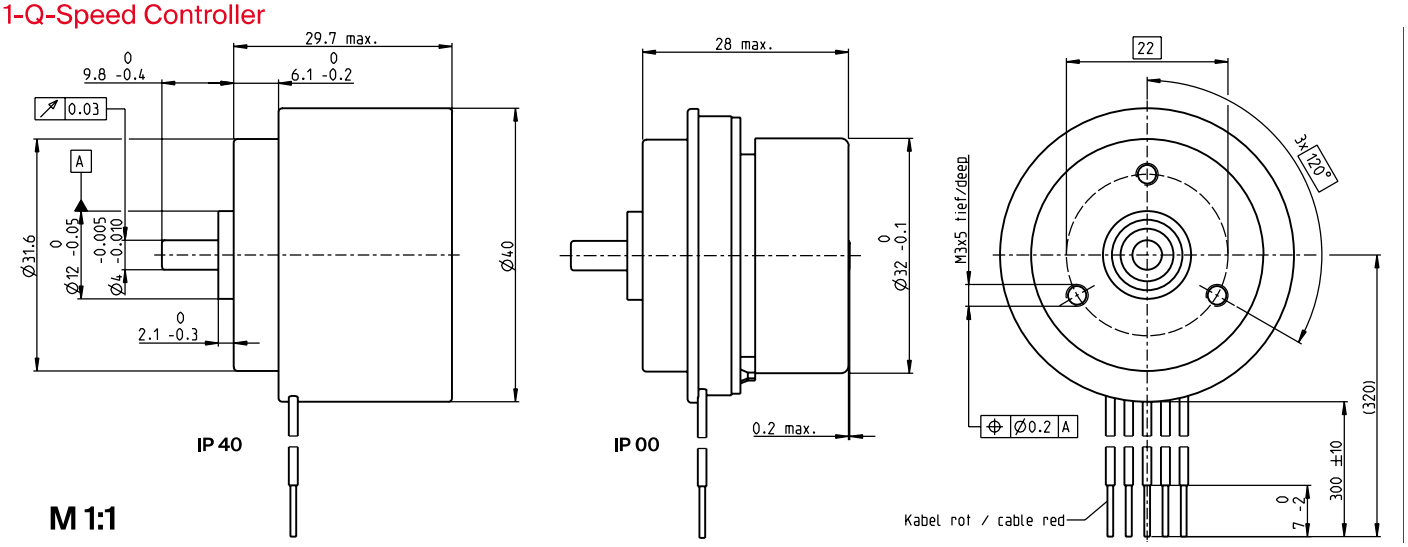


Recommended Electronics:

Notes	Page **38**
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
ESCON Module 50/5	487
ESCON 50/5	489
DEC Module 24/2	491
DEC Module 50/5	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Mod./Comp. 50/5	496
EPOS4 Comp. 24/5 3-axes	497
EPOS4 50/5	501

EC 32 flat brushless, 15 Watt, with integrated electronics

1-Q-Speed Controller



EC flat

Stock program
Standard program
Special program (on request)

Part Numbers					
	2 wire version		5 wire version		
			Enable	Direction	
IP 40 (with cover)	353400	353401	353399	370418	
IP 00 (without cover)	353324	353325	349801	370417	

Motor Data									
	Values at nominal voltage								
1	Nominal voltage	V	24	24	24	24			
2	No load speed	rpm	3000	6000	6000	6000			
3	No load current	mA	44.8	84.6	84.6	84.6			
4	Nominal speed	rpm	3000	6000	6000	6000			
5	Nominal torque (max. continuous torque)	mNm	18.8	18.6	18.6	18.6			
6	Nominal current (max. continuous current)	A	0.44	0.741	0.741	0.741			
33	Max. torque	mNm	35.8	35.8	35.8	35.8			
34	Max. current	A	1.6	1.6	1.6	1.6			
9	Max. efficiency	%	58	66	66	66			
	Characteristics								
35	Type of control		Speed	Speed	Speed	Speed			
36	Supply voltage $+V_{CC}$	V	10...28	10...28	10...28	10...28			
37	Speed set value input	V	= V_{CC}	= V_{CC}	0.33...10.8	0.33...10.8			
38	Scale speed set value input	rpm/V	125	250	600	600			
39	Speed range	rpm	1250...3500	2500...7000	200...6480	200...6480			
40	Max. acceleration	rpm/s	3000	6000	6000	6000			

Specifications

Thermal data

17	Thermal resistance housing-ambient	7.24 K/W
18	Thermal resistance winding-housing	4.99 K/W
19	Thermal time constant winding	8.69 s
20	Thermal time constant motor	80.5 s
21	Ambient temperature	-40...+85°C
22	Max. winding temperature	+125°C
41	Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16	Rotor inertia		35 gcm²
24	Axial play at axial load	< 7.0 N	0 mm
		> 7.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		6.8 N
27	Max. force for press fits (static)		95 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		37 N

Other specifications

31	Weight of motor	91 g
32	Direction of rotation	Clockwise (CW)

Values listed in the table are nominal.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

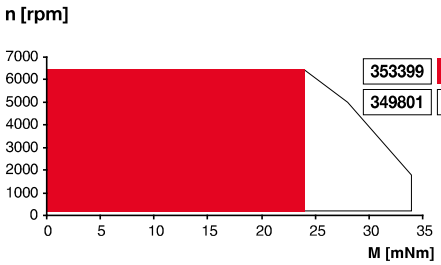
Connection 2 wire version (Cable AWG 24)

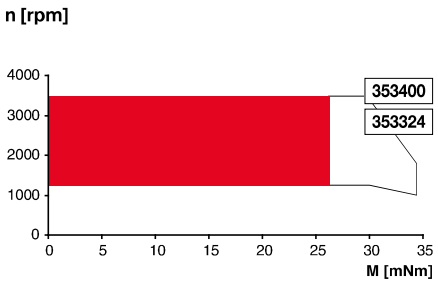
red	$+V_{CC}$ 10...28 VDC
black	GND

Connection 5 wire version (Cable AWG 24)

red	$+V_{CC}$ 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range

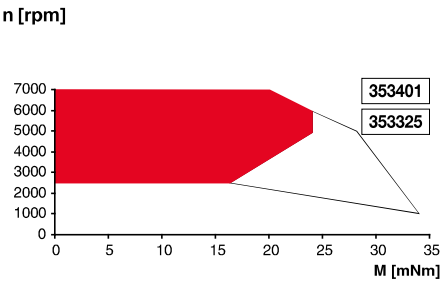




Comments

Continuous operation
The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

Overload range
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

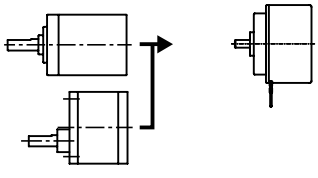


maxon Modular System

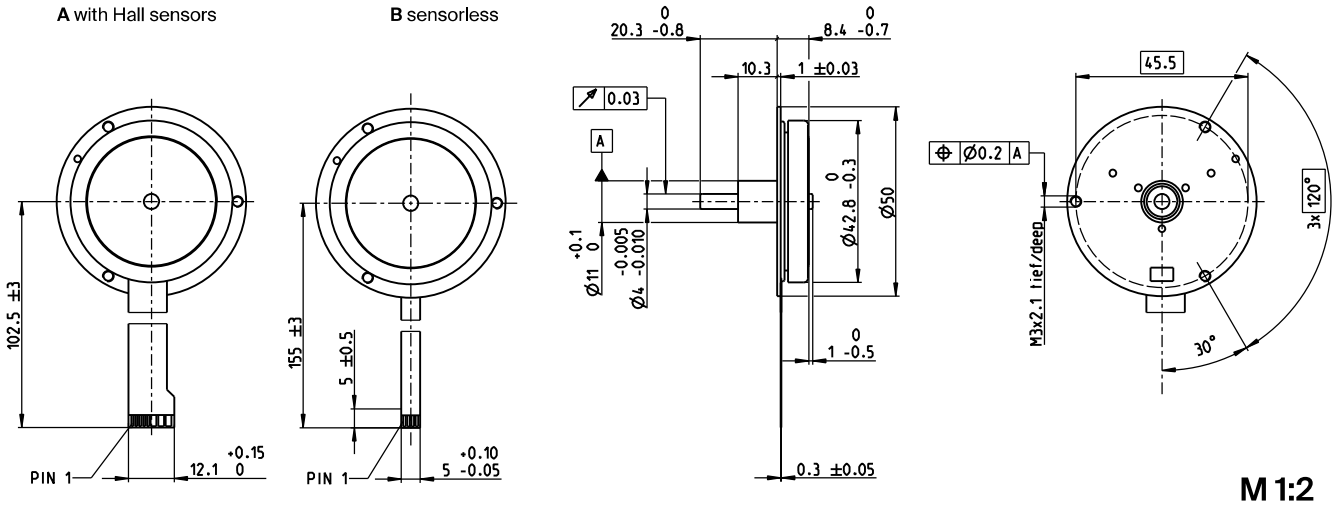
Details on catalog page 38

Planetary Gearhead
Ø32 mm
0.75 - 6 Nm
Page 385/388

Spur Gearhead
Ø38 mm
0.1 - 0.6 Nm
Page 395



EC 45 flat ∅42.8 mm, brushless, 12 Watt



M 1:2

Stock program
Standard program
Special program (on request)

	Part Numbers					
A with Hall sensors	200188		339275		339276	
B sensorless		200141		339277		339278
Motor Data						
Values at nominal voltage						
1 Nominal voltage V	9	9	12	12	24	24
2 No load speed rpm	8000	7980	8160	8150	7310	7300
3 No load current mA	147	147	115	115	47.6	47.6
4 Nominal speed rpm	4780	4540	4840	4720	4390	4360
5 Nominal torque (max. continuous torque) mNm	23.8	23.6	20.1	20	27	27.1
6 Nominal current (max. continuous current) A	2.04	2.04	1.37	1.37	0.766	0.768
7 Stall torque[1] mNm	92.6	80.6	70.8	66.5	114	112
8 Stall current A	8.9	7.75	5.24	4.92	3.74	3.67
9 Max. efficiency %	77	75	73	73	79	79
Characteristics						
10 Terminal resistance phase to phase Ω	1.01	1.16	2.29	2.44	6.42	6.54
11 Terminal inductance phase to phase mH	0.32	0.32	0.541	0.541	2.75	2.75
12 Torque constant mNm/A	10.4	10.4	13.5	13.5	30.5	30.5
13 Speed constant rpm/V	918	918	706	706	313	313
14 Speed/torque gradient rpm/mNm	89.3	103	120	128	65.9	67.1
15 Mechanical time constant ms	48.9	56.1	65.5	69.8	36.1	36.8
16 Rotor inertia gcm²	52.3	52.3	52.3	52.3	52.3	52.3

Specifications

Thermal data

17	Thermal resistance housing-ambient	6.59 K/W
18	Thermal resistance winding-housing	5.56 K/W
19	Thermal time constant winding	8.36 s
20	Thermal time constant motor	188 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	10 000 rpm
24	Axial play at axial load < 5.0 N	0 mm
	> 5.0 N	typ. 0.6 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	4.8 N
27	Max. force for press fits (static)	45 N
	(static, shaft supported)	1000 N
28	Max. radial load, 15 mm from flange	12.5 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	57 g

Values listed in the table are nominal.

Connection	with Hall sensors	sensorless
Pin 1	V_{Hall} 4.5...18 VDC	Motor winding 1
Pin 2	Hall sensor 3*	Motor winding 2
Pin 3	Hall sensor 1*	Motor winding 3
Pin 4	Hall sensor 2*	⅄ neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

*Internal pull-up (7...13 kΩ) on V_{Hall}
Wiring diagram for Hall sensors see p. 49

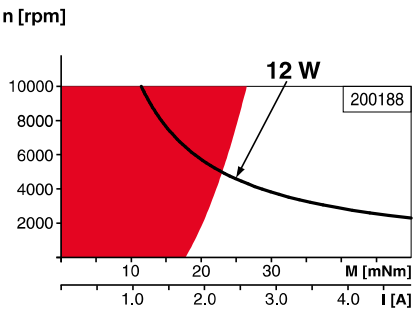
Adapter	Part number	Part number
see p. 514	220300	220310

Connector	Part number	Part number
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System Details on catalog page 38

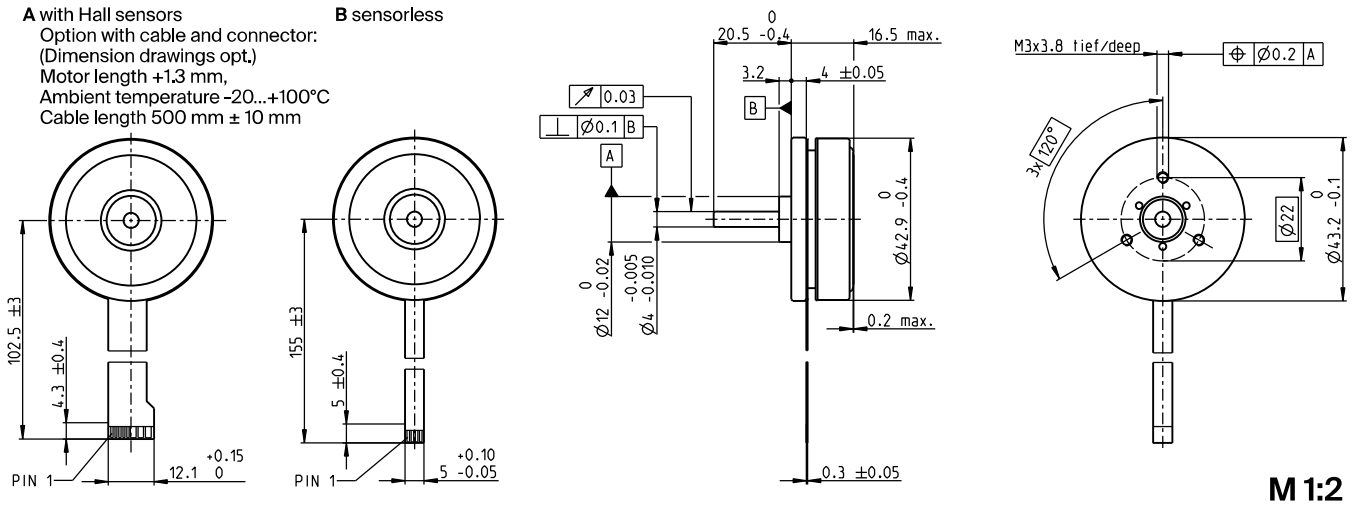
Recommended Electronics:

Notes	Page 38
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
DEC Module 24/2	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Mod./Comp. 50/5	496
EPOS4 Comp. 24/5 3-axes	497
EPOS4 50/5	501

EC 45 flat ∅42.9 mm, brushless, 30 Watt

A with Hall sensors
Option with cable and connector:
(Dimension drawings opt.)
Motor length +1.3 mm,
Ambient temperature -20...+100°C
Cable length 500 mm ± 10 mm

B sensorless



M 1:2

Stock program
Standard program
Special program (on request)

	Part Numbers					
A with Hall sensors	200142		339281		339282	
Option with Cable and Connector	668555		668556		668557	
B sensorless		200189		339283		339284

Motor Data								
	Values at nominal voltage							
1	Nominal voltage	V	12	12	24	24	36	36
2	No load speed	rpm	4370	4350	4360	4380	4750	4760
3	No load current	mA	163	163	81.4	73	61.6	55.3
4	Nominal speed	rpm	2940	2800	2940	2900	3290	3270
5	Nominal torque (max. continuous torque)	mNm	55	54.7	54.8	55.2	66	66.6
6	Nominal current (max. continuous current)	A	2.02	2.02	1.01	1.01	0.847	0.849
7	Stall torque[1]	mNm	255	219	253	243	380	369
8	Stall current	A	10	8.58	4.97	4.77	5.38	5.22
9	Max. efficiency	%	76	75	76	77	80	81
	Characteristics							
10	Terminal resistance phase to phase	Ω	1.2	1.4	4.83	5.03	6.69	6.89
11	Terminal inductance phase to phase	mH	0.56	0.56	2.24	2.24	4.29	4.29
12	Torque constant	mNm/A	25.5	25.5	51	51	70.6	70.6
13	Speed constant	rpm/V	374	374	187	187	135	135
14	Speed/torque gradient	rpm/mNm	17.6	20.5	17.7	18.5	12.8	13.2
15	Mechanical time constant	ms	17.1	19.9	17.2	17.9	12.4	12.8
16	Rotor inertia	gcm²	92.5	92.5	92.5	92.5	92.5	92.5

Specifications

	Thermal data		
17	Thermal resistance housing-ambient		6.69 K/W
18	Thermal resistance winding-housing		3.92 K/W
19	Thermal time constant winding		11.4 s
20	Thermal time constant motor		295 s
21	Ambient temperature		-40...+100°C
22	Max. winding temperature		+125°C
	Mechanical data (preloaded ball bearings)		
23	Max. speed		10 000 rpm
24	Axial play at axial load	< 5.0 N	0 mm
		> 5.0 N	typ. 0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		4.8 N
27	Max. force for press fits (static)		53 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		18 N
	Other specifications		
29	Number of pole pairs		8
30	Number of phases		3
31	Weight of motor		75 g

Values listed in the table are nominal.

Connection	**with Hall sensors**	**sensorless**
Pin 1	V_{Hall} 4.5...18 VDC	Motor winding 1
Pin 2	Hall sensor 3*	Motor winding 2
Pin 3	Hall sensor 1*	Motor winding 3
Pin 4	Hall sensor 2*	⅄ neutral point
Pin 5	GND	
Pin 6	Motor winding 3	
Pin 7	Motor winding 2	
Pin 8	Motor winding 1	

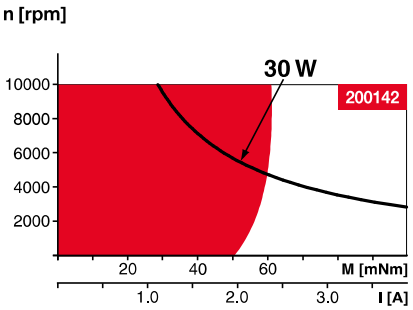
*Internal pull-up (7...13 kΩ) on V_{Hall}
Wiring diagram for Hall sensors see p. 49

Adapter	**Part number**	**Part number**
see p. 514	220300	220310
Connector	**Part number**	**Part number**
TE	1-84953-1	84953-4
Molex	52207-1133	52207-0433

Pin for design with Hall sensors:
FPC, 11-pol, Pitch 1.0 mm, top contact style

[1]Calculation does not include saturation effect (p. 61/168)

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

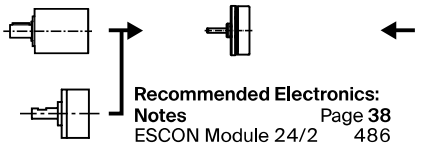
Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398
Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



Recommended Electronics:

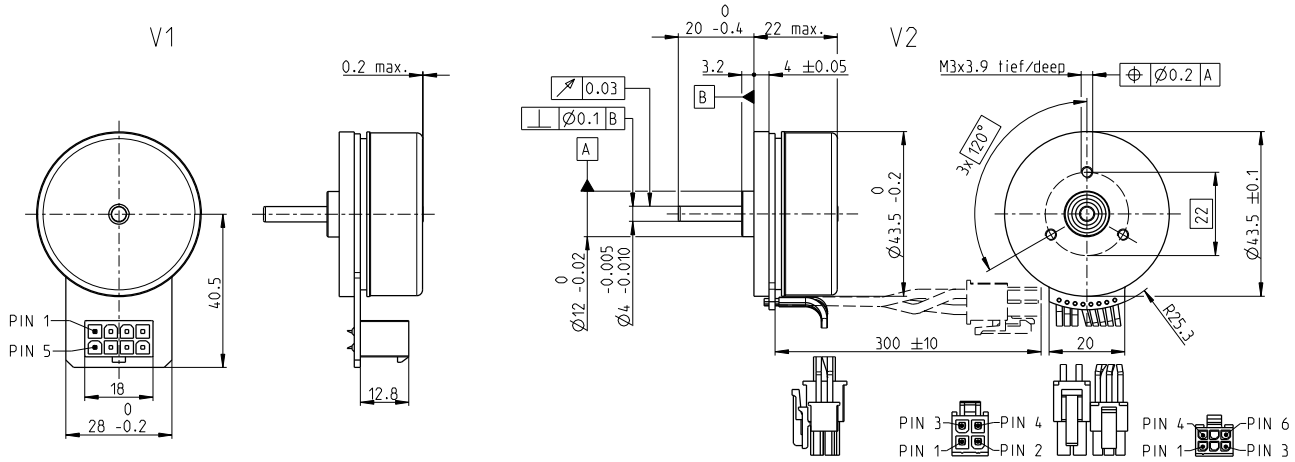
Notes	Page **38**
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Mod. 50/4 EC-S	487
ESCON Module 50/5	487
ESCON 50/5	489
DEC Module 24/2	491
DEC Module 50/5	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Mod./Comp. 50/5	496
EPOS4 Comp. 24/5 3-axes	497
EPOS4 50/5	501
EPOS2 P 24/5	504

for motor type A:
Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

EC 45 flat ∅43.5 mm, brushless, 50 Watt

NEW

EC flat



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	651606	651607	651608	651609
V2 with Hall sensors and cables	651610	651611	651612	651613

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	18	24	36	48
2	No load speed	rpm	5740	6250	6060	5740
3	No load current	mA	277	238	151	104
4	Nominal speed	rpm	4690	5170	5010	4710
5	Nominal torque (max. continuous torque)	mNm	112	91.1	90.9	102
6	Nominal current (max. continuous current)	A	3.68	2.52	1.63	1.27
7	Stall torque[1]	mNm	1190	918	895	1040
8	Stall current	A	40	26	16	13
9	Max. efficiency	%	84.4	82	81.9	83.4
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.447	0.942	2.240	3.610
11	Terminal inductance phase to phase	mH	0.243	0.363	0.868	1.730
12	Torque constant	mNm/A	29.5	36	55.7	78.6
13	Speed constant	rpm/V	324	265	171	121
14	Speed/torque gradient	rpm/mNm	4.910	6.920	6.890	5.580
15	Mechanical time constant	ms	6.940	9.790	9.750	7.890
16	Rotor inertia	gcm²	135	135	135	135

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.57 K/W
18	Thermal resistance winding-housing	8.28 K/W
19	Thermal time constant winding	28.8 s
20	Thermal time constant motor	78.3 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		10 000 rpm
24	Axial play at axial load	< 8.0 N	0 mm
		> 8.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		7.2 N
27	Max. force for press fits (static)		53 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		14.5 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	116.4 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1*	Hall sensor 1*
Pin 2	Hall sensor 2*	Hall sensor 2*
Pin 3	V_{Hall} 3.5...24 VDC	Hall sensor 3*
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3*	V_{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (motor, AWG 22)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7...13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 49

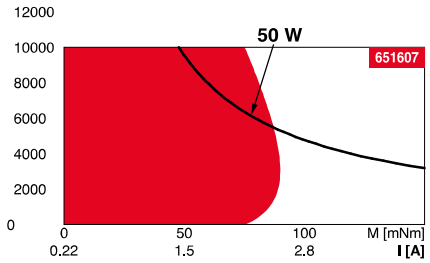
Connector	**Part number**	**Part number**
Molex	39-28-1083	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS, L = 500 mm	**354045**

Operating Range

n [rpm]



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

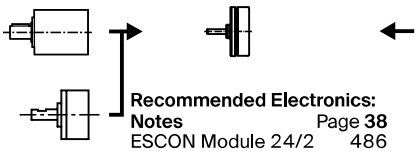
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398

Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



Recommended Electronics:

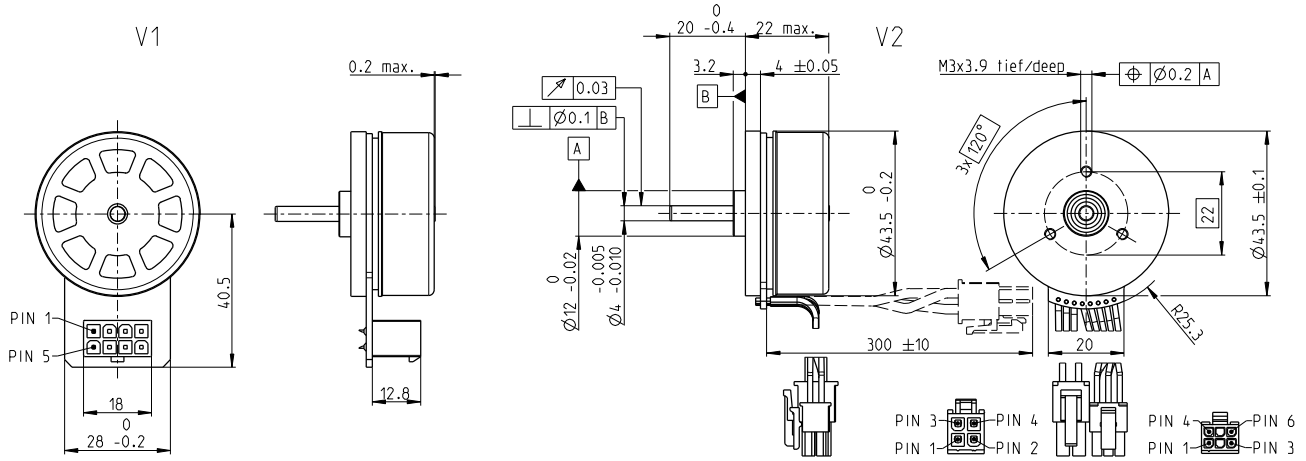
Notes	**Page 38**
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Module 50/5	487
ESCON 50/5	489
DEC Module 24/2	491
DEC Module 50/5	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 24/1.5	496
EPOS4 Mod./Comp. 50/5	496
EPOS4 Comp. 24/5 3-axes	497
EPOS4 50/5	501
EPOS2 P 24/5	504

Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

EC 45 flat ∅43.5 mm, brushless, 60 Watt

NEW

Open Motor



M 1:2

Stock program
Standard program
Special program (on request)

	Part Numbers			
V1 with Hall sensors	591476	591477	591478	591479
V2 with Hall sensors and cables	608131	608132	608133	608134

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	18	24	36	48
2	No load speed	rpm	5740	6250	6060	5740
3	No load current	mA	277	238	151	104
4	Nominal speed	rpm	4510	4970	4810	4530
5	Nominal torque (max. continuous torque)	mNm	134	110	109	122
6	Nominal current (max. continuous current)	A	4.29	2.97	1.91	1.48
7	Stall torque[1]	mNm	1190	918	895	1040
8	Stall current	A	40	26	16	13
9	Max. efficiency	%	84.4	82	81.9	83.4
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.447	0.942	2.240	3.610
11	Terminal inductance phase to phase	mH	0.243	0.363	0.868	1.730
12	Torque constant	mNm/A	29.5	36	55.7	78.6
13	Speed constant	rpm/V	324	265	171	121
14	Speed/torque gradient	rpm/mNm	4.910	6.920	6.890	5.580
15	Mechanical time constant	ms	6.940	9.790	9.750	7.890
16	Rotor inertia	gcm²	135	135	135	135

Specifications

Thermal data

17	Thermal resistance housing-ambient	0.268 K/W
18	Thermal resistance winding-housing	7.05 K/W
19	Thermal time constant winding	26.7 s
20	Thermal time constant motor	13.4 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	10 000 rpm
24	Axial play at axial load < 8.0 N	0 mm
	> 8.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	7.2 N
27	Max. force for press fits (static)	53 N
	(static, shaft supported)	1000 N
28	Max. radial load, 5 mm from flange	14.5 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	113.1 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1*	Hall sensor 1*
Pin 2	Hall sensor 2*	Hall sensor 2*
Pin 3	V_{Hall} 3.5...24 VDC	Hall sensor 3*
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3*	V_{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (motor, AWG 22)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7...13 kΩ) on V_{Hall}

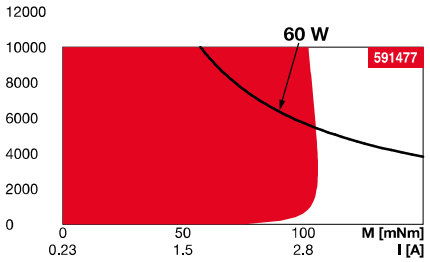
Wiring diagram for Hall sensors see p. 49

Connector	**Part number**	**Part number**
Molex	39-28-1083	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS, L = 500 mm	**354045**

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

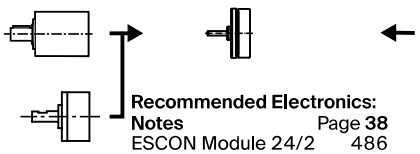
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398

Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



Recommended Electronics:

Notes	Page **38**
ESCON Module 24/2	486
ESCON 36/3 EC	487
ESCON Module 50/5	487
ESCON 50/5	489
DEC Module 24/2	491
DEC Module 50/5	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 50/5	496
EPOS4 Comp. 24/5 3-axes	497
EPOS4 50/5	501
EPOS2 P 24/5	504

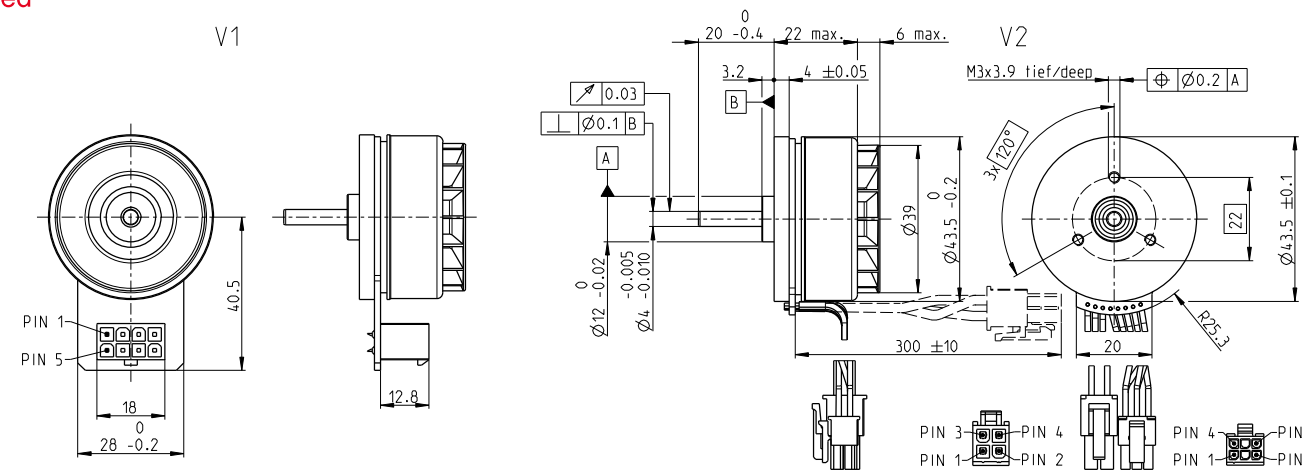
Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

EC 45 flat ∅43.5 mm, brushless, 90 Watt

NEW

Ventilated

EC flat



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	608135	608136	608137	608138
V2 with Hall sensors and cables	608139	608140	608141	608142

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	18	24	36	48
2	No load speed	rpm	5740	6250	6060	5740
3	No load current	mA	281	242	154	105
4	Nominal speed	rpm	4280	4700	4560	4300
5	Nominal torque (max. continuous torque)	mNm	164	136	135	149
6	Nominal current (max. continuous current)	A	5.08	3.57	2.29	1.76
7	Stall torque[1]	mNm	1190	918	895	1040
8	Stall current	A	40	26	16	13
9	Max. efficiency	%	84.3	81.9	81.8	83.3
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.447	0.942	2.240	3.610
11	Terminal inductance phase to phase	mH	0.243	0.363	0.868	1.730
12	Torque constant	mNm/A	29.5	36	55.7	78.6
13	Speed constant	rpm/V	324	265	171	121
14	Speed/torque gradient	rpm/mNm	4.910	6.920	6.890	5.580
15	Mechanical time constant	ms	6.940	9.790	9.750	7.890
16	Rotor inertia	gcm²	135	135	135	135

Specifications

Thermal data

17	Thermal resistance housing-ambient	0.23 K/W
18	Thermal resistance winding-housing	4.6 K/W
19	Thermal time constant winding	16 s
20	Thermal time constant motor	11.5 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	10 000 rpm
24	Axial play at axial load < 8.0 N	0 mm
	> 8.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	7.2 N
27	Max. force for press fits (static)	53 N
	(static, shaft supported)	1000 N
28	Max. radial load, 5 mm from flange	14.5 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	115.1 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1*	Hall sensor 1*
Pin 2	Hall sensor 2*	Hall sensor 2*
Pin 3	V_{Hall} 3.5...24 VDC	Hall sensor 3*
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3*	V_{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 22)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

*Internal pull-up (7..13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 49

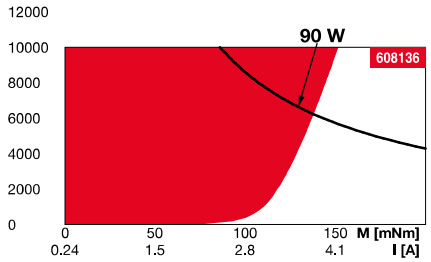
Connector	**Part number**	**Part number**
Molex	39-28-1083	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS, L = 500 mm	**354045**

21 **V2** Ambient temperature -20...+100°C

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

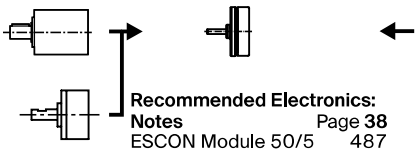
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398

Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



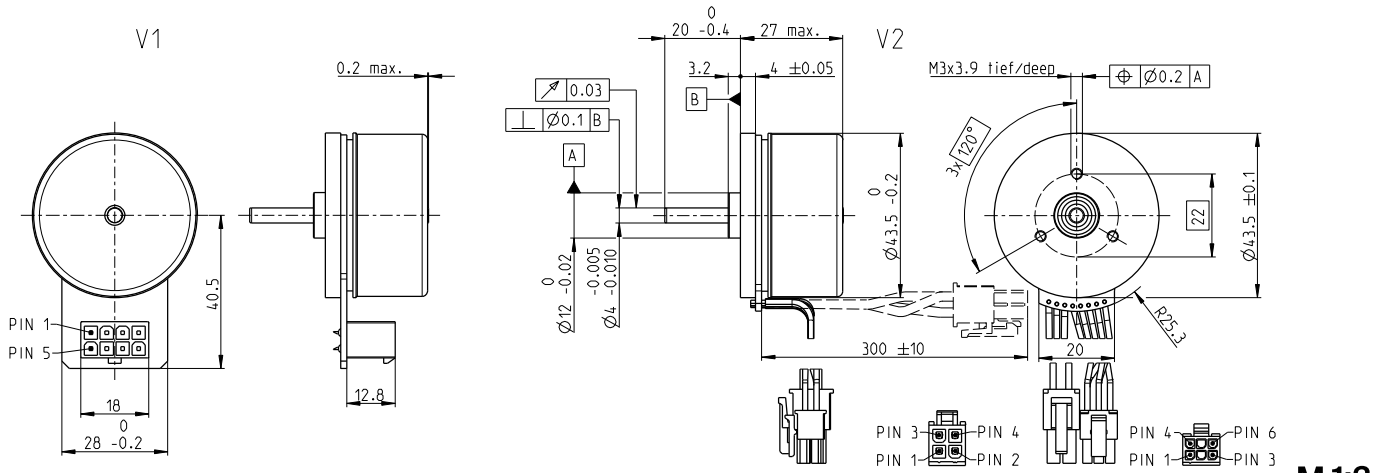
Recommended Electronics:

Notes	**Page 38**
ESCON Module 50/5	487
ESCON Module 50/8 (HE)	488
ESCON 50/5	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	497
EPOS4 50/5	501
EPOS2 P 24/5	504

Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

EC 45 flat ∅43.5 mm, brushless, 70 Watt

NEW



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	**651614**	651615	651616	**651617**
V2 with Hall sensors and cables	651618	651619	651620	651621

Motor Data (provisional)

	Values at nominal voltage					
1	Nominal voltage	V	24	36	48	60
2	No load speed	rpm	5600	5930	5580	3720
3	No load current	mA	270	198	135	57
4	Nominal speed	rpm	4750	5080	4750	3010
5	Nominal torque (max. continuous torque)	mNm	134	110	112	143
6	Nominal current (max. continuous current)	A	3.29	1.97	1.41	0.92
7	Stall torque[1]	mNm	1690	1320	1260	1240
8	Stall current	A	42	23	16	8
9	Max. efficiency	%	84.9	82.7	82.6	84.2
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.573	1.560	3.070	7.370
11	Terminal inductance phase to phase	mH	0.301	0.601	1.210	4.270
12	Torque constant	mNm / A	40.4	57	80.8	152
13	Speed constant	rpm / V	236	167	118	62.8
14	Speed / torque gradient	rpm / mNm	3.350	4.580	4.490	3.040
15	Mechanical time constant	ms	6.350	8.680	8.510	5.770
16	Rotor inertia	gcm²	181	181	181	181

Specifications

Thermal data

17	Thermal resistance housing-ambient	2.55 K/W
18	Thermal resistance winding-housing	6.64 K/W
19	Thermal time constant winding	43.1 s
20	Thermal time constant motor	127 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	10 000 rpm
24	Axial play at axial load < 8.0 N	0 mm
	> 8.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	7.2 N
27	Max. force for press fits (static)	53 N
	(static, shaft supported)	1000 N
28	Max. radial load, 5 mm from flange	15.1 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	150.4 g

Values listed in the table are nominal.

Connection V1

		V2 (sensors, AWG 24)
Pin 1	Hall sensor 1*	Hall sensor 1*
Pin 2	Hall sensor 2*	Hall sensor 2*
Pin 3	V_{Hall} 3.5...24 VDC	Hall sensor 3*
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3*	V_{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (motor, AWG 22)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

*Internal pull-up (7 ... 13 kΩ) on V_{Hall}

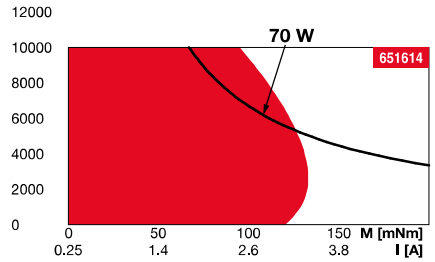
Wiring diagram for Hall sensors see p. 49

Connector	**Part number**	**Part number**
Molex	39-28-1083	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS, L = 500 mm	**354045**
21 **V2** Ambient temperature	20 ... +100°C

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

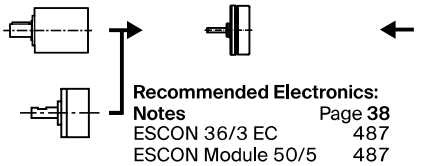
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398

Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



Recommended Electronics:

Notes	**Page 38**
ESCON 36/3 EC	487
ESCON Module 50/5	487
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 50/5	496
EPOS4 50/5	501
EPOS2 P 24/5	504

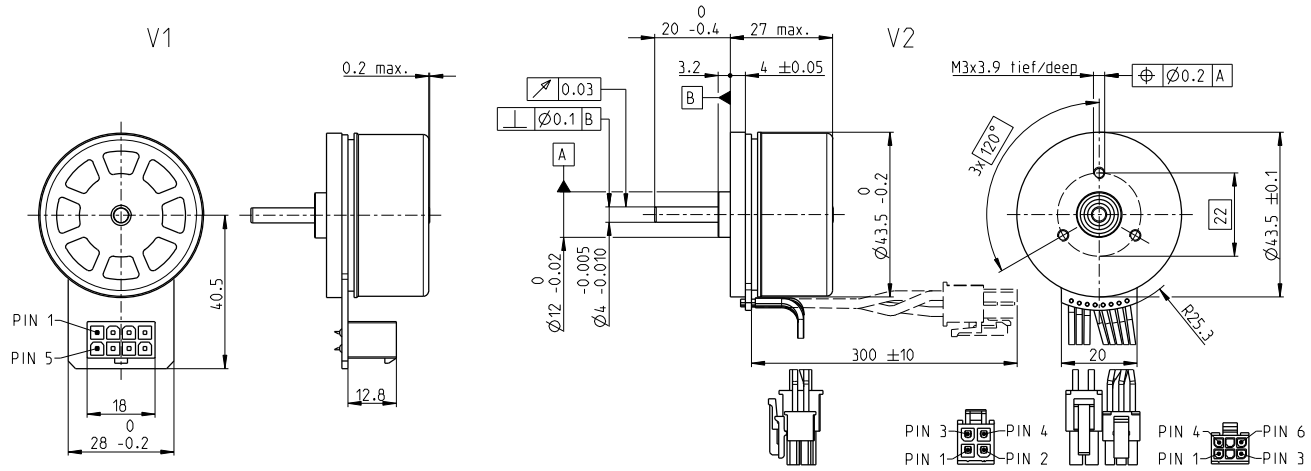
Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

EC 45 flat ∅43.5 mm, brushless, 80 Watt

NEW

Open Motor

EC flat



M 1:2

Stock program
Standard program
Special program (on request)

	Part Numbers			
V1 with Hall sensors	591480	591481	591482	591483
V2 with Hall sensors and cables	608144	608145	608146	608147

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	24	36	48	60
2	No load speed	rpm	5600	5930	5580	3720
3	No load current	mA	270	198	135	57
4	Nominal speed	rpm	4560	4870	4560	2890
5	Nominal torque (max. continuous torque)	mNm	167	139	140	170
6	Nominal current (max. continuous current)	A	3.96	2.41	1.71	1.06
7	Stall torque[1]	mNm	1690	1320	1260	1240
8	Stall current	A	42	23	16	8
9	Max. efficiency	%	84.9	82.7	82.6	84.2
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.573	1.560	3.070	7.370
11	Terminal inductance phase to phase	mH	0.301	0.601	1.210	4.270
12	Torque constant	mNm/A	40.4	57	80.8	152
13	Speed constant	rpm/V	236	167	118	62.8
14	Speed/torque gradient	rpm/mNm	3.350	4.580	4.490	3.040
15	Mechanical time constant	ms	6.350	8.680	8.510	5.770
16	Rotor inertia	gcm²	181	181	181	181

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.29 K/W
18	Thermal resistance winding-housing	5.23 K/W
19	Thermal time constant winding	34 s
20	Thermal time constant motor	64.7 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	10 000 rpm
24	Axial play at axial load < 8.0 N	0 mm
	> 8.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	7.2 N
27	Max. force for press fits (static)	53 N
	(static, shaft supported)	1000 N
28	Max. radial load, 5 mm from flange	15.1 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	147.1 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1*	Hall sensor 1*
Pin 2	Hall sensor 2*	Hall sensor 2*
Pin 3	V_{Hall} 3.5...24 VDC	Hall sensor 3*
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3*	V_{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 22)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

*Internal pull-up (7..13 kΩ) on V_{Hall}

Wiring diagram for Hall sensors see p. 49

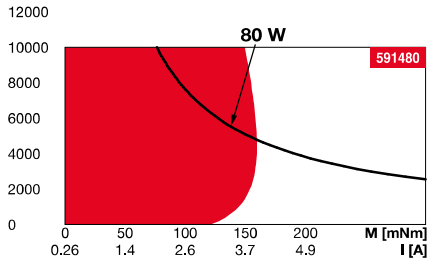
Connector	**Part number**	**Part number**
Molex	39-28-1083	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS, L = 500 mm	**354045**

21 **V2** Ambient temperature -20...+100°C

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

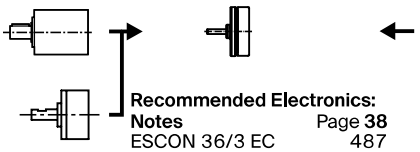
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398

Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

Recommended Electronics:

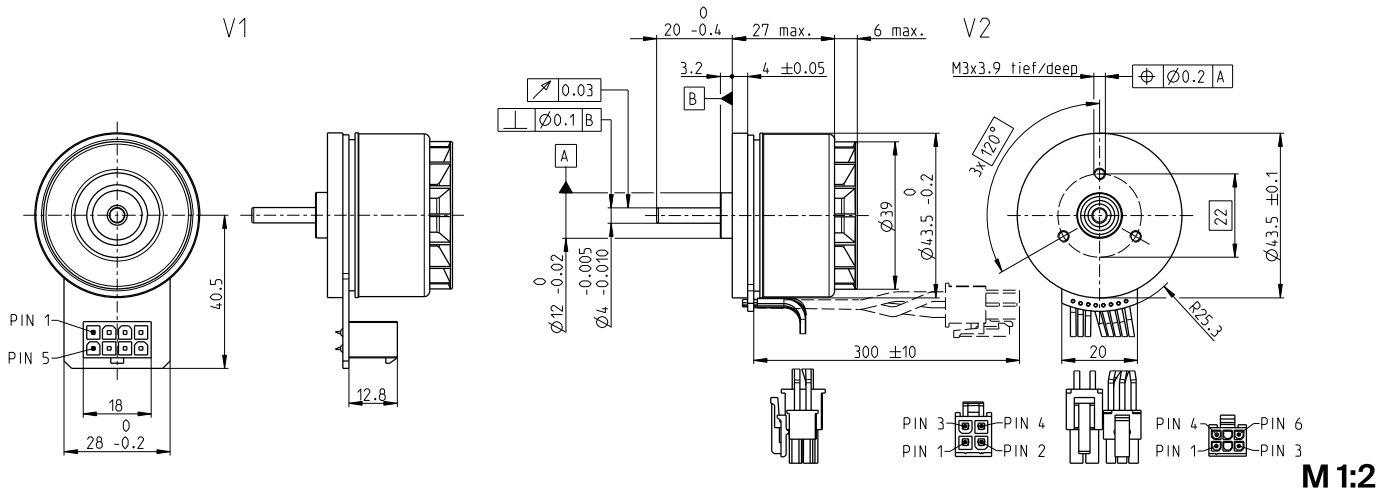
Notes	Page **38**
ESCON 36/3 EC	487
ESCON Module 50/5	487
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Micro 24/5	495
EPOS4 Mod./Comp. 50/5	496
EPOS4 50/5	501
EPOS2 P 24/5	504

EC 45 flat ∅43.5 mm, brushless, 120 Watt

Ventilated

NEW

EC flat



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	**608148**	608149	608150	**608151**
V2 with Hall sensors and cables	608152	608153	608154	608155

Motor Data (provisional)									
	Values at nominal voltage								
1	Nominal voltage	V	24	36	48	60			
2	No load speed	rpm	5600	5930	5580	3720			
3	No load current	mA	277	204	138	58.2			
4	Nominal speed	rpm	4520	4820	4510	2900			
5	Nominal torque (max. continuous torque)	mNm	174	147	146	169			
6	Nominal current (max. continuous current)	A	4.13	2.53	1.78	1.06			
7	Stall torque[1]	mNm	1690	1320	1260	1240			
8	Stall current	A	42	23	16	8			
9	Max. efficiency	%	84.7	82.5	82.4	84.1			
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.573	1.560	3.070	7.370			
11	Terminal inductance phase to phase	mH	0.301	0.601	1.210	4.270			
12	Torque constant	mNm / A	40.4	57	80.8	152			
13	Speed constant	rpm / V	236	167	118	62.8			
14	Speed / torque gradient	rpm / mNm	3.350	4.580	4.490	3.040			
15	Mechanical time constant	ms	6.350	8.680	8.510	5.770			
16	Rotor inertia	gcm²	181	181	181	181			

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.94 K/W
18	Thermal resistance winding-housing	3.86 K/W
19	Thermal time constant winding	25.1 s
20	Thermal time constant motor	97 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	10 000 rpm
24	Axial play at axial load < 8.0 N	0 mm
	> 8.0 N	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	7.2 N
27	Max. force for press fits (static)	53 N
	(static, shaft supported)	1000 N
28	Max. radial load, 5 mm from flange	15.1 N

Other specifications

29	Number of pole pairs	8
30	Number of phases	3
31	Weight of motor	149.1 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1*	Hall sensor 1*
Pin 2	Hall sensor 2*	Hall sensor 2*
Pin 3	V_{Hall} 3.5...24 VDC	Hall sensor 3*
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3*	V_{Hall} 3.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 22)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

*Internal pull-up (7 ... 13 kΩ) on V_{Hall}

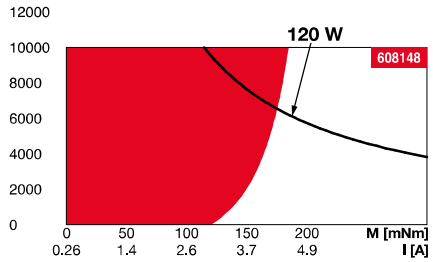
Wiring diagram for Hall sensors see p. 49

Connector	**Part number**	**Part number**
Molex	39-28-1083	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS, L = 500 mm	**354045**
21 **V2** Ambient temperature	20 ... +100°C

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

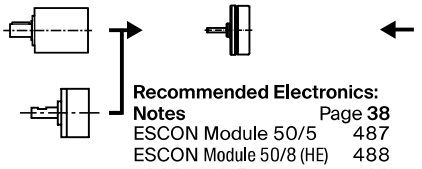
Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅42 mm
3 - 15 Nm
Page 398

Spur Gearhead
∅45 mm
0.5 - 2.0 Nm
Page 400



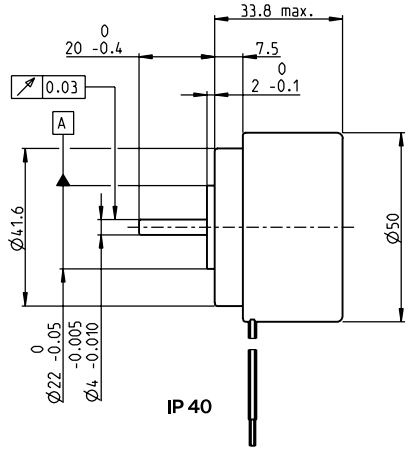
Recommended Electronics:

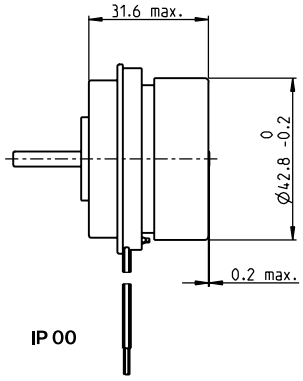
Notes	**Page 38**
ESCON Module 50/5	487
ESCON Module 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 50/5	501
EPOS2 P 24/5	504

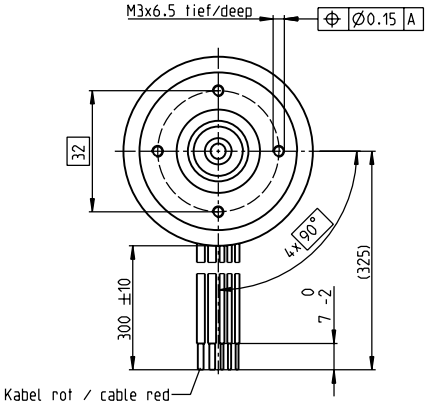
Encoder MILE
256 - 2048 CPT,
2 channels
Page 446

EC 45 flat brushless, 30 Watt, with integrated electronics

1-Q-Speed Controller







M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers				
	5 wire version			
	Enable		Direction	
IP 40 (with cover)	688721		688722	
IP 00 (without cover)		688725		688726

Motor Data (provisional)						
	Values at nominal voltage					
1	Nominal voltage	V	24	24	24	24
2	No load speed	rpm	6000	6000	6000	6000
3	No load current	mA	210	210	210	210
4	Nominal speed	rpm	6000	6000	6000	6000
5	Nominal torque (max. continuous torque)	mNm	59.4	89.6	59.4	89.6
6	Nominal current (max. continuous current)	A	2.06	3.1	2.06	3.1
33	Max. torque	mNm	104	104	104	104
34	Max. current	A	3.62	3.62	3.62	3.62
9	Max. efficiency	%	76	76	76	76
	Characteristics					
35	Type of control		Speed	Speed	Speed	Speed
36	Supply voltage $+V_{CC}$	V	10...28	10...28	10...28	10...28
37	Speed set value input	V	0.33...10.8	0.33...10.8	0.33...10.8	0.33...10.8
38	Scale speed set value input	rpm/V	600	600	600	600
39	Speed range	rpm	200...6480	200...6480	200...6480	200...6480
40	Max. acceleration	rpm/s	6000	6000	6000	6000

Specifications

	Thermal data		
17	Thermal resistance housing-ambient		5.6 (3.12) K/W
18	Thermal resistance winding-housing		7.7 (4.5) K/W
19	Thermal time constant winding		37.6 (22) s
20	Thermal time constant motor		633 (353) s
21	Ambient temperature		-40...+85°C
22	Max. winding temperature		+125°C
41	Max. temperature of electronics		+105°C
	Mechanical data (preloaded ball bearings)		
16	Rotor inertia		135 gcm²
24	Axial play at axial load	< 7.0 N	0 mm
		> 7.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		6.8 N
27	Max. force for press fits (static)		95 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		55 N
	Other specifications		
31	Weight of motor		226 g
32	Direction of rotation		Clockwise (CW)

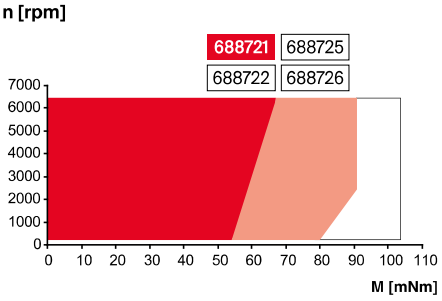
Values listed in the table are nominal.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 18/24)

red	$+V_{CC}$ 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range



Comments

Continuous operation
The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

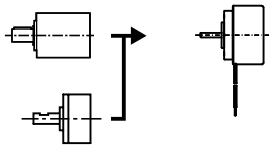
Overload range
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

maxon Modular System

Details on catalog page 38

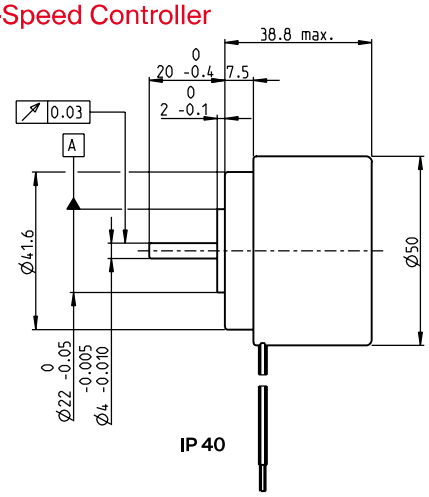
Planetary Gearhead
Ø42 mm
3 - 15 Nm
Page 398

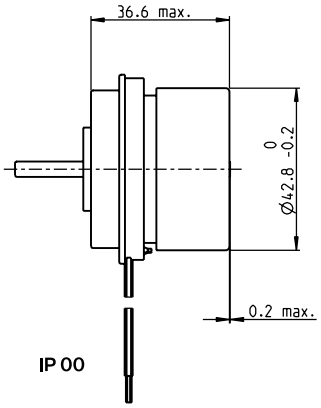
Spur Gearhead
Ø45 mm
0.5 - 2.0 Nm
Page 400

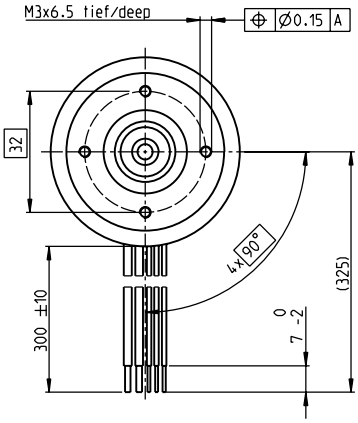


EC 45 flat brushless, 50 Watt, with integrated electronics

1-Q-Speed Controller







M 1:2

EC flat

Stock program
Standard program
Special program (on request)

Part Numbers				
	5 wire version			
	Enable		Direction	
IP 40 (with cover)	688723		688724	
IP 00 (without cover)		688727		688728

Motor Data (provisional)									
	Values at nominal voltage								
1	Nominal voltage	V	24	24	24	24			
2	No load speed	rpm	4500	4500	4500	4500			
3	No load current	mA	192	192	192	192			
4	Nominal speed	rpm	4500	4500	4500	4500			
5	Nominal torque (max. continuous torque)	mNm	82.8	131	82.8	131			
6	Nominal current (max. continuous current)	A	2.15	3.45	2.15	3.45			
33	Max. torque	mNm	149	149	149	149			
34	Max. current	A	3.86	3.86	3.86	3.86			
9	Max. efficiency	%	76	76	76	76			
	Characteristics								
35	Type of control		Speed	Speed	Speed	Speed			
36	Supply voltage +V_{CC}	V	10...28	10...28	10...28	10...28			
37	Speed set value input	V	0.33...10.8	0.33...10.8	0.33...10.8	0.33...10.8			
38	Scale speed set value input	rpm/V	600	600	600	600			
39	Speed range	rpm	200...6480	200...6480	200...6480	200...6480			
40	Max. acceleration	rpm/s	6000	6000	6000	6000			

Specifications

Thermal data

17	Thermal resistance housing-ambient	5.1 (2.5) K/W
18	Thermal resistance winding-housing	6.7 (3.3) K/W
19	Thermal time constant winding	45.1 (22.1) s
20	Thermal time constant motor	256 (124) s
21	Ambient temperature	-40...+85°C
22	Max. winding temperature	+125°C
41	Max. temperature of electronics	+105°C

Mechanical data (preloaded ball bearings)

16	Rotor inertia		181 gcm²
24	Axial play at axial load	< 7.0 N	0 mm
		> 7.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		6.8 N
27	Max. force for press fits (static)		95 N
	(static, shaft supported)		1000 N
28	Max. radial load, 5 mm from flange		63 N

Other specifications

31	Weight of motor	260 g
32	Direction of rotation	Clockwise (CW)

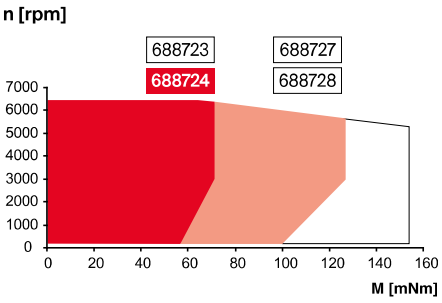
Values listed in the table are nominal.

Protective functions
Overload protection, blockage protection, inverse-polarity protection, thermal overload protection, low/high voltage cut-off

Connection 5 wire version (Cable AWG 18/24)

red	+V_{CC} 10...28 VDC
black	GND
white	Speed set value input
green	Monitor n (6 pulses per revolution)
grey	Disable (Type Enable) or sense of direction (Type Direction)

Operating Range



Comments

Continuous operation
The drive can be operated with a speed controller and, taking account of the given thermal resistance (fig. 17 and 18) at an ambient temperature of 25°C, does not exceed the maximum permissible operating temperatures.

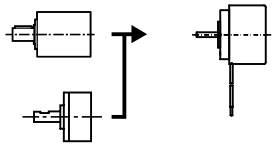
Overload range
The drive reaches these operating points. Speed may vary from the set value. The overload protection shuts down the drive in the event of sustained overload.

maxon Modular System

Details on catalog page 38

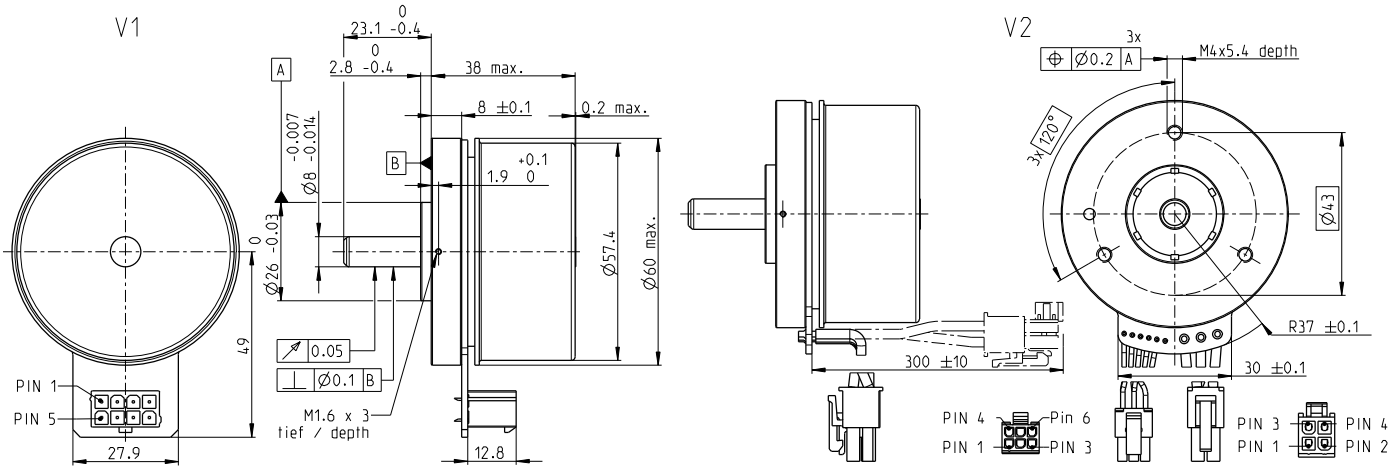
Planetary Gearhead
Ø42 mm
3 - 15 Nm
Page 398

Spur Gearhead
Ø45 mm
0.5 - 2.0 Nm
Page 400



EC 60 flat ∅60 mm, brushless, 100 Watt

EC flat



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	625854	625855	625856
V2 with Hall sensors and cables	647691	645604	647692

Motor Data

	Values at nominal voltage				
1	Nominal voltage	V	12	24	48
2	No load speed	rpm	3760	4300	4020
3	No load current	mA	797	493	221
4	Nominal speed	rpm	3210	3730	3460
5	Nominal torque (max. continuous torque)	mNm	261	269	298
6	Nominal current (max. continuous current)	A	8.72	5.14	2.61
7	Stall torque[1]	mNm	3340	4300	4870
8	Stall current	A	111	81.9	43.2
9	Max. efficiency	%	84.1	85.3	86.4
	Characteristics				
10	Terminal resistance phase to phase	Ω	0.108	0.293	1.11
11	Terminal inductance phase to phase	mH	0.0911	0.279	1.28
12	Torque constant	mNm/A	30	52.5	113
13	Speed constant	rpm/V	318	182	84.8
14	Speed/torque gradient	rpm/mNm	1.14	1.01	0.837
15	Mechanical time constant	ms	9.99	8.86	7.32
16	Rotor inertia	gcm²	835	835	835

Specifications

Thermal data

17	Thermal resistance housing-ambient	2.5 K/W
18	Thermal resistance winding-housing	3.8 K/W
19	Thermal time constant winding	41.4 s
20	Thermal time constant motor	90 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		6000 rpm
24	Axial play at axial load	< 12.0 N	0 mm
		> 12.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		12 N
27	Max. force for press fits (static)		170 N
	(static, shaft supported)		8000 N
28	Max. radial load, 5 mm from flange		112 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	355 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor1	Hall sensor1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (Motor, AWG 16)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

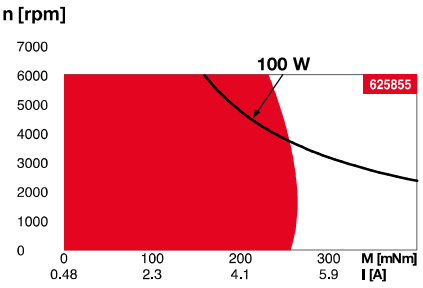
Wiring diagram for Hall sensors see p. 49

Connector	**Part number**
Molex 46015-0806	43025-0600
Molex	39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
zu EPOS4, L = 500 mm	**354045**

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅52 mm
4 - 30 Nm
Page 402

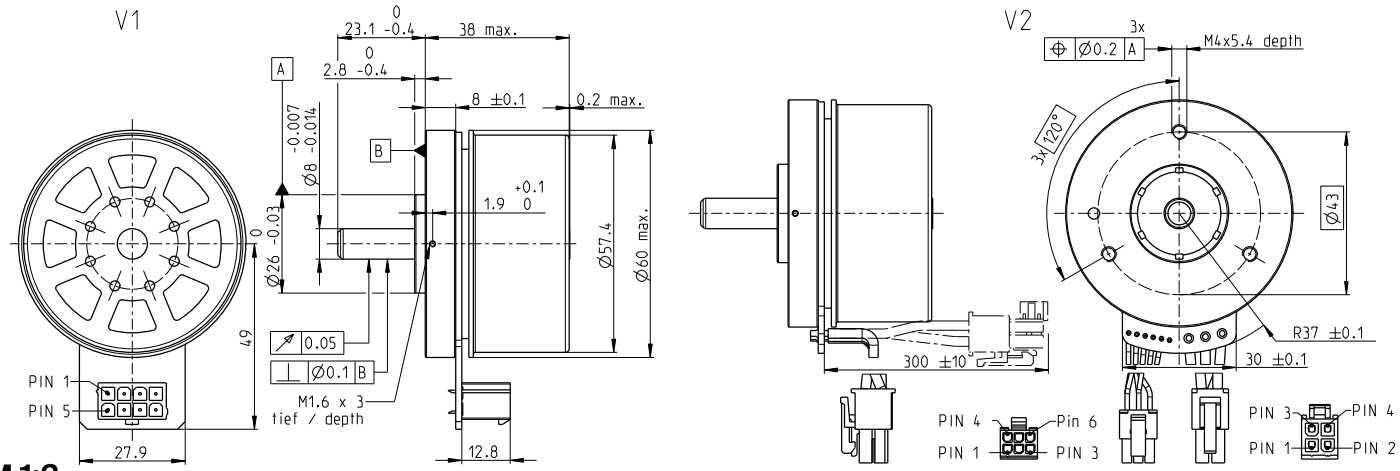
Encoder MILE
512 - 4096 CPT,
2 channels
Page 447

Recommended Electronics:

Notes	**Page 38**
ESCON Module 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	500
EPOS4 50/5	501
EPOS4 70/15	501
EPOS2 P 24/5	504

EC 60 flat ∅60 mm, brushless, 150 Watt

Open Rotor



M 1:2

Stock program
Standard program
Special program (on request)

	Part Numbers		
V1 with Hall sensors	625857	**625858**	625859
V2 with Hall sensors and cables	647693	647694	647695

Motor Data					
	Values at nominal voltage				
1	Nominal voltage	V	12	24	48
2	No load speed	rpm	3760	4300	4020
3	No load current	mA	815	497	224
4	Nominal speed	rpm	2990	3480	3230
5	Nominal torque (max. continuous torque)	mNm	378	401	437
6	Nominal current (max. continuous current)	A	12*	7.25	3.63
7	Stall torque[1]	mNm	3340	4300	4870
8	Stall current	A	111	81.9	43.2
9	Max. efficiency	%	83.8	85.2	86.3
	Characteristics				
10	Terminal resistance phase to phase	Ω	0.108	0.293	1.11
11	Terminal inductance phase to phase	mH	0.0911	0.279	1.28
12	Torque constant	mNm/A	30	52.5	113
13	Speed constant	rpm/V	318	182	84.8
14	Speed/torque gradient	rpm/mNm	1.14	1.01	0.837
15	Mechanical time constant	ms	9.68	8.6	9.1
16	Rotor inertia	gcm²	810	810	810

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.94 K/W
18	Thermal resistance winding-housing	1.48 K/W
19	Thermal time constant winding	16.1 s
20	Thermal time constant motor	69.9 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		6000 rpm
24	Axial play at axial load	< 12.0 N	0 mm
		> 12.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		12 N
27	Max. force for press fits (static)		170 N
	(static, shaft supported)		8000 N
28	Max. radial load, 5 mm from flange		112 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	350 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor1	Hall sensor1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (Motor, AWG 16)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

Wiring diagram for Hall sensors see p. 49

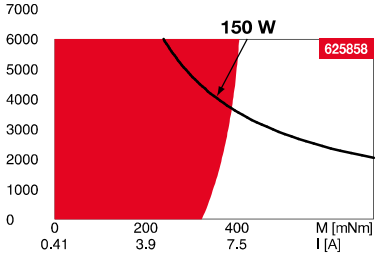
Connector	**Part number**	
Molex	46015-0806	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**

Operating Range

n [rpm]



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅52 mm
4 - 30 Nm
Page 402

Encoder MILE
512 - 4096 CPT,
2 channels
Page 447

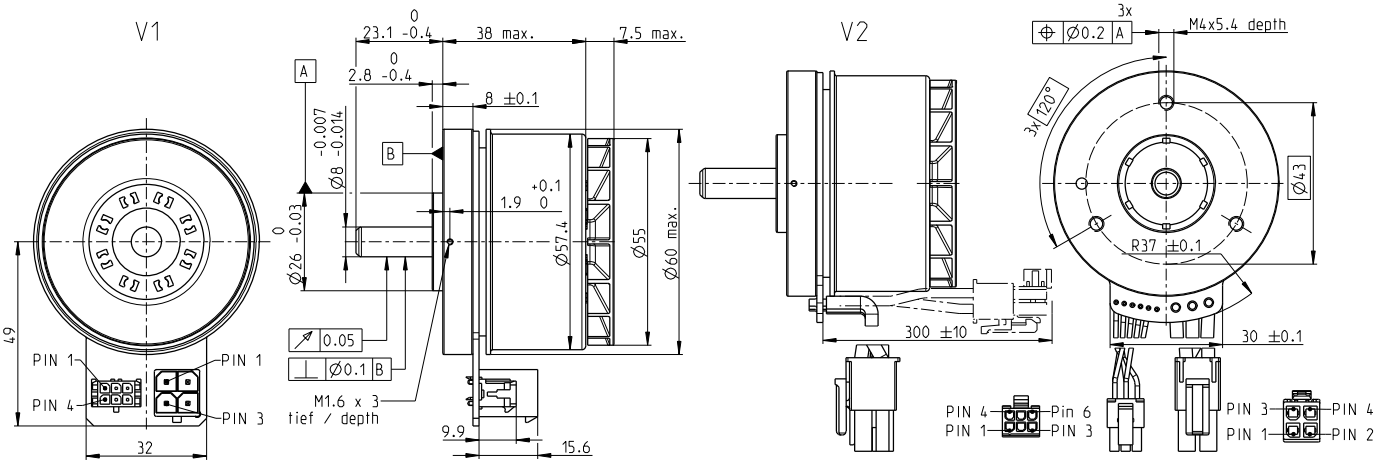
Recommended Electronics:

Notes	**Page 38**
ESCON Module 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	500
EPOS4 50/5	501
EPOS4 70/15	501
EPOS2 P 24/5	504

*In combination with EPOS4 positioning controllers, the connector technology

EC 60 flat ∅60 mm, brushless, 200 Watt

Ventilated



M 1:2

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	625860	614949	625861
V2 with Hall sensors and cables	647696	642221	647697

Motor Data					
	Values at nominal voltage				
1	Nominal voltage	V	12	24	48
2	No load speed	rpm	3760	4300	4020
3	No load current	mA	815	497	224
4	Nominal speed	rpm	2790	3240	3020
5	Nominal torque (max. continuous torque)	mNm	492	536	577
6	Nominal current (max. continuous current)	A	15.1*	9.28	4.6
7	Stall torque[1]	mNm	3340	4300	4870
8	Stall current	A	111	81.9	43.2
9	Max. efficiency	%	83.8	85.2	86.3
	Characteristics				
10	Terminal resistance phase to phase	Ω	0.108	0.293	1.11
11	Terminal inductance phase to phase	mH	0.0911	0.279	1.28
12	Torque constant	mNm/A	30	52.5	113
13	Speed constant	rpm/V	318	182	84.8
14	Speed/torque gradient	rpm/mNm	1.14	1.01	0.837
15	Mechanical time constant	ms	9.95	8.83	9.29
16	Rotor inertia	gcm²	832	832	832

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.22 K/W
18	Thermal resistance winding-housing	0.843 K/W
19	Thermal time constant winding	9.19 s
20	Thermal time constant motor	44 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed		6000 rpm
24	Axial play at axial load	< 12.0 N	0 mm
		> 12.0 N	0.14 mm
25	Radial play		preloaded
26	Max. axial load (dynamic)		12 N
27	Max. force for press fits (static)		170 N
	(static, shaft supported)		8000 N
28	Max. radial load, 5 mm from flange		112 N

Other specifications

29	Number of pole pairs	7
30	Number of phases	3
31	Weight of motor	360 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	Hall sensor 3	Hall sensor 3
Pin 4	GND	
Pin 5	V_{Hall} 4.5...24 VDC	GND V_{Hall} 4.5...24 VDC
Pin 6	N.C.	N.C.
		V2 (Motor, AWG 14)
Pin 1	Motor winding 1	Motor winding 1
Pin 2	Motor winding 2	Motor winding 2
Pin 3	Motor winding 3	Motor winding 3
Pin 4		N.C.

Wiring diagram for Hall sensors see p. 49

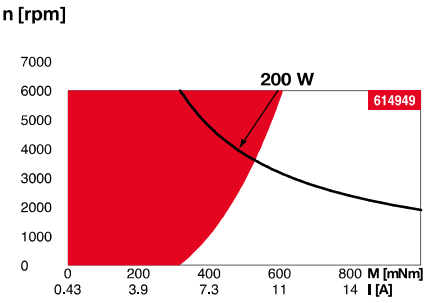
Connector	**Part number**	
Molex Micro-Fit	43045-0627	43025-0600
Molex	76829-0104	171692-0104

Connection cable for V1

for windings, L = 3 m	**520851**
for Hall sensors, L = 3 m	**275878**

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38

Planetary Gearhead
∅52 mm
4 - 30 Nm
Page 402

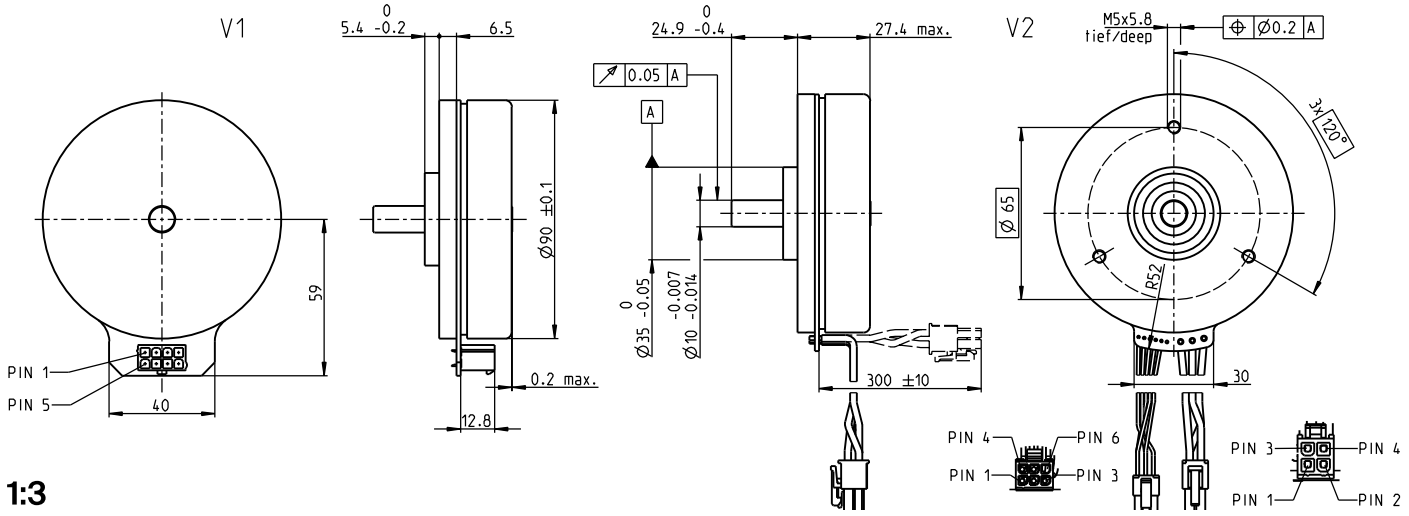
Encoder MILE
512 - 4096 CPT,
2 channels
Page 447

Recommended Electronics:

Notes	Page **38**
ESCON Module 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 70/10	489
DEC Module 50/5	491

*625860 and 647696 cannot be combined with the MILE encoder, because the

EC 90 flat ∅90 mm, brushless, 160 Watt



M 1:3

Stock program
Standard program
Special program (on request)

Part Numbers				
V1 with Hall sensors	586655	515458	505592	580047
V2 with Hall sensors and cables	607321	607322	607323	607324

Motor Data									
	Values at nominal voltage								
1	Nominal voltage	V	12	24	36	60			
2	No load speed	rpm	3170	3170	3070	2600			
3	No load current	mA	1320	658	420	197			
4	Nominal speed	rpm	2710	2720	2640	2200			
5	Nominal torque (max. continuous torque)	mNm	458	457	453	460			
6	Nominal current (max. continuous current)	A	12.8*	6.39	4.09	2.1			
7	Stall torque[1]	mNm	7400	7910	7580	6410			
8	Stall current	A	208	111	68.9	29.6			
9	Max. efficiency	%	85	85	85	85			
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.0577	0.216	0.523	2.03			
11	Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15			
12	Torque constant	mNm/A	35.6	71.2	110	217			
13	Speed constant	rpm/V	268	134	86.8	44.1			
14	Speed/torque gradient	rpm/mNm	0.435	0.407	0.412	0.412			
15	Mechanical time constant	ms	14.4	13.5	13.7	13.7			
16	Rotor inertia	gcm²	3170	3170	3170	3170			

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.75 K/W
18	Thermal resistance winding-housing	3.71 K/W
19	Thermal time constant winding	69.8 s
20	Thermal time constant motor	260 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	100 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	630 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	

	V2 (motor, AWG 16)
Pin 1	Motor winding 1
Pin 2	Motor winding 2
Pin 3	Motor winding 3
Pin 4	N.C.

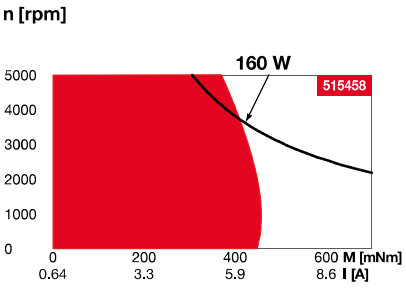
Wiring diagram for Hall sensors see p. 49

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		39-01-2040

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating Range



Comments

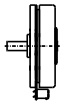
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38



Encoder MILE
512 - 6400 CPT,
2 channels
Page 448

Recommended Electronics:

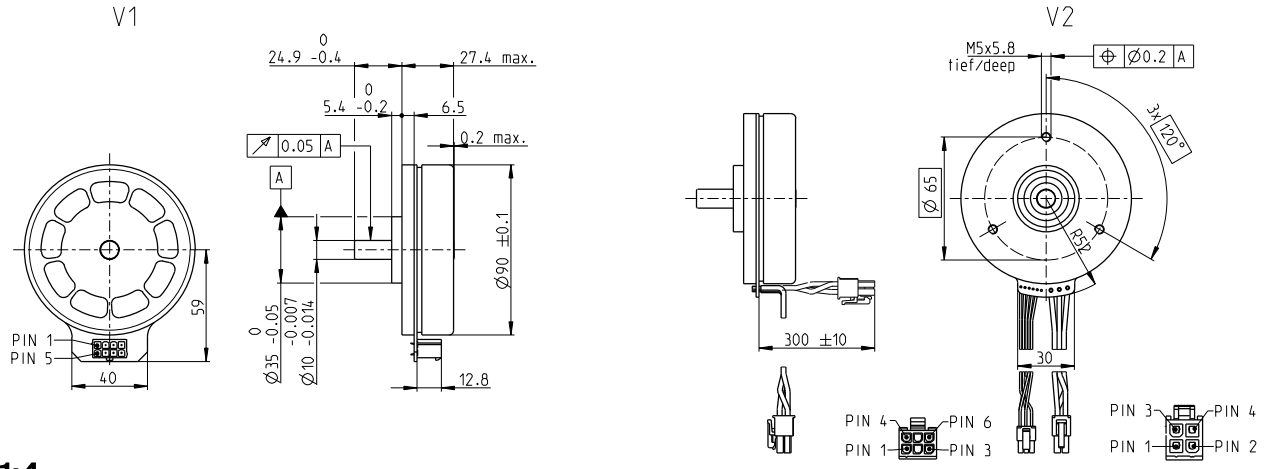
Notes	**Page 38**
ESCON Mod. 50/4 EC-S	487
ESCON Mod. 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	500
EPOS4 50/5	501
EPOS4 70/15	501

*In combination with EPOS4 positioning controllers, the connector technology

EC 90 flat ∅90 mm, brushless, 220 Watt

Open Rotor

EC flat



M 1:4

Stock program
Standard program
Special program (on request)

Part Numbers			
V1 with Hall sensors	**607942**	607943	607944
V2 with Hall sensors and cables	607946	607947	607948

Motor Data					
	Values at nominal voltage				
1	Nominal voltage	V	24	36	60
2	No load speed	rpm	3170	3070	2600
3	No load current	mA	658	420	197
4	Nominal speed	rpm	2490	2420	2020
5	Nominal torque (max. continuous torque)	mNm	729	715	692
6	Nominal current (max. continuous current)	A	9.44	6.01	2.96
7	Stall torque[1]	mNm	7910	7580	6410
8	Stall current	A	111	68.9	29.6
9	Max. efficiency	%	85.4	85.2	84.6
	Characteristics				
10	Terminal resistance phase to phase	Ω	0.216	0.523	2.03
11	Terminal inductance phase to phase	mH	0.232	0.554	2.15
12	Torque constant	mNm/A	71.2	110	217
13	Speed constant	rpm/V	134	86.8	44.1
14	Speed/torque gradient	rpm/mNm	0.407	0.412	0.412
15	Mechanical time constant	ms	13.5	13.7	13.7
16	Rotor inertia	gcm²	2875	2875	2875

Specifications

	Thermal data	
17	Thermal resistance housing-ambient	1.87 K/W
18	Thermal resistance winding-housing	1.43 K/W
19	Thermal time constant winding	27.7 s
20	Thermal time constant motor	278 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C
	Mechanical data (preloaded ball bearings)	
23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	100 N
	Other specifications	
29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	624 g

Values listed in the table are nominal.

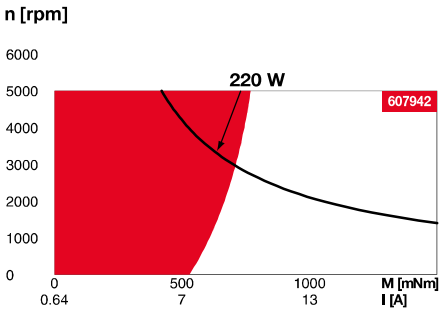
Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 16)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

Wiring diagram for Hall sensors see p. 49

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		39-01-2040

Connection cable for V1	
Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating Range



Comments

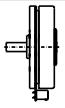
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

Details on catalog page 38



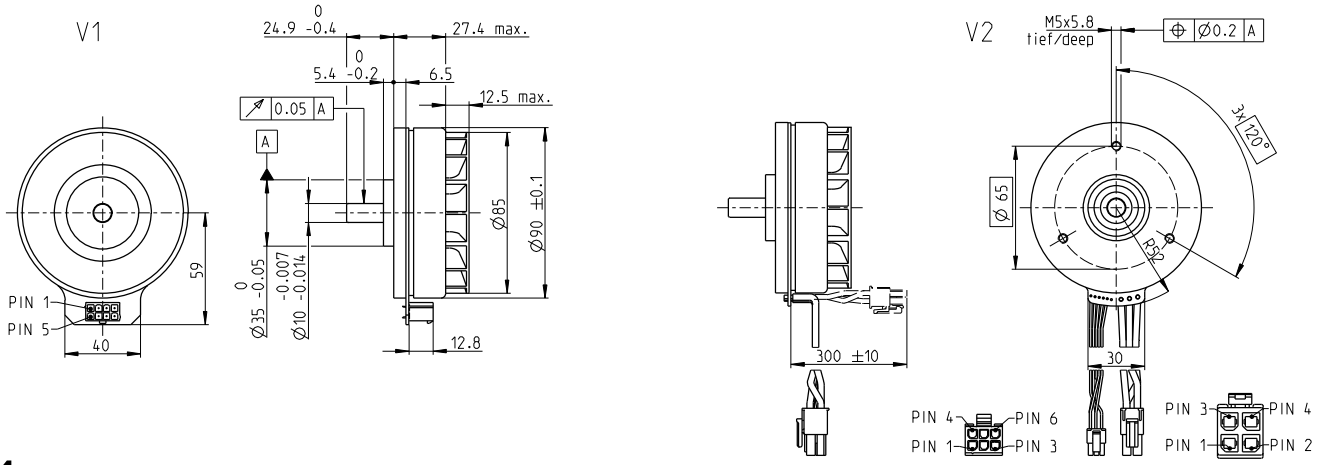
Encoder MILE
512 - 6400 CPT,
2 channels
Page 448

Recommended Electronics:

Notes	Page **38**
ESCON Mod. 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	500
EPOS4 50/5	501
EPOS4 70/15	501

EC 90 flat ∅90 mm, brushless, 360 Watt

Ventilated



M 1:4

Stock program
Standard program
Special program (on request)

	Part Numbers			
V1 with Hall sensors		607950	607951	607952
V2 with Hall sensors and cables	607953	607954	607955	607956
Motor Data				
Values at nominal voltage				
1 Nominal voltage	V	12	24	36	60
2 No load speed	rpm	3210	3210	3120	2640
3 No load current	mA	1390	696	444	210
4 Nominal speed	rpm	2310	2340	2270	1890
5 Nominal torque (max. continuous torque)	mNm	951	953	933	894
6 Nominal current (max. continuous current)	A	23.9*	12	7.61	3.73
7 Stall torque[1]	mNm	7290	7800	7470	6320
8 Stall current	A	208	111	68.9	29.6
9 Max. efficiency	%	84.5	85	84.8	84
Characteristics				
10 Terminal resistance phase to phase	Ω	0.0577	0.216	0.523	2.03
11 Terminal inductance phase to phase	mH	0.058	0.232	0.554	2.15
12 Torque constant	mNm/A	35.1	70.1	108	214
13 Speed constant	rpm/V	272	136	88.1	44.7
14 Speed/torque gradient	rpm/mNm	0.448	0.419	0.425	0.424
15 Mechanical time constant	ms	14.9	13.9	14.1	14.1
16 Rotor inertia	gcm²	3210	3210	3210	3210

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.12 K/W
18	Thermal resistance winding-housing	1.04 K/W
19	Thermal time constant winding	20 s
20	Thermal time constant motor	166 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	100 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	638 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 14)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

Wiring diagram for Hall sensors see p. 49

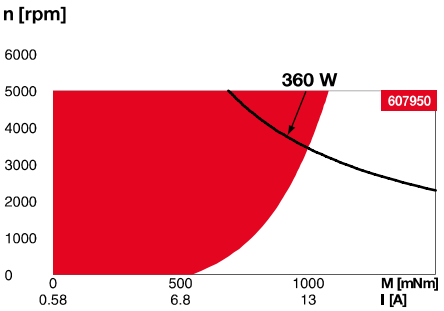
Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		171692-0104

Connection cable for V1
Universal, L = 500 mm **339380**

[1]Calculation does not include saturation effect

*In combination with EPOS4 positioning controllers, the connector technology

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

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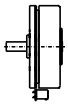

Encoder MILE
512 - 6400 CPT,
2 channels
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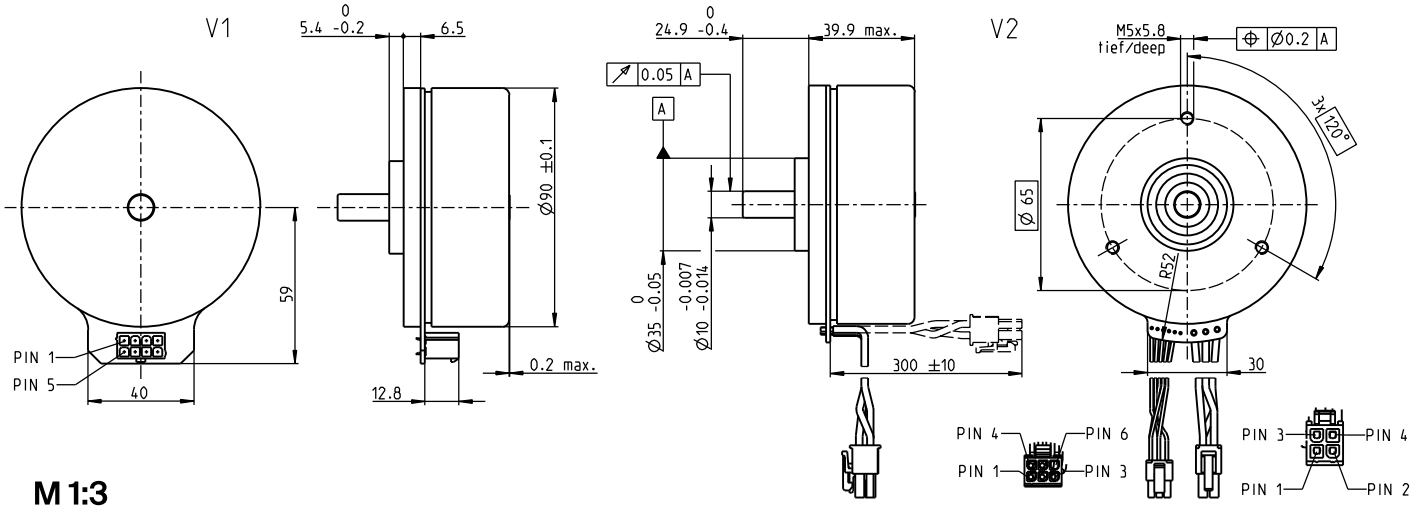
Recommended Electronics:

Notes	Page **38**
ESCON Mod. 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491

EC 90 flat ∅90 mm, brushless, 260 Watt

EC flat



M 1:3

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors	**500269**	500266	**500267**	500268					
V2 with Hall sensors and cables	607325	607326	607327	607328					

Motor Data									
	Values at nominal voltage								
1	Nominal voltage	V	18	30	48	60			
2	No load speed	rpm	2110	2080	1960	1980			
3	No load current	mA	830	490	278	227			
4	Nominal speed	rpm	1790	1780	1670	1690			
5	Nominal torque (max. continuous torque)	mNm	1010	988	964	963			
6	Nominal current (max. continuous current)	A	12.1*	7.06	4.06	3.28			
7	Stall torque[1]	mNm	14800	14600	13100	13300			
8	Stall current	A	183	107	56.9	46.7			
9	Max. efficiency	%	87	87	86	87			
	Characteristics								
10	Terminal resistance phase to phase	Ω	0.0983	0.28	0.844	1.28			
11	Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63			
12	Torque constant	mNm/A	80.7	136	231	286			
13	Speed constant	rpm/V	118	70.2	41.3	33.4			
14	Speed/torque gradient	rpm/mNm	0.144	0.144	0.151	0.15			
15	Mechanical time constant	ms	7.63	7.66	7.99	7.97			
16	Rotor inertia	gcm²	5060	5060	5060	5060			

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.74 K/W
18	Thermal resistance winding-housing	1.82 K/W
19	Thermal time constant winding	57 s
20	Thermal time constant motor	258 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	130 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	980 g

Values listed in the table are nominal.

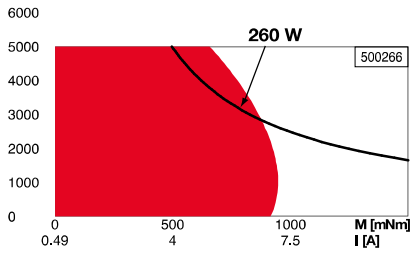
Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 16)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

Wiring diagram for Hall sensors see p. 49

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		39-01-2040

Connection cable for V1	
Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

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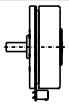

Encoder MILE
512 - 6400 CPT,
2 channels
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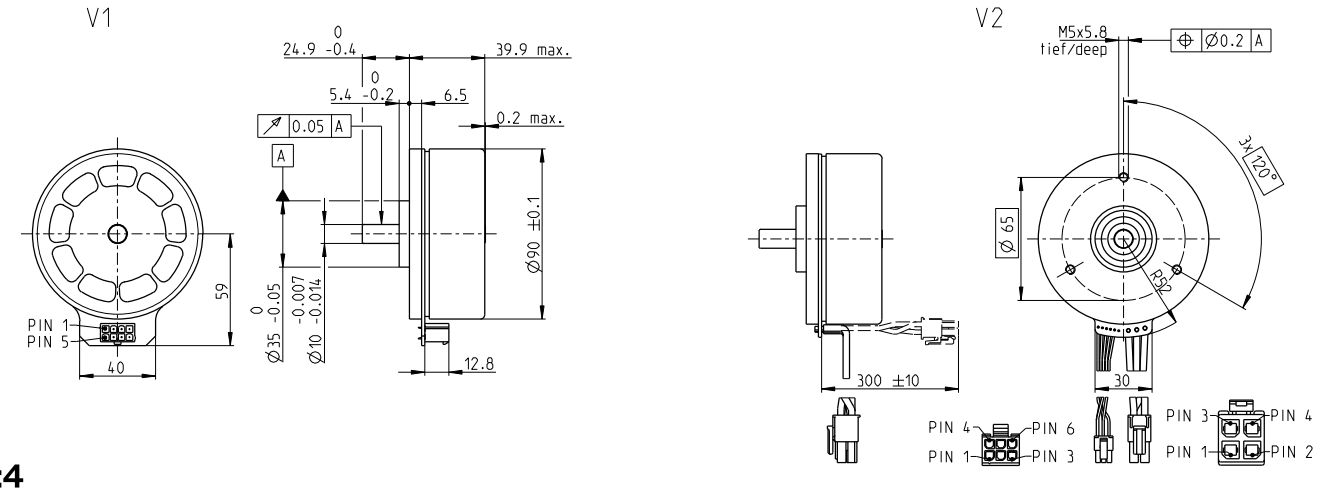
Recommended Electronics:

Notes	**Page 38**
ESCON Mod. 50/4 EC-S	487
ESCON Mod. 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	500
EPOS4 50/5	501
EPOS4 70/15	501

*In combination with EPOS4 positioning controllers, the connector technology

EC 90 flat ∅90 mm, brushless, 400 Watt

Open Rotor



M 1:4

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors		607930	607931	607932
V2 with Hall sensors and cables	607933	607934	607935	607936

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	18	30	48	60
2	No load speed	rpm	2080	2080	1960	1980
3	No load current	mA	792	475	272	221
4	Nominal speed	rpm	1700	1700	1600	1620
5	Nominal torque (max. continuous torque)	mNm	1300	1260	1210	1220
6	Nominal current (max. continuous current)	A	14.9*	8.73	4.96	4.03
7	Stall torque[1]	mNm	14900	14600	13100	13300
8	Stall current	A	183	107	56.9	46.7
9	Max. efficiency	%	87.4	87.3	86.8	86.9
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.0983	0.28	0.844	1.28
11	Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63
12	Torque constant	mNm/A	81.6	136	231	286
13	Speed constant	rpm/V	117	70.2	41.3	33.4
14	Speed/torque gradient	rpm/mNm	0.141	0.144	0.151	0.15
15	Mechanical time constant	ms	7.47	7.66	7.99	7.97
16	Rotor inertia	gcm²	4765	4765	4765	4765

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.56 K/W
18	Thermal resistance winding-housing	1.09 K/W
19	Thermal time constant winding	34.2 s
20	Thermal time constant motor	232 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static) (static, shaft supported)	440 N 8000N
28	Max. radial load, 10 mm from flange	130 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	964 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 14)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

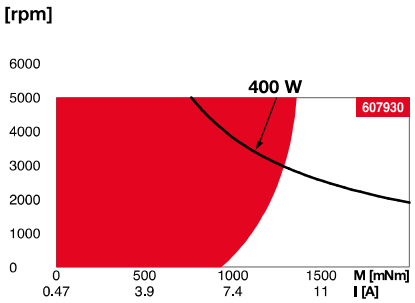
Wiring diagram for Hall sensors see p. 49

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		171692-0104

Connection cable for V1

Universal, L = 500 mm	**339380**
to EPOS4, L = 500 mm	**354045**

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

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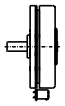

Encoder MILE
512 - 6400 CPT,
2 channels
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Recommended Electronics:

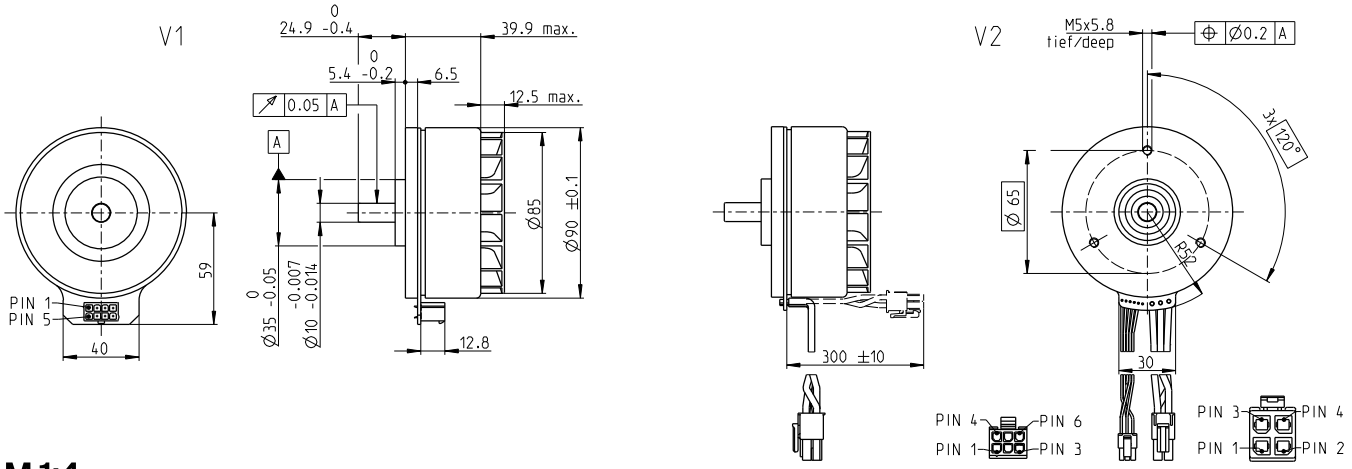
Notes	**Page 38**
ESCON Mod. 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491
EPOS4 Mod./Comp. 50/5	496
EPOS4 Mod./Comp. 50/8	497
EPOS4 Mod./Comp. 50/15	500
EPOS4 50/5	501
EPOS4 70/15	501

*607933 cannot be combined with the MILE encoder, because the current limit of

EC 90 flat ∅90 mm, brushless, 600 Watt

Ventilated

EC flat



M 1:4

Stock program
Standard program
Special program (on request)

Part Numbers

V1 with Hall sensors		597974	597975	597976
V2 with Hall sensors and cables	607937	607938	607939	607940

Motor Data						
	Values at nominal voltage					
1	Nominal voltage	V	18	30	48	60
2	No load speed	rpm	2080	2080	1960	1980
3	No load current	mA	821	493	283	230
4	Nominal speed	rpm	1620	1620	1520	1540
5	Nominal torque (max. continuous torque)	mNm	1610	1560	1490	1500
6	Nominal current (max. continuous current)	A	18*	10.5	5.95	4.83
7	Stall torque[1]	mNm	14900	14600	13100	13300
8	Stall current	A	183	107	56.9	46.7
9	Max. efficiency	%	87.2	87	86.5	86.6
	Characteristics					
10	Terminal resistance phase to phase	Ω	0.0983	0.28	0.844	1.28
11	Terminal inductance phase to phase	mH	0.133	0.369	1.07	1.63
12	Torque constant	mNm/A	81.6	136	231	286
13	Speed constant	rpm/V	117	70.2	41.3	33.4
14	Speed/torque gradient	rpm/mNm	0.141	0.144	0.151	0.15
15	Mechanical time constant	ms	7.47	7.66	7.99	7.97
16	Rotor inertia	gcm²	5100	5100	5100	5060

Specifications

Thermal data

17	Thermal resistance housing-ambient	1.04 K/W
18	Thermal resistance winding-housing	0.89 K/W
19	Thermal time constant winding	27.9 s
20	Thermal time constant motor	255 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+125°C

Mechanical data (preloaded ball bearings)

23	Max. speed	5000 rpm
24	Axial play at axial load	0.14 mm
25	Radial play	preloaded
26	Max. axial load (dynamic)	34 N
27	Max. force for press fits (static)	440 N
	(static, shaft supported)	8000 N
28	Max. radial load, 10 mm from flange	130 N

Other specifications

29	Number of pole pairs	11
30	Number of phases	3
31	Weight of motor	988 g

Values listed in the table are nominal.

Connection V1		**V2** (sensors, AWG 24)
Pin 1	Hall sensor 1	Hall sensor 1
Pin 2	Hall sensor 2	Hall sensor 2
Pin 3	V_{Hall} 4.5...24 VDC	Hall sensor 3
Pin 4	Motor winding 3	GND
Pin 5	Hall sensor 3	V_{Hall} 4.5...24 VDC
Pin 6	GND	N.C.
Pin 7	Motor winding 1	
Pin 8	Motor winding 2	
		V2 (motor, AWG 14)
Pin 1		Motor winding 1
Pin 2		Motor winding 2
Pin 3		Motor winding 3
Pin 4		N.C.

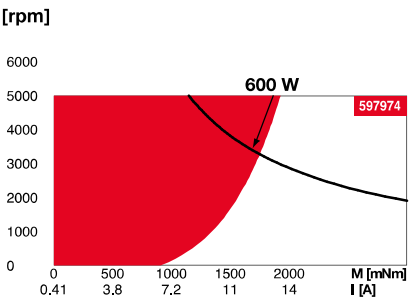
Wiring diagram for Hall sensors see p. 49

Connector		**Part number**
Molex	46015-0806	43025-0600
Molex		171692-0104

Connection cable for V1
Universal, L = 500 mm **339380**

[1]Calculation does not include saturation effect

Operating Range



Comments

Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit.

Short term operation
The motor may be briefly overloaded (recurring).

Assigned power rating

maxon Modular System

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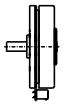

Encoder MILE
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Recommended Electronics:

Notes	Page **38**
ESCON Mod. 50/5	487
ESCON Mod. 50/8 (HE)	488
ESCON 50/5	489
ESCON 70/10	489
DEC Module 50/5	491

*607937 cannot be combined with the MILE encoder, because the current limit of