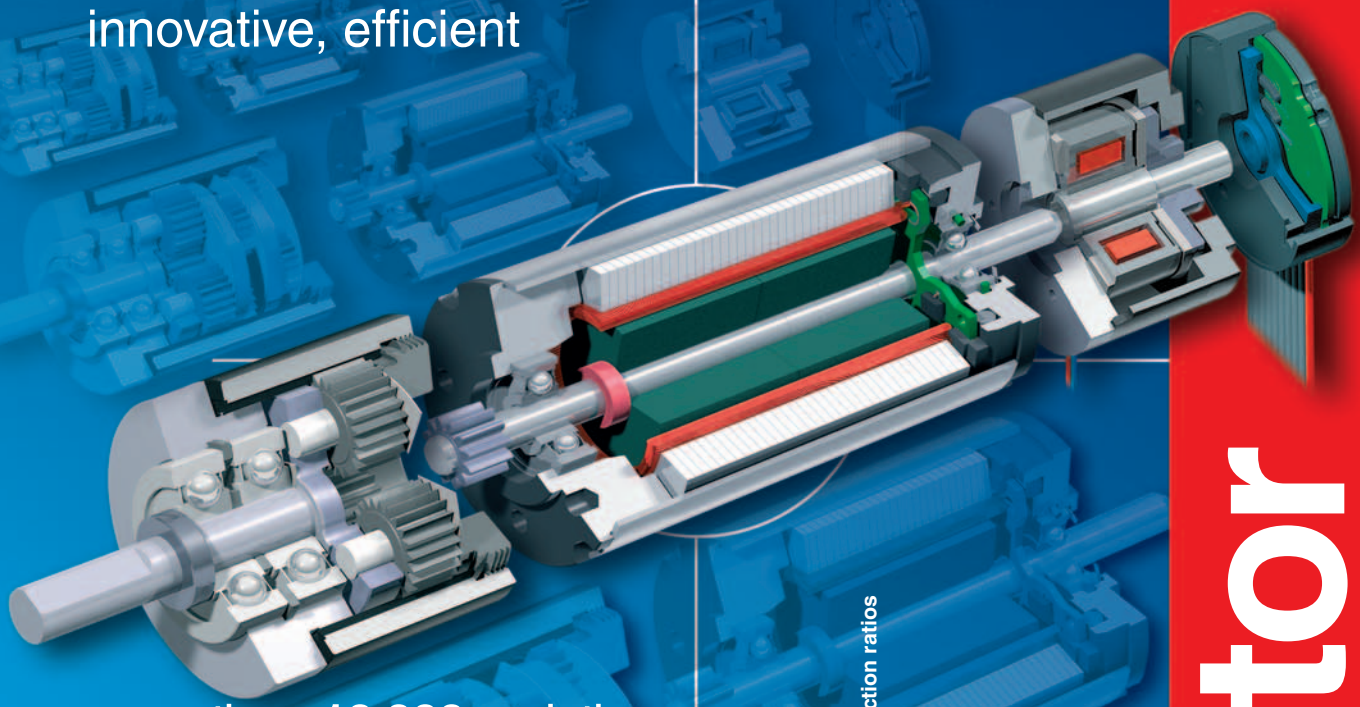
New

EC-max Program

user-oriented,
innovative, efficient



more than **10,000** variations

EC-max 16
EC-max 22
EC-max 30
EC-max 35
EC-max 40

2 lengths per type
= 10 power categories

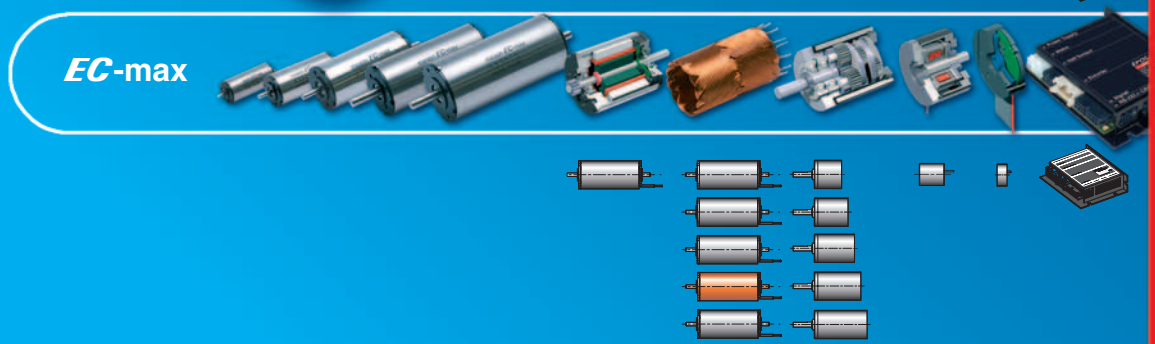
up to 6 windings
per type

2 gearheads
up to 55 reduction ratios

Brake

MR Encoder or HP Encoder

Control technology



maxon motor

EDITION 04/2004

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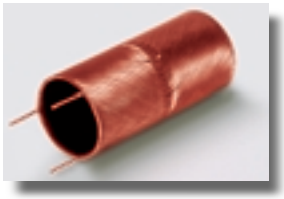
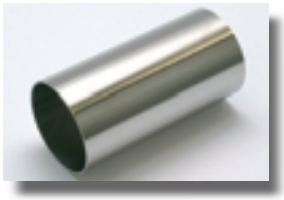
The maxon EC-max program

The modular EC motor Program with convincing price-performance ratio.

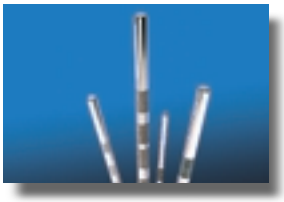


The "heart" is the ironless winding, System maxon®. This means – physically dependent – advantages such as no detent, high efficiency and excellent control dynamics.



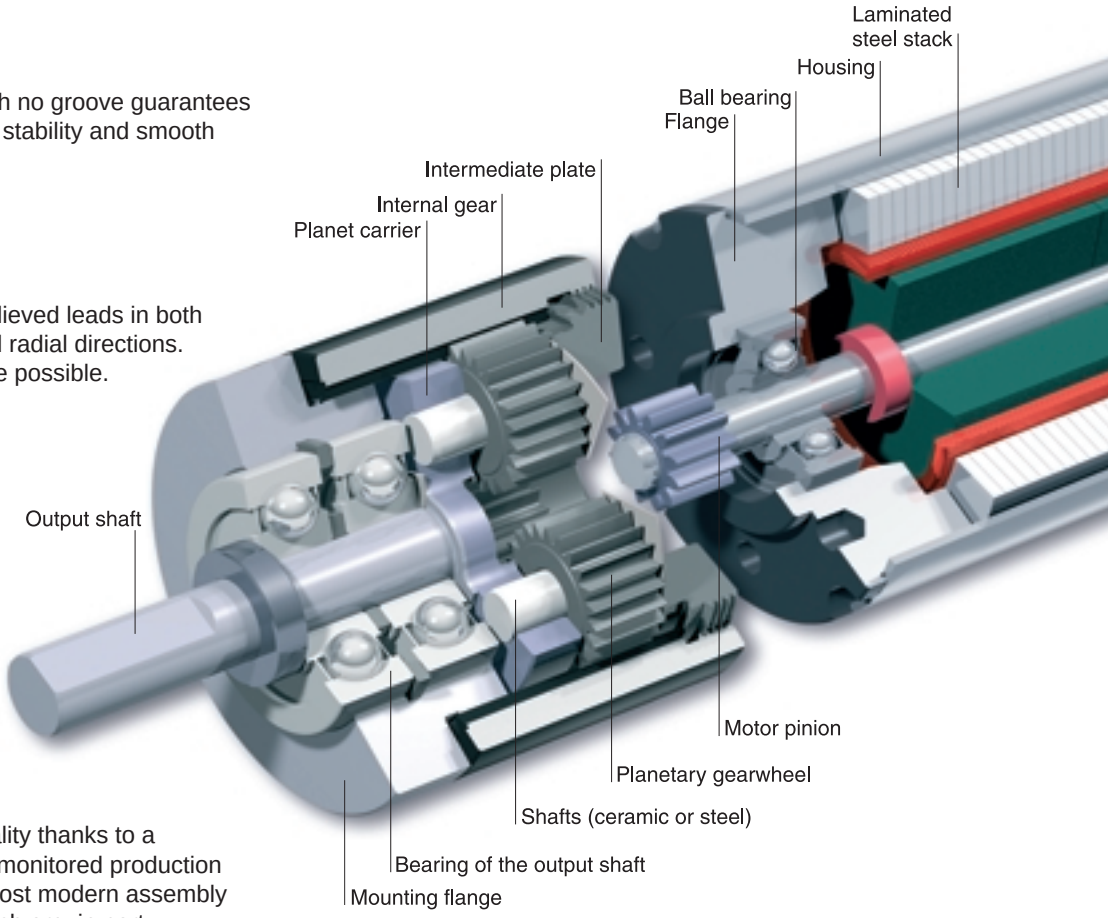
The motor housing, a simple tube made of stainless steel – non magnetic, rigid, rust-proof.

Metal housing and flange allow good heat dissipation and mechanical stability.

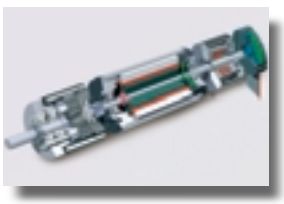


Shaft with no groove guarantees torsional stability and smooth running.

Strain relieved leads in both axial and radial directions. Plugs are possible.



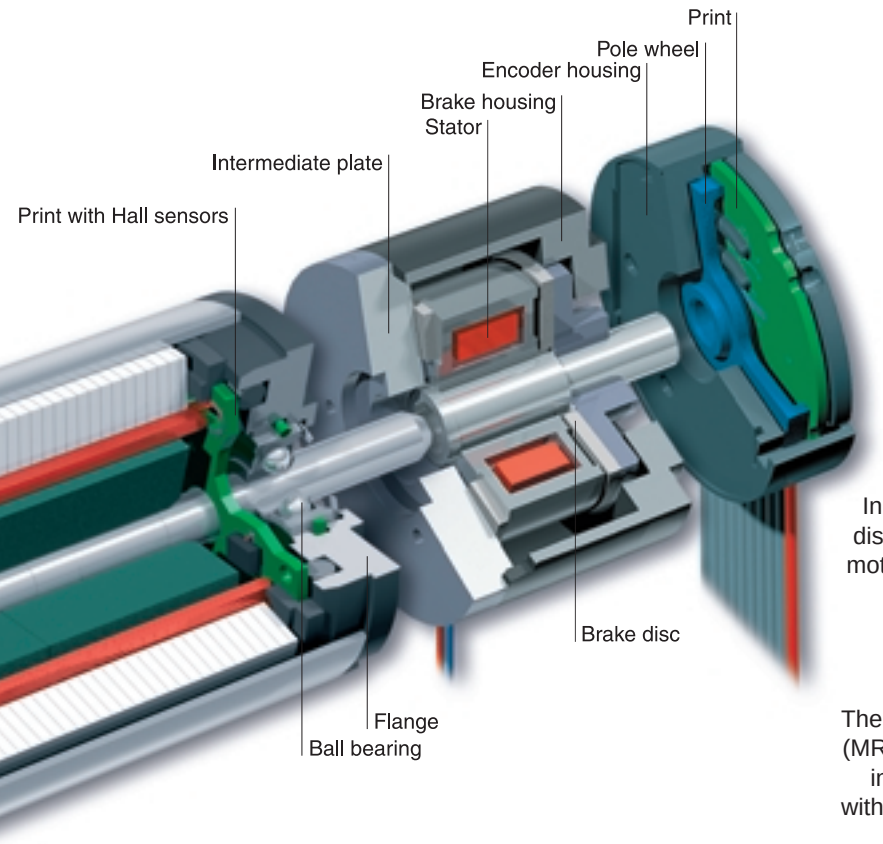
High quality thanks to a process monitored production on the most modern assembly lines which are, in part, developed by maxon.



Modular construction with gears, sensors and brakes.

If basically the power of a motor is high enough, but its speed is too high and its torque too low, a maxon precision gear is recommended.

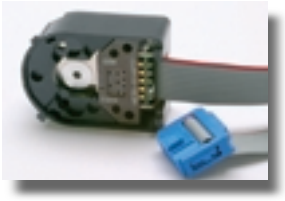
The innovative use of high-tech ceramic components markedly improves the performance and service life of our gearheads.

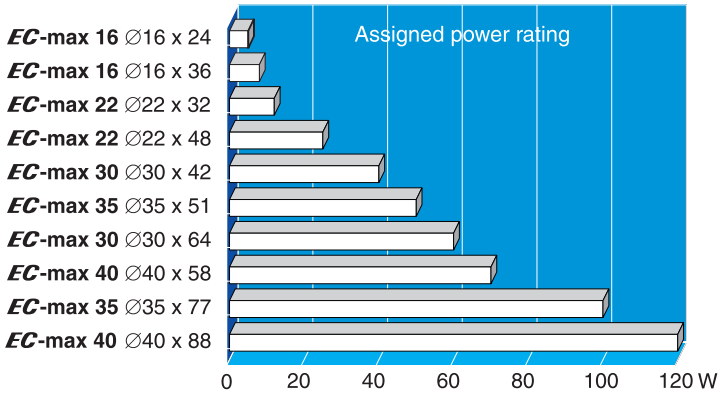


In an MR-Encoder, the magnetic disc (pole wheel) mounted on the motor shaft produces a sine-wave voltage flow which creates the typical encoder signals.

The Magneto-Resistance-Encoder (MR-Encoder) features up to 1024 increments per turn, 3 channels with complementary signals and is extremely compact.

The digital incremental tacho HEDL works on the optical principle.

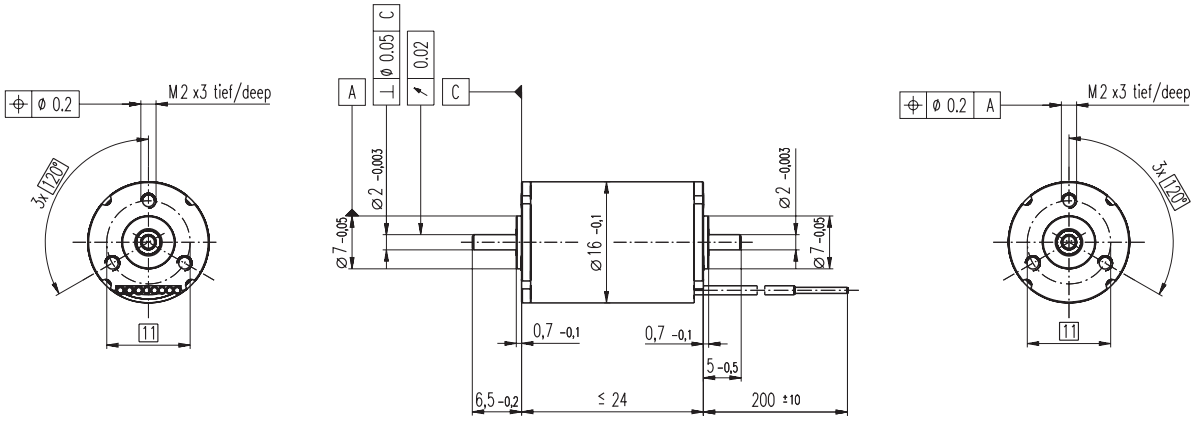




The holding brake inhibits drifting in the stationary and switched off motor.

The control electronics is optimised for the maxon EC-max - from simple electronic commutation to miniaturised 1-axis positioning control unit.

EC-max 16 ∅16 mm, brushless, 5 Watt



M 1:1

Stock program
Standard program
Special program (on request!)

			Order Number			
		Δ-circuit	283825	283826	283827	283828
Motor Data (provisional)						
1	Assigned power rating	W	5	5	5	5
2	Nominal voltage	Volt	4.5	6.0	9.0	12.0
3	No load speed 1)	rpm	12400	13000	12100	13000
4	Stall torque 1)	mNm	6.25	6.19	6.00	6.34
5	Speed / torque gradient 1)	rpm / mNm	2130	2260	2180	2210
6	No load current 1)	mA	133	107	65.0	53.6
7	Terminal resistance phase to phase	Ohm	2.33	3.97	9.86	15.5
8	Max. permissible speed	rpm	20000	20000	20000	20000
9	Max. continuous current at 5000 rpm 1)	mA	1170	899	570	455
10	Max. continuous torque at 5000 rpm	mNm	3.15	3.05	3.11	3.09
11	Max. efficiency 1)	%	55	55	55	55
12	Torque constant	mNm / A	3.23	4.09	6.57	8.19
13	Speed constant	rpm / V	2950	2330	1450	1170
14	Mechanical time constant	ms	10.4	11.0	10.7	10.8
15	Rotor inertia	gcm²	0.466	0.466	0.466	0.466
16	Terminal inductance phase to phase	mH	0.032	0.051	0.132	0.205
17	Thermal resistance housing-ambient	K / W	24	24	24	24
18	Thermal resistance winding-housing	K / W	2.9	2.9	2.9	2.9
19	Thermal time constant winding	s	1.0	0.9	1.0	1.0
20	Thermal time constant stator	s	322	322	322	322

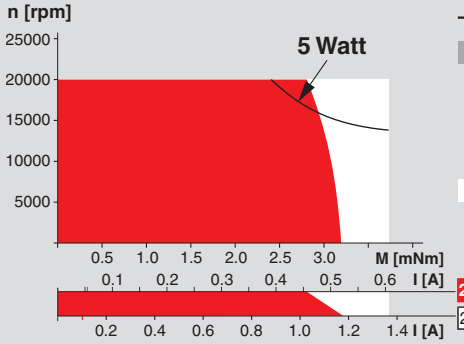
1) Values determined with block commutation (control 108319)!

Specifications

- Axial play at axial load < 1.5 N: 0 mm
  > 1.5 N: max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 1.5 N
- Max. **ball bearings** loads
  axial (dynamic) 1.5 N
  radial (5 mm from flange) 6 N
  Force for press fits (static) 40 N
  (static, shaft supported) 600 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 27 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 24)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1

Operating Range



Comments

Curve of constant assigned power rating

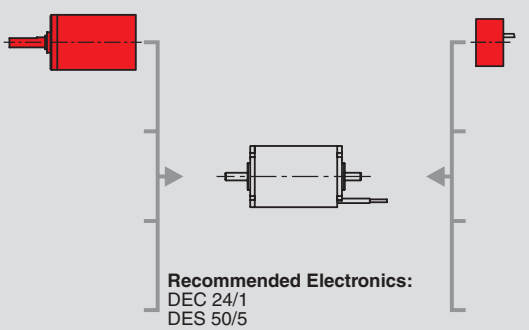
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283828 Motor with high resistance winding
283825 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅16 mm
0.1 - 0.3 Nm
Details page 14

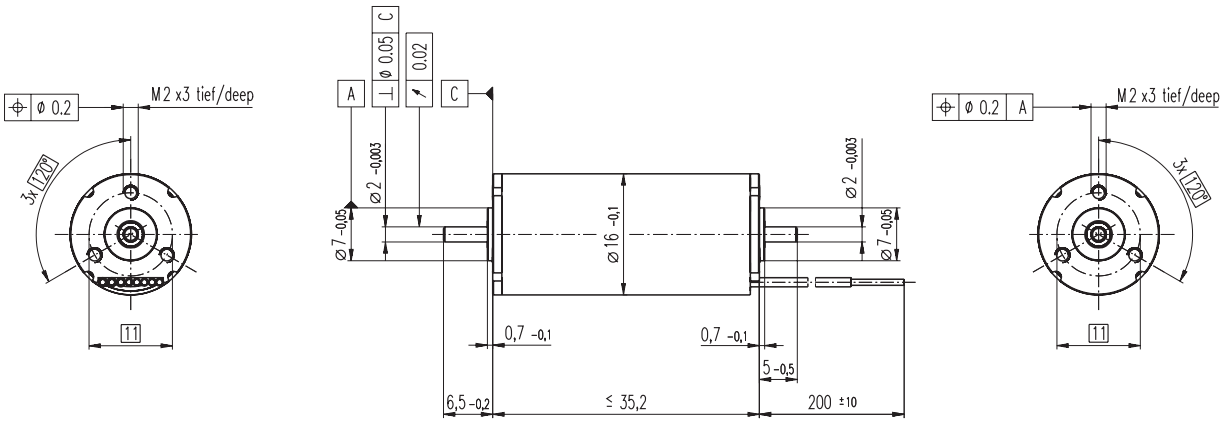


Digital MR Encoder
128 / 256 / 512 CPT,
2 / 3 channels
Details page 19

Recommended Electronics:
DEC 24/1
DES 50/5
EPOS 24/1

April 2004 edition / subject to change

EC-max 16 ∅16 mm, brushless, 8 Watt



M 1:1

Stock program
Standard program
Special program (on request!)

			Order Number							
		Δ-circuit	283831	283832	283833	283834	283835			
Motor Data (provisional)										
1	Assigned power rating	W	8	8	8	8	8			
2	Nominal voltage	Volt	6.0	9.0	12.0	18.0	24.0			
3	No load speed 1)	rpm	12100	12000	12000	12000	12000			
4	Stall torque 1)	mNm	18.9	19.3	20.5	19.6	21.2			
5	Speed / torque gradient 1)	rpm / mNm	666	645	609	634	585			
6	No load current 1)	mA	161	105	79.4	52.6	39.4			
7	Terminal resistance phase to phase	Ohm	1.44	3.23	5.38	12.7	20.9			
8	Max. permissible speed	rpm	20000	20000	20000	20000	20000			
9	Max. continuous current at 5000 rpm 1)	mA	1750	1170	903	588	458			
10	Max. continuous torque at 5000 rpm	mNm	6.62	6.74	6.94	6.80	7.09			
11	Max. efficiency 1)	%	65	66	66	66	67			
12	Torque constant	mNm / A	4.54	6.92	9.19	13.8	18.5			
13	Speed constant	rpm / V	2100	1380	1040	690	517			
14	Mechanical time constant	ms	6.5	6.3	5.9	6.2	5.7			
15	Rotor inertia	gcm²	0.93	0.93	0.93	0.93	0.93			
16	Terminal inductance phase to phase	mH	0.032	0.074	0.131	0.296	0.528			
17	Thermal resistance housing-ambient	K / W	18	18	18	18	18			
18	Thermal resistance winding-housing	K / W	1.5	1.5	1.5	1.5	1.5			
19	Thermal time constant winding	s	0.9	1.0	1.0	1.0	1.1			
20	Thermal time constant stator	s	333	333	333	333	333			

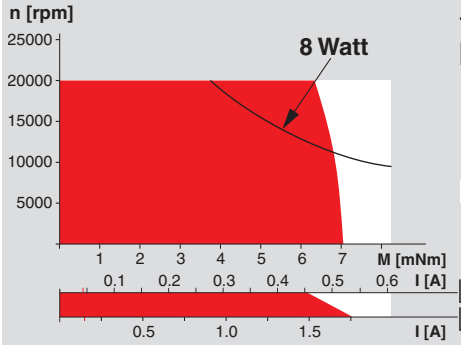
1) Values determined with block commutation (control 108319)!

Specifications

- Axial play at axial load < 1.5 N 0 mm
  > 1.5 N max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 1.5 N
- Max. **ball bearings** loads
  axial (dynamic) 1.5 N
  radial (5 mm from flange) 6 N
  Force for press fits (static) 40 N
  (static, shaft supported) 400 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 43 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 24)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1

Operating Range



Comments

Curve of constant assigned power rating

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).

283835 Motor with high resistance winding
283831 Motor with low resistance winding

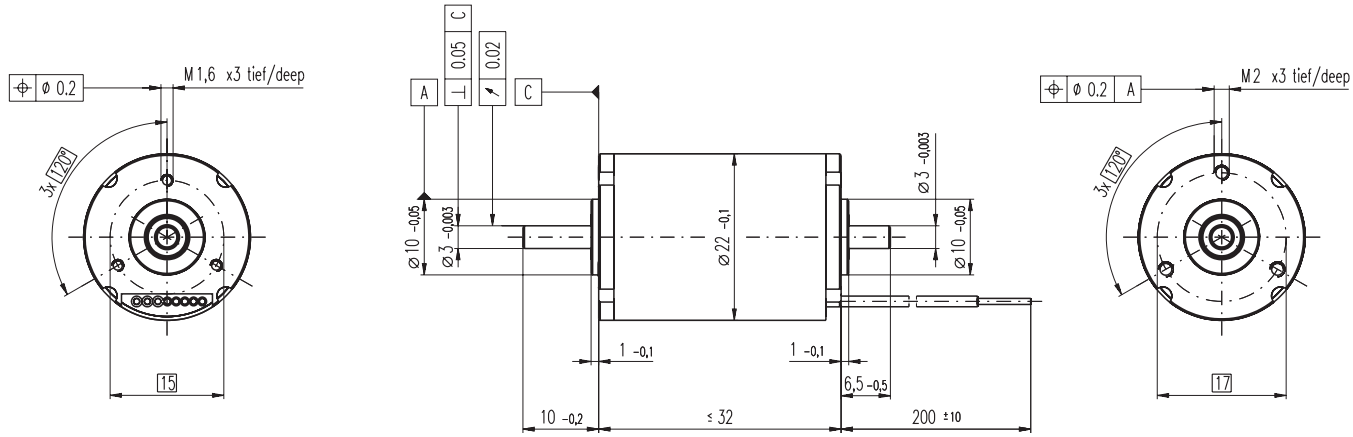
maxon Modular System

Planetary Gearhead
∅22 mm
0.5 - 2.0 Nm
Details page 15

Digital MR Encoder
128 / 256 / 512 CPT,
2 / 3 channels
Details page 19

Recommended Electronics:
DEC 24/1
DES 50/5
EPOS 24/1

EC-max 22 ∅22 mm, brushless, 12 Watt



M 1:1

Stock program
Standard program
Special program (on request!)

			Order Number				
		Δ-circuit	283837	283838	283839	**283840**	283841
Motor Data (provisional)							
1	Assigned power rating	W	12	12	12	12	12
2	Nominal voltage	Volt	6.0	12.0	18.0	24.0	36.0
3	No load speed [1]	rpm	12100	12900	12800	12900	12900
4	Stall torque [1]	mNm	30.2	30.9	34.8	34.3	33.3
5	Speed / torque gradient [1]	rpm / mNm	413	431	381	386	399
6	No load current [1]	mA	218	119	78.7	59.2	39.5
7	Terminal resistance phase to phase	Ohm	0.910	3.34	6.73	12.1	28.0
8	Max. permissible speed	rpm	18000	18000	18000	18000	18000
9	Max. continuous current at 5000 rpm [1]	mA	2450	1280	899	671	441
10	Max. continuous torque at 5000 rpm	mNm	9.45	9.24	9.86	9.78	9.62
11	Max. efficiency [1]	%2	68	68	69	69	69
12	Torque constant	mNm / A	4.59	8.60	13.0	17.3	25.9
13	Speed constant	rpm / V	2080	1110	735	552	369
14	Mechanical time constant	ms	9.5	9.9	8.7	8.9	9.1
15	Rotor inertia	gcm²	2.2	2.2	2.2	2.2	2.2
16	Terminal inductance phase to phase	mH	0.026	0.090	0.206	0.366	0.820
17	Thermal resistance housing-ambient	K / W	14	14	14	14	14
18	Thermal resistance winding-housing	K / W	2.0	2.0	2.0	2.0	2.0
19	Thermal time constant winding	s	1.8	1.7	2.0	1.9	1.9
20	Thermal time constant stator	s	471	471	471	471	471

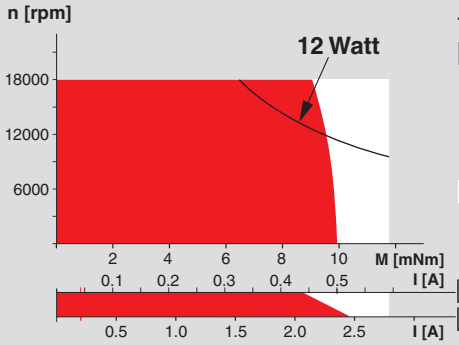
1) Values determined with block commutation (control 108319)!

Specifications

- Axial play at axial load < 5 N: 0 mm
  > 5 N: max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 5 N
- Max. **ball bearings** loads
  axial (dynamic) 5 N
  radial (5 mm from flange) 16 N
  Force for press fits (static) 60 N
  (static, shaft supported) 1400 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 67 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 24)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1

Operating Range



Comments

Curve of constant assigned power rating

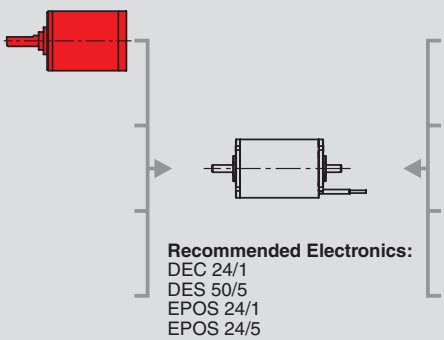
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283841 Motor with high resistance winding
283837 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅22 mm
0.5 - 2.0 Nm
Details page 15

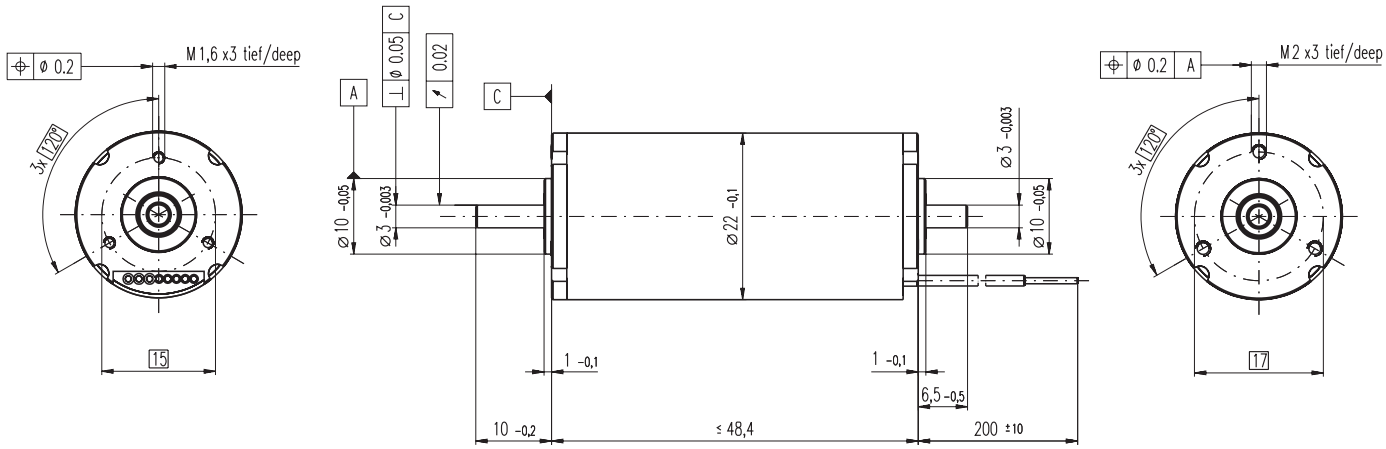


Digital MR Encoder
128 / 256 / 512 CPT,
2 / 3 channels
Details page 19

Brake
∅20 mm
24 VDC, 0.1 Nm
Details page 22

Recommended Electronics:
DEC 24/1
DES 50/5
EPOS 24/1
EPOS 24/5

EC-max 22 ∅22 mm, brushless, 25 Watt



M 1:1

Stock program
Standard program
Special program (on request!)

			Order Number							
		Δ-circuit	283856	283857	283858	283859	283860			
Motor Data (provisional)										
1	Assigned power rating	W	25	25	25	25	25			
2	Nominal voltage	Volt	12.0	18.0	24.0	36.0	48.0			
3	No load speed 1)	rpm	13700	13700	13700	12900	13700			
4	Stall torque 1)	mNm	114	109	118	107	122			
5	Speed / torque gradient 1)	rpm / mNm	124	129	119	124	115			
6	No load current 1)	mA	314	209	157	96.4	78.5			
7	Terminal resistance phase to phase	Ohm	0.862	2.02	3.33	8.75	12.8			
8	Max. permissible speed	rpm	18000	18000	18000	18000	18000			
9	Max. continuous current at 5000 rpm 1)	mA	2920	1910	1480	916	757			
10	Max. continuous torque at 5000 rpm	mNm	19.8	19.4	20.2	19.8	20.6			
11	Max. efficiency 1)	%	73	72	73	72	74			
12	Torque constant	mNm / A	8.16	12.2	16.3	26.0	32.6			
13	Speed constant	rpm / V	1170	780	585	368	293			
14	Mechanical time constant	ms	5.6	5.8	5.4	5.6	5.2			
15	Rotor inertia	gcm²	4.3	4.3	4.3	4.3	4.3			
16	Terminal inductance phase to phase	mH	0.041	0.092	0.163	0.413	0.652			
17	Thermal resistance housing-ambient	K / W	10	10	10	10	10			
18	Thermal resistance winding-housing	K / W	1.1	1.1	1.1	1.1	1.1			
19	Thermal time constant winding	s	1.8	1.8	1.9	1.8	2.0			
20	Thermal time constant stator	s	491	491	491	491	491			

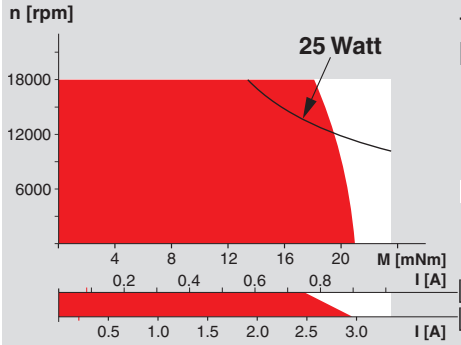
1) Values determined with block commutation (control 108319)!

Specifications

- Axial play at axial load < 5 N 0 mm
  > 5 N max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 5 N
- Max. **ball bearings** loads
  axial (dynamic) 5 N
  radial (5 mm from flange) 16 N
  Force for press fits (static) 60 N
  (static, shaft supported) 1000 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 110 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 24)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1

Operating Range



Comments

Curve of constant assigned power rating

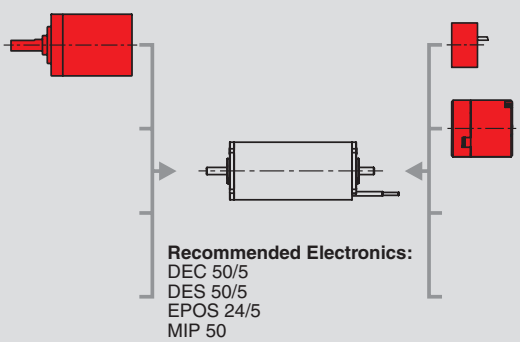
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283860 Motor with high resistance winding
283855 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅32 mm
1 - 6 Nm
Details page 16

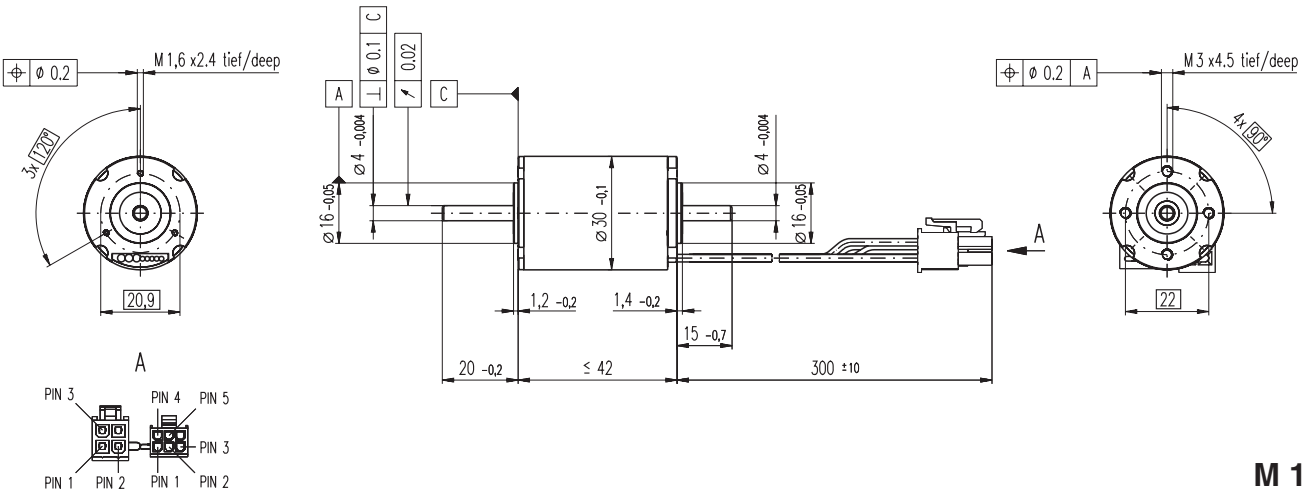


Digital MR Encoder
128 / 256 / 512 CPT,
2 / 3 channels
Details page 19

Brake
∅20 mm
24 VDC, 0.1 Nm
Details page 22

Recommended Electronics:
DEC 50/5
DES 50/5
EPOS 24/5
MIP 50

EC-max 30 ∅30 mm, brushless, 40 Watt



M 1:2

Stock program
Standard program
Special program (on request!)

			Order Number							
		Δ-circuit	272766	**272768**	272769	272770				
Motor Data (provisional)										
1	Assigned power rating	W	40	40	40	40				
2	Nominal voltage	Volt	12.0	24.0	36.0	48.0				
3	No load speed [1]	rpm	9480	10100	9980	10100				
4	Stall torque [1]	mNm	146	149	143	145				
5	Speed / torque gradient [1]	rpm / mNm	66.0	68.9	71.0	70.4				
6	No load current [1]	mA	160	86.7	56.8	43.2				
7	Terminal resistance phase to phase	Ohm	0.984	3.62	8.58	14.8				
8	Max. permissible speed	rpm	15000	15000	15000	15000				
9	Max. continuous current at 5000 rpm [1]	mA	2810	1470	955	728				
10	Max. continuous torque at 5000 rpm	mNm	29.5	28.9	28.5	28.7				
11	Max. efficiency [1]	%	79	79	78	79				
12	Torque constant	mNm / A	11.9	22.4	34.0	44.8				
13	Speed constant	rpm / V	800	426	281	213				
14	Mechanical time constant	ms	7.6	7.9	8.2	8.1				
15	Rotor inertia	gcm²	11.0	11.0	11.0	11.0				
16	Terminal inductance phase to phase	mH	0.068	0.238	0.547	0.952				
17	Thermal resistance housing-ambient	K / W	8.0	8.0	8.0	8.0				
18	Thermal resistance winding-housing	K / W	1.0	1.0	0.9	0.9				
19	Thermal time constant winding	s	3.1	2.8	2.7	2.6				
20	Thermal time constant stator	s	643	643	643	643				

1) Values determined with block commutation (control 108319)!

Specifications

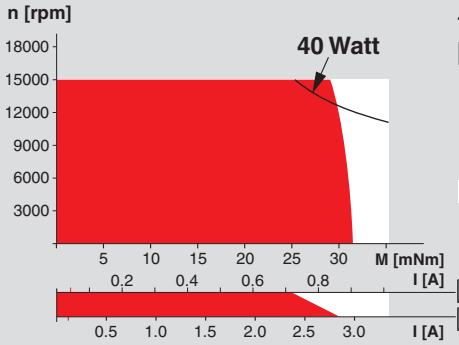
- Axial play at axial load < 6 N: 0 mm
  > 6 N: max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 6 N
- Max. **ball bearings** loads
  axial (dynamic) 5.5 N
  radial (5 mm from flange) 25 N
  Force for press fits (static) 100 N
  (static, shaft supported) 2000 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 163 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 22)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
Connector	**Article number**
Molex	39-01-2040

Connections (Cable AWG 26)

white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1
Connector	**Article number**
Molex	430-25-0600

Operating Range



Comments

Curve of constant assigned power rating

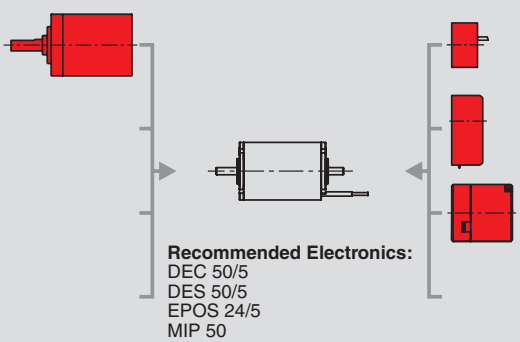
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

272770 Motor with high resistance winding
272766 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅32 mm
1 - 6 Nm
Details page 16



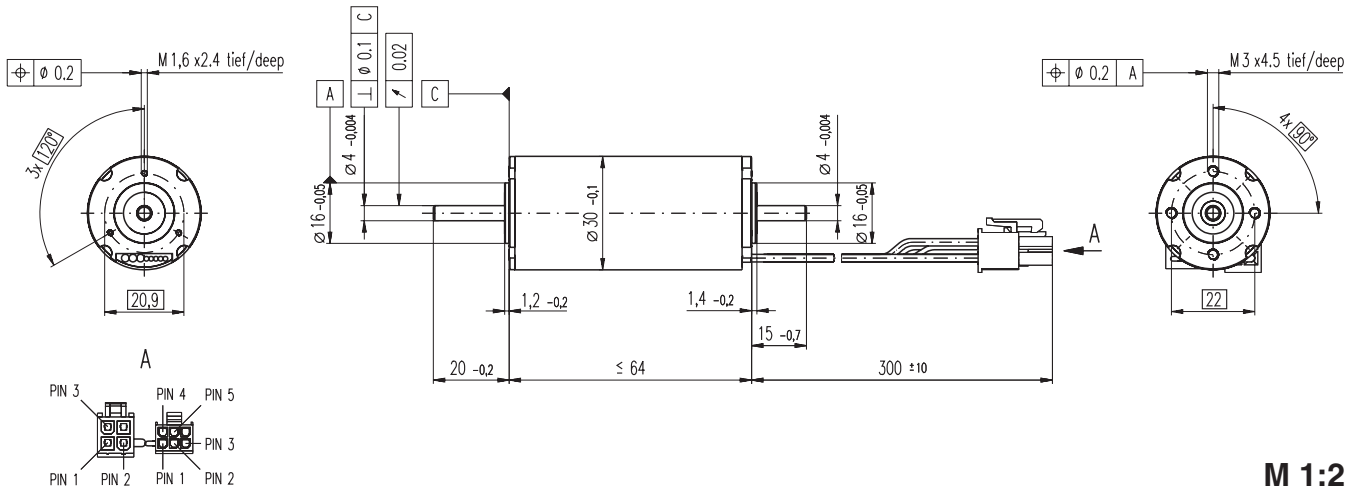
Recommended Electronics:
DEC 50/5
DES 50/5
EPOS 24/5
MIP 50

Digital MR Encoder
256 - 1024 CPT,
3 channels
Details page 20

Digital Encoder HP HEDL 5540
500 CPT, 3 channels
Details page 21

Brake
∅20 mm
24 VDC, 0.1 Nm
Details page 22

EC-max 30 ∅30 mm, brushless, 60 Watt



M 1:2

Stock program
Standard program
Special program (on request!)

			Order Number		
		Δ-circuit	272763	272764	272765
Motor Data (provisional)					
1	Assigned power rating	W	60	60	60
2	Nominal voltage	Volt	24.0	36.0	48.0
3	No load speed 1)	rpm	9740	9900	9750
4	Stall torque 1)	mNm	447	467	500
5	Speed / torque gradient 1)	rpm / mNm	22.1	21.4	19.7
6	No load current 1)	mA	210	142	105
7	Terminal resistance phase to phase	Ohm	1.25	2.65	4.47
8	Max. permissible speed	rpm	15000	15000	15000
9	Max. continuous current at 5000 rpm 1)	A	2.98	2.05	1.58
10	Max. continuous torque at 5000 rpm	mNm	60.8	61.8	64.5
11	Max. efficiency 1)	%	80	81	81
12	Torque constant	mNm / A	23.3	34.4	46.5
13	Speed constant	rpm / V	410	278	205
14	Mechanical time constant	ms	5.1	4.9	4.5
15	Rotor inertia	gcm²	21.9	21.9	21.9
16	Terminal inductance phase to phase	mH	0.124	0.271	0.497
17	Thermal resistance housing-ambient	K / W	5.9	5.9	5.9
18	Thermal resistance winding-housing	K / W	0.55	0.54	0.53
19	Thermal time constant winding	s	2.8	2.8	3.0
20	Thermal time constant stator	s	669	669	669

1) Values determined with block commutation (control 108319)!

Specifications

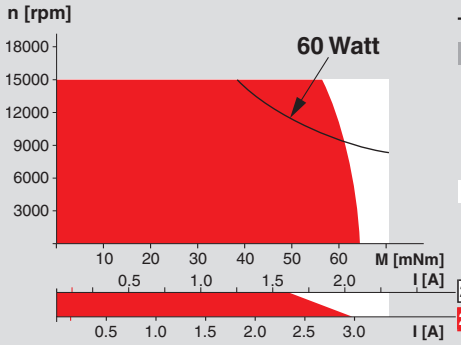
- Axial play at axial load < 6 N: 0 mm; > 6 N: max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 6 N
- Max. **ball bearings** loads
  axial (dynamic) 5.5 N
  radial (5 mm from flange) 25 N
  Force for press fits (static) 100 N
  (static, shaft supported) 1300 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 271 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 22)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
Connector	**Article number**
Molex	39-01-2040

Connections (Cable AWG 26)

white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1
Connector	**Article number**
Molex	430-25-0600

Operating Range



Comments

Curve of constant assigned power rating

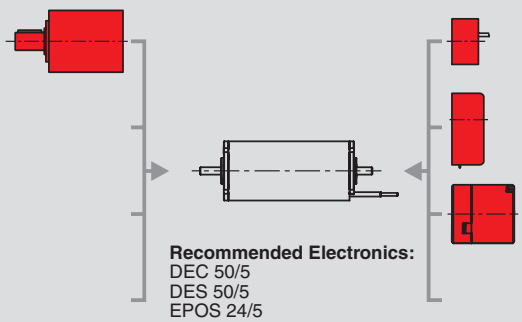
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

272765 Motor with high resistance winding
272763 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅42 mm
3 - 15 Nm
Details page 17



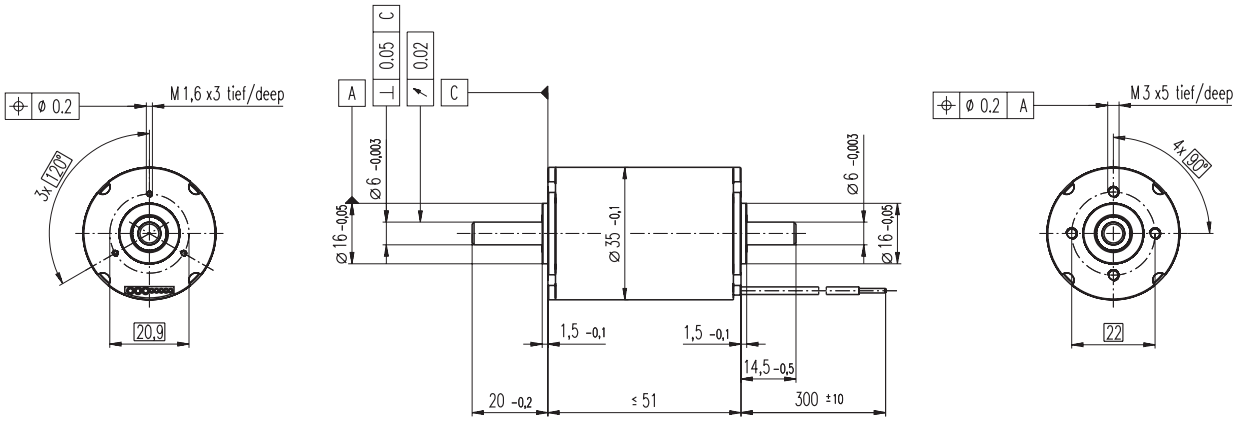
Digital MR Encoder
256 - 1024 CPT,
3 channels
Details page 20

Digital Encoder HP HEDL 5540
500 CPT, 3 channels
Details page 21

Brake
∅20 mm
24 VDC, 0.1 Nm
Details page 22

Recommended Electronics:
DEC 50/5
DES 50/5
EPOS 24/5
MIP 50

EC-max 35 ∅35 mm, brushless, 50 Watt



M 1:2

Stock program
Standard program
Special program (on request!)

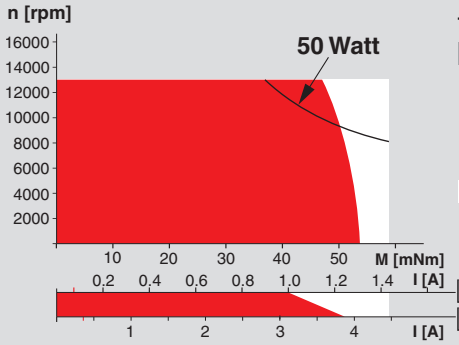
			Order Number								
		Δ-circuit	283861	283862	283863						
Motor Data (provisional)											
1	Assigned power rating	W	50	50	50						
2	Nominal voltage	Volt	12.0	24.0	48.0						
3	No load speed 1)	rpm	7420	7700	7680						
4	Stall torque 1)	mNm	221	257	228						
5	Speed / torque gradient 1)	rpm / mNm	34.4	30.6	34.5						
6	No load current 1)	mA	326	171	85.3						
7	Terminal resistance phase to phase	Ohm	0.821	2.73	12.3						
8	Max. permissible speed	rpm	13000	13000	13000						
9	Max. continuous current at 5000 rpm 1)	A	3.88	2.13	1.00						
10	Max. continuous torque at 5000 rpm	mNm	49.1	52.2	49.0						
11	Max. efficiency 1)	%	73	75	73						
12	Torque constant	mNm / A	15.1	29.2	58.4						
13	Speed constant	rpm / V	632	327	164						
14	Mechanical time constant	ms	10.0	8.94	10.1						
15	Rotor inertia	gcm²	27.9	27.9	27.9						
16	Terminal inductance phase to phase	mH	0.066	0.248	0.991						
17	Thermal resistance housing-ambient	K / W	5.9	5.9	5.9						
18	Thermal resistance winding-housing	K / W	0.74	0.74	0.74						
19	Thermal time constant winding	s	3.1	3.4	3.1						
20	Thermal time constant stator	s	785	785	785						

1) Values determined with block commutation (control 108319)!

Specifications

- Axial play at axial load < 8 N: 0 mm; > 8 N: max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 8 N
- Max. **ball bearings** loads
  axial (dynamic) 7.5 N
  radial (5 mm from flange) 50 N
  Force for press fits (static) 100 N
  (static, shaft supported) 5000 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 270 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 22)
  black Motor winding 2
  white Motor winding 3
  red Motor winding 1
  Connections (Cable AWG 26)
  white / grey Hall sensor 3
  green V_{Hall} 4.5 ... 24 VDC
  blue GND
  black / grey Hall sensor 2
  red / grey Hall sensor 1

Operating Range



Comments

Curve of constant assigned power rating

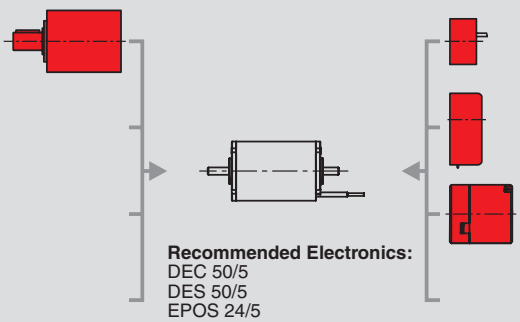
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283863 Motor with high resistance winding
283861 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅42 mm
3 - 15 Nm
Details page 17



Digital MR Encoder
256 - 1024 CPT,
3 channels
Details page 20

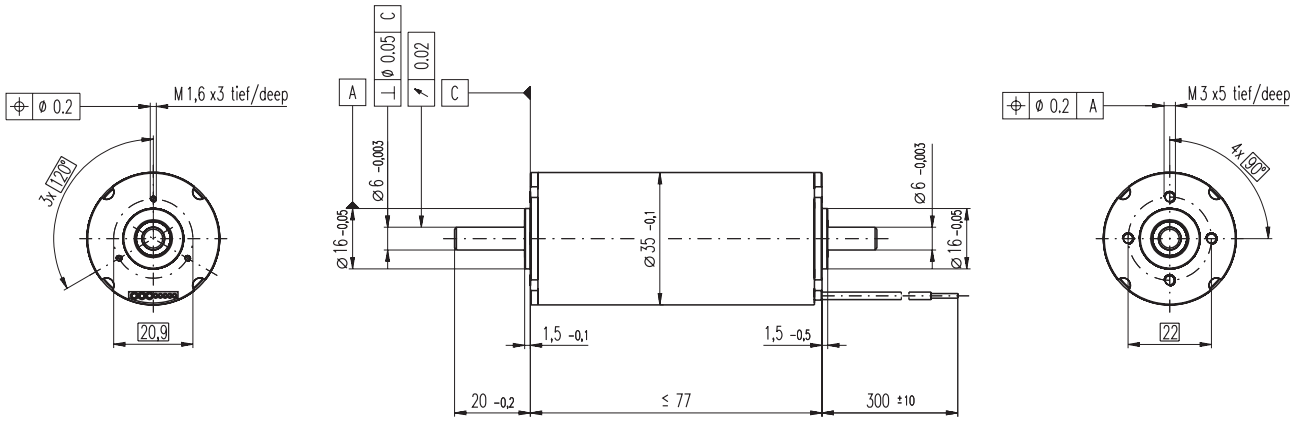
Digital Encoder HP HEDL 5540
500 CPT, 3 channels
Details page 21

Brake
∅28 mm
24 VDC, 0.4 Nm
Details page 23

Recommended Electronics:
DEC 50/5
DES 50/5
EPOS 24/5
MIP 50

April 2004 edition / subject to change

EC-max 35 ∅35 mm, brushless, 100 Watt



M 1:2

Stock program
Standard program
Special program (on request!)

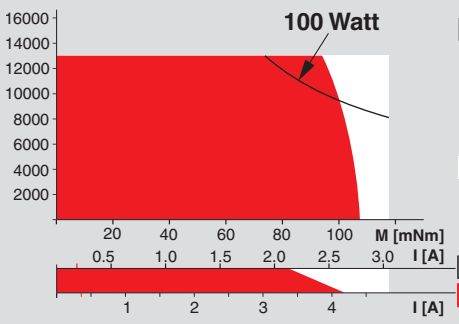
			Δ-circuit	**283864**	283865
Motor Data (provisional)					
1	Assigned power rating	W		100	100
2	Nominal voltage	Volt		24.0	48.0
3	No load speed [1]	rpm		7550	7560
4	Stall torque [1]	mNm		753	809
5	Speed / torque gradient [1]	rpm / mNm		10.1	9.44
6	No load current [1]	mA		276	138
7	Terminal resistance phase to phase	Ohm		0.956	3.56
8	Max. permissible speed	rpm		13000	13000
9	Max. continuous current at 5000 rpm [1]	A		4.20	2.17
10	Max. continuous torque at 5000 rpm	mNm		106	110
11	Max. efficiency [1]	%		80	81
12	Torque constant	mNm / A		30	60
13	Speed constant	rpm / V		318	159
14	Mechanical time constant	ms		5.8	5.4
15	Rotor inertia	gcm²		55	55
16	Terminal inductance phase to phase	mH		0.132	0.527
17	Thermal resistance housing-ambient	K / W		4.4	4.4
18	Thermal resistance winding-housing	K / W		0.39	0.39
19	Thermal time constant winding	s		3.0	3.2
20	Thermal time constant stator	s		808	808

1) Values determined with block commutation (control 108319)!

Specifications

- Axial play at axial load < 8 N 0 mm
  > 8 N max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 8 N
- Max. **ball bearings** loads
  axial (dynamic) 7.5 N
  radial (5 mm from flange) 50 N
  Force for press fits (static) 100 N
  (static, shaft supported) 5000 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 444 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 22)
  black Motor winding 2
  white Motor winding 3
  red Motor winding 1
  Connections (Cable AWG 26)
  white / grey Hall sensor 3
  green V_{Hall} 4.5 ... 24 VDC
  blue GND
  black / grey Hall sensor 2
  red / grey Hall sensor 1

Operating Range



Comments

Curve of constant assigned power rating

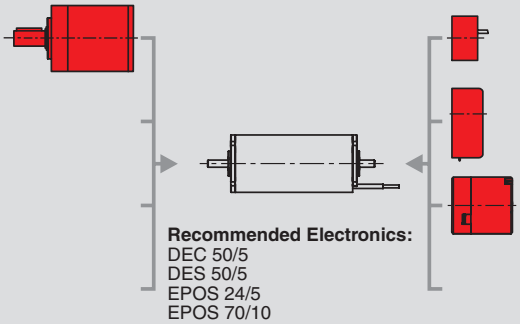
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283865 Motor with high resistance winding
283864 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅52 mm
4 - 30 Nm
Details page 18



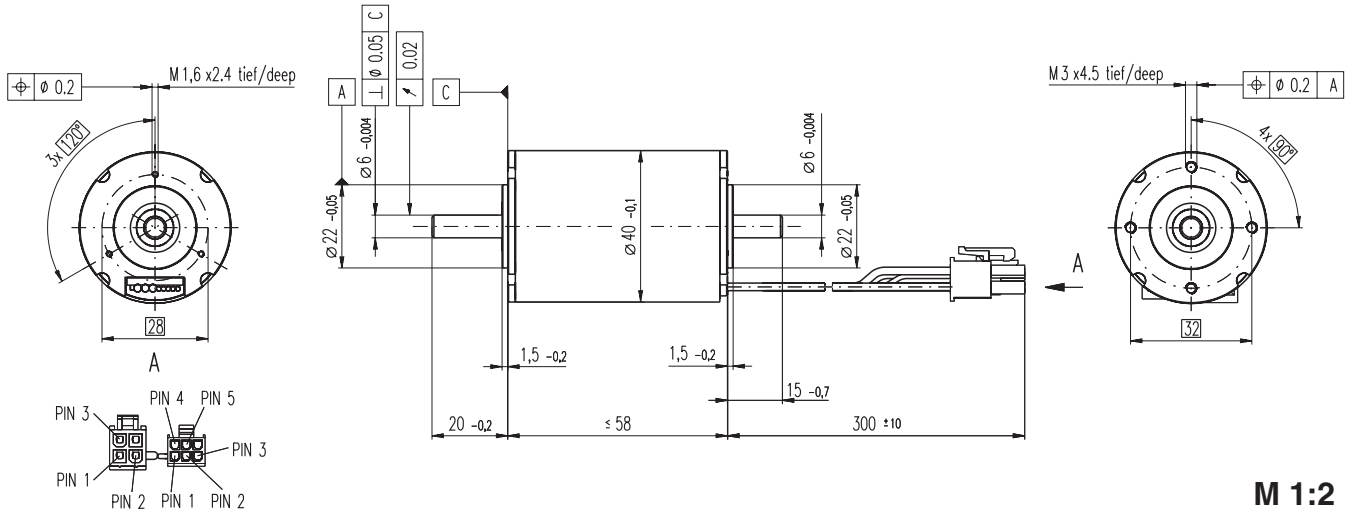
Digital MR Encoder
256 - 1024 CPT,
3 channels
Details page 20

Digital Encoder HP HEDL 5540
500 CPT, 3 channels
Details page 21

Brake
∅28 mm
24 VDC, 0.4 Nm
Details page 23

Recommended Electronics:
DEC 50/5
DES 50/5
EPOS 24/5
EPOS 70/10
MIP 50, MIP 100

EC-max 40 ∅40 mm, brushless, 70 Watt



Stock program
Standard program
Special program (on request!)

			Order Number			
		Δ-circuit	283866	283867	283868	283869
Motor Data (provisional)						
1	Assigned power rating	W	70	70	70	70
2	Nominal voltage	Volt	12.0	24.0	36.0	48.0
3	No load speed 1)	rpm	8090	8090	8510	9080
4	Stall torque 1)	mNm	519	509	603	640
5	Speed / torque gradient 1)	rpm / mNm	15.8	16.1	14.3	14.3
6	No load current 1)	mA	427	213	152	124
7	Terminal resistance phase to phase	Ohm	0.324	1.32	2.39	3.75
8	Max. permissible speed	rpm	12000	12000	12000	12000
9	Max. continuous current at 5000 rpm 1)	A	6.55	3.24	2.41	1.92
10	Max. continuous torque at 5000 rpm	mNm	80.7	80.0	85.1	84.9
11	Max. efficiency 1)	%	80	80	81	82
12	Torque constant	mNm / A	14	28	40	50
13	Speed constant	rpm / V	682	341	239	191
14	Mechanical time constant	ms	8.5	8.6	7.7	7.7
15	Rotor inertia	gcm²	51	51	51	51
16	Terminal inductance phase to phase	mH	0.037	0.147	0.299	0.468
17	Thermal resistance housing-ambient	K / W	4.6	4.6	4.6	4.6
18	Thermal resistance winding-housing	K / W	0.54	0.54	0.54	0.54
19	Thermal time constant winding	s	3.7	3.6	4.1	4.1
20	Thermal time constant stator	s	917	917	917	917

1) Values determined with block commutation (control 108319)!

Specifications

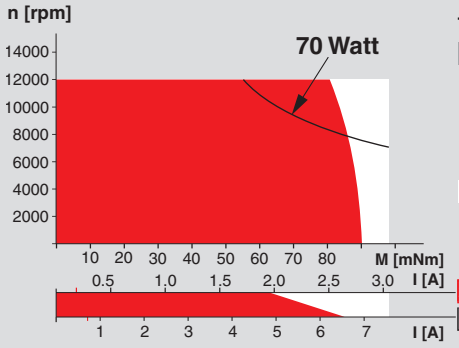
- Axial play at axial load < 10 N 0 mm
  > 10 N max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 10 N
- Max. **ball bearings** loads
  axial (dynamic) 9 N
  radial (5 mm from flange) 80 N
  Force for press fits (static) 170 N
  (static, shaft supported) 5000 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 400 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 22)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
Connector	**Article number**
Molex	39-01-2040

Connections (Cable AWG 26)

white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1
Connector	**Article number**
Molex	430-25-0600

Operating Range



Comments

Curve of constant assigned power rating

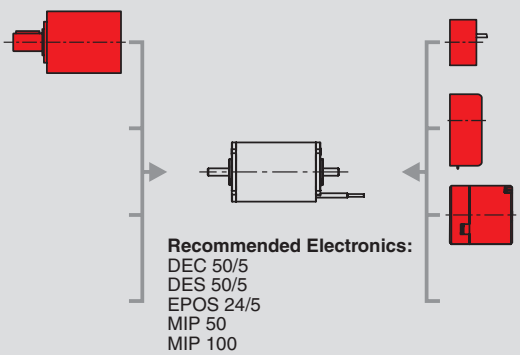
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283869 Motor with high resistance winding
283866 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅42 mm
3 - 15 Nm
Details page 17



Digital MR Encoder
256 - 1024 CPT,
3 channels
Details page 20

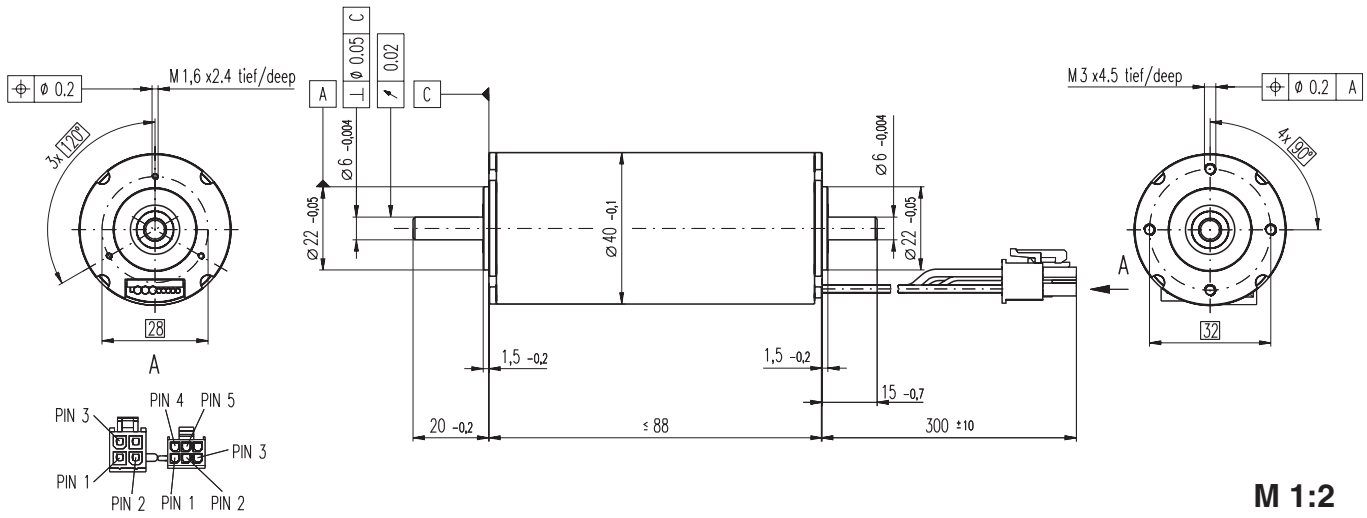
Digital Encoder HP HEDL 5540
500 CPT, 3 channels
Details page 21

Brake
∅28 mm
24 VDC, 0.4 Nm
Details page 23

Recommended Electronics:
DEC 50/5
DES 50/5
EPOS 24/5
MIP 50
MIP 100

April 2004 edition / subject to change

EC-max 40 ∅40 mm, brushless, 120 Watt



M 1:2

Stock program
Standard program
Special program (on request!)

			Order Number			
		Δ-circuit	283870	283871	283872	283873
Motor Data (provisional)						
1	Assigned power rating	W	120	120	120	120
2	Nominal voltage	Volt	48.0	48.0	48.0	48.0
3	No load speed 1)	rpm	10000	7140	4650	3550
4	Stall torque 1)	mNm	2190	1540	1070	854
5	Speed / torque gradient 1)	rpm / mNm	4.61	4.68	4.39	4.21
6	No load current 1)	mA	306	194	113	81.7
7	Terminal resistance phase to phase	Ohm	0.999	1.99	4.37	7.16
8	Max. permissible speed	rpm	12000	12000	12000	12000
9	Max. continuous current at 5000 rpm 1)	A	4.8	3.4	2.3	1.79
10	Max. continuous torque at 5000 rpm	mNm	186	185	191	195
11	Max. efficiency 1)	%	85	83	81	79
12	Torque constant	mNm / A	45.5	63.7	97.5	127
13	Speed constant	rpm / V	210	150	97.9	75
14	Mechanical time constant	ms	4.9	5.0	4.6	4.5
15	Rotor inertia	gcm²	101	101	101	101
16	Terminal inductance phase to phase	mH	0.196	0.383	0.898	1.53
17	Thermal resistance housing-ambient	K / W	3.5	3.5	3.5	3.5
18	Thermal resistance winding-housing	K / W	0.29	0.29	0.29	0.29
19	Thermal time constant winding	s	3.8	3.7	4.0	4.2
20	Thermal time constant stator	s	952	952	952	952

1) Values determined with block commutation (control 108319)!

Specifications

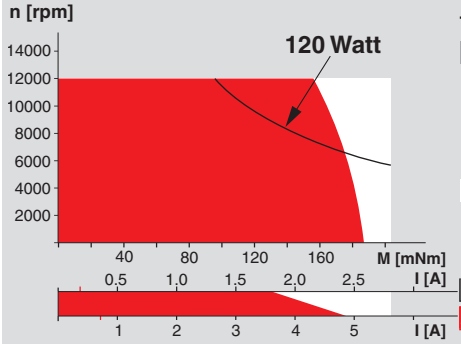
- Axial play at axial load < 10 N 0 mm
  > 10 N max. 0.15 mm
- **Preloaded ball bearings**
  Preload strength min. 10 N
- Max. **ball bearings** loads
  axial (dynamic) 9 N
  radial (5 mm from flange) 80 N
  Force for press fits (static) 170 N
  (static, shaft supported) 5000 N
- Ambient temperature range -40 ... +100°C
- Max. permissible winding temperature +155°C
- Weight of motor 660 g
- Values listed in the table are nominal.
- **Connections** (Cable AWG 22)

black	Motor winding 2
white	Motor winding 3
red	Motor winding 1
Connector	**Article number**
Molex	39-01-2040

Connections (Cable AWG 26)

white / grey	Hall sensor 3
green	V_{Hall} 4.5 ... 24 VDC
blue	GND
black / grey	Hall sensor 2
red / grey	Hall sensor 1
Connector	**Article number**
Molex	430-25-0600

Operating Range



Comments

Curve of constant assigned power rating

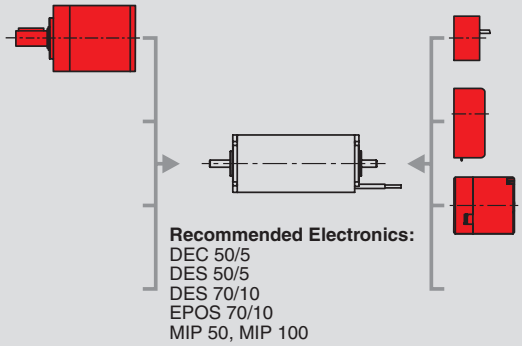
Continuous operation
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.
= Thermal limit

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

283873 Motor with high resistance winding
283870 Motor with low resistance winding

maxon Modular System

Planetary Gearhead
∅52 mm
4 - 30 Nm
Details page 18



Digital MR Encoder
256 - 1024 CPT,
3 channels
Details page 20

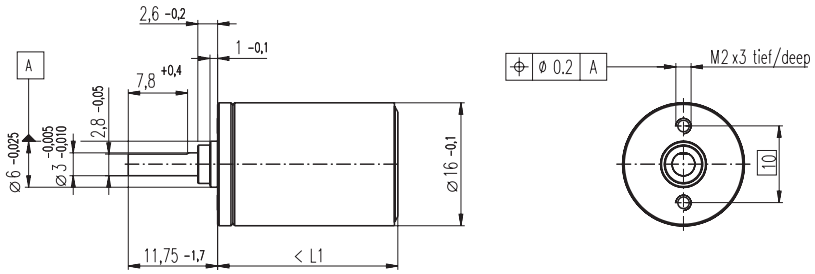
Digital Encoder HP HEDL 5540
500 CPT, 3 channels
Details page 21

Brake
∅28 mm
24 VDC, 0.4 Nm
Details page 23

Recommended Electronics:
DEC 50/5
DES 50/5
DES 70/10
EPOS 70/10
MIP 50, MIP 100

Planetary Gearhead GP 16 A ∅16 mm, 0.1 - 0.3 Nm

Metal Version



M 1:1

Technical Data

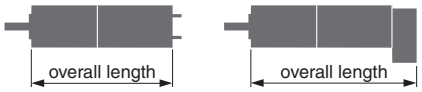
Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	sleeve bearings*
Radial play, 6 mm from flange	max. 0.06 mm
Axial play	0.02 - 0.10 mm
Max. permissible axial load	8 N
Max. permissible force for press fits	100 N
Sense of rotation, drive to output	=
Recommended input speed	< 6000 rpm
Recommended temperature range	-15 ... +65°C

Number of stages	1	2	3	4	5
Max. radial load, 6 mm from flange	8 N	12 N	16 N	20 N	20 N

*Option: ball bearings

Stock program
Standard program
Special program (on request!)

			Order Number							
			110321	110322	110323	118186	110324	134782	110325	134785
Gearhead Data										
1	Reduction		4.4 : 1	19 : 1	84 : 1	157 : 1	370 : 1	690 : 1	1621 : 1	3027 : 1
2	Reduction absolute		$^{57}/_{13}$	$^{3249}/_{169}$	$^{185193}/_{2197}$	$^{19683}/_{125}$	$^{10556001}/_{28561}$	$^{1121931}/_{1625}$	$^{601692057}/_{371293}$	$^{63950067}/_{21125}$
3	Max. motor shaft diameter	mm	2	2	2	1.5	2	2	2	2
	Order Number		118184	134777	134778		134780	118187	134783	134786
1	Reduction		5.4 : 1	24 : 1	104 : 1		455 : 1	850 :1	1996 : 1	3728 : 1
2	Reduction absolute		$^{27}/_{5}$	$^{1539}/_{65}$	$^{87723}/_{845}$		$^{5000211}/_{10985}$	$^{531441}/_{625}$	$^{285012027}/_{142805}$	$^{30292137}/_{8125}$
3	Max. motor shaft diameter	mm	1.5	2	2		2	1.5	2	2
	Order Number			118185	134779		134781		134784	118188
1	Reduction			29 : 1	128 : 1		561 : 1		2458 : 1	4592 : 1
2	Reduction absolute			$^{729}/_{25}$	$^{41553}/_{325}$		$^{2368521}/_{4225}$		$^{135005697}/_{54925}$	$^{14348907}/_{3125}$
3	Max. motor shaft diameter	mm		1.5	2		2		2	1.5
4	Number of stages		1	2	3	3	4	4	5	5
5	Max. continuous torque	Nm	0.10	0.15	0.20	0.20	0.25	0.25	0.30	0.30
6	Intermittently permissible torque at gear output	Nm	0.150	0.225	0.300	0.300	0.375	0.375	0.450	0.450
7	Max. efficiency	%	90	81	73	73	65	65	59	59
8	Weight	g	20	23	27	27	31	31	35	35
9	Average backlash no load	°	0.7	0.8	1.0	1.0	1.2	1.2	1.5	1.5
10	Mass inertia	gcm²	0.08	0.05	0.05	0.05	0.05	0.05	0.05	0.05
11	Gearhead length L1	mm	15.5	19.1	22.7	22.7	26.3	26.3	29.9	29.9

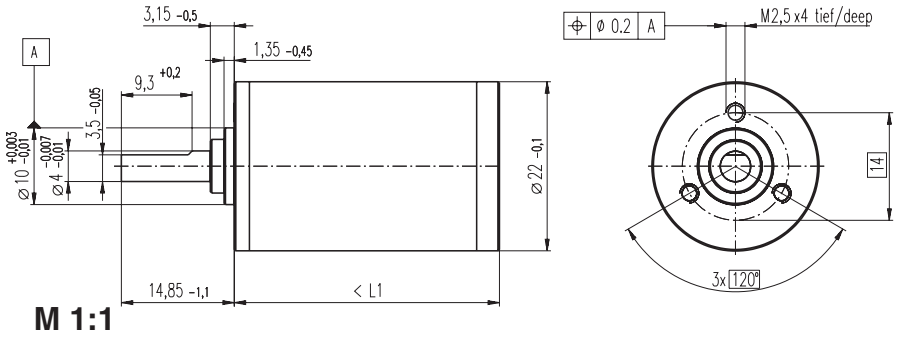


Combination

+ Motor	Page	+ Tacho / Encoder / Brake	Page	Overall length [mm] = Motor length + gearhead length + (tacho / encoder / brakes) + assembly parts							
EC-max 16	4			39.6	43.2	46.8	46.8	50.4	50.4	54.0	54.0
EC-max 16	4	MR Encoder	19	44.6	48.2	51.8	51.8	55.4	55.4	59.0	59.0

Planetary Gearhead GP 22 C ∅22 mm, 0.5 - 2.0 Nm

Ceramic Version



M 1:1

Technical Data

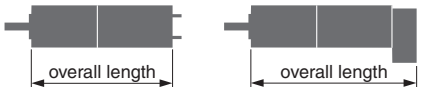
Planetary Gearhead	straight teeth
Output shaft	stainless steel, hardened
Bearing at output	ball bearings
Radial play, 10 mm from flange	max. 0.2 mm
Axial play	max. 0.2 mm
Max. radial load, 10 mm from flange	70 N
Max. permissible axial load	100 N
Max. permissible force for press fits	100 N
Sense of rotation, drive to output	=
Recommended input speed	< 8000 rpm
Recommended temperature range	-15 ... +80°C

Stock program
Standard program
Special program (on request!)

Gearhead Data

			Order Number									
			143971	143974	143980	143986	143990	143996	144002	144004	144011	144017	144023
1	Reduction		3.8 : 1	14 : 1	53 : 1	104 : 1	198 : 1	370 : 1	590 : 1	742 : 1	1386 : 1	1996 : 1	3189 : 1
2	Reduction absolute		15/4	225/16	3375/64	87723/845	50625/256	10556001/28561	59049/100	759375/1024	15834015/114244	285012027/142805	1594323/500
3	Max. motor shaft diameter	mm	4	4	4	3.2	4	3.2	4	4	3.2	3.2	4
	Order Number		143972	143975	143981	143987	143991	143997	144003	144006	144012	144018	144024
1	Reduction		4.4 :1	16 : 1	62 : 1	109 : 1	231 : 1	389 : 1	690 : 1	867 : 1	1460 : 1	2102 : 1	3728 : 1
2	Reduction absolute		57/13	855/52	12825/208	2187/20	192375/832	263169/676	1121931/1625	2885625/3328	3947535/2704	7105563/3380	30292137/8125
3	Max. motor shaft diameter	mm	3.2	3.2	3.2	4	3.2	3.2	3.2	3.2	3.2	3.2	3.2
	Order Number		143973	143976	143982	143988	143992	143998	144005	144007	144013	144019	144025
1	Reduction		5.4 : 1	19 : 1	72 : 1	128 : 1	270 : 1	410 : 1	850 : 1	1014 : 1	1538 : 1	2214 : 1	4592 : 1
2	Reduction absolute		27/5	3249/169	48735/676	41553/325	731025/2704	6561/16	531441/625	10965375/10816	98415/64	177147/80	14348907/3125
3	Max. motor shaft diameter	mm	2.5	3.2	3.2	3.2	3.2	4	2.5	3.2	4	4	2.5
	Order Number			143977	143983	143989	143993	143999		144008	144014	144020	
1	Reduction			20 : 1	76 : 1	157 : 1	285 : 1	455 : 1		1068 : 1	1621 : 1	2458 : 1	
2	Reduction absolute			81/4	1215/16	19683/125	18225/64	5000211/10985		273375/256	601692057/371293	135005697/54925	
3	Max. motor shaft diameter	mm		4	4	2.5	4	3.2		4	3.2	3.2	
	Order Number			143978	143984		143994	144000		144009	144015	144021	
1	Reduction			24 : 1	84 : 1		316 : 1	479 : 1		1185 : 1	1707 : 1	2589 : 1	
2	Reduction absolute			1539/65	185193/2197		2777895/8788	124659/260		41668425/35152	15000633/8788	3365793/1300	
3	Max. motor shaft diameter	mm		3.2	3.2		3.2	3.2		3.2	3.2	3.2	
	Order Number			143979	143985		143995	144001		144010	144016	144022	
1	Reduction			29 : 1	89 : 1		333 : 1	561 : 1		1249 : 1	1798 : 1	3027 : 1	
2	Reduction absolute			729/25	4617/52		69255/208	2368521/4225		1038825/832	373977/208	63950067/21125	
3	Max. motor shaft diameter	mm		2.5	3.2		3.2	3.2		3.2	3.2	3.2	
4	Number of stages		1	2	3	3	4	4	4	5	5	5	5
5	Max. continuous torque	Nm	0.5	0.6	1.3	1.3	1.8	1.8	1.8	2.0	2.0	2.0	2.0
6	Intermittently permissible torque at gear output	Nm	0.8	0.9	1.9	1.9	2.7	2.7	2.7	3.0	3.0	3.0	3.0
7	Max. efficiency	%	84	70	59	59	49	49	49	42	42	42	42
8	Weight	g	42	55	68	68	81	81	81	94	94	94	94
9	Average backlash no load	°	0.5	0.6	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10	Mass inertia	gcm²	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
11	Gearhead length L1*	mm	25.4	32.2	39.0	39.0	45.8	45.8	45.8	52.6	52.6	52.6	52.6

*for EC-max 16 and EC-max 22 is L1 - 2.8 mm

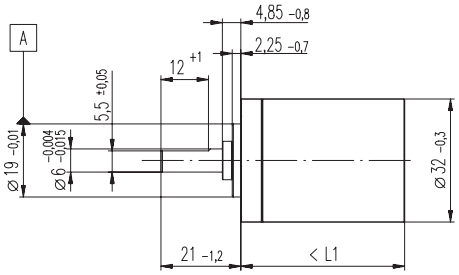


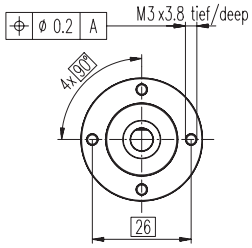
Combination

+ Motor	Page	+ Tacho / Encoder / Brake	Page	Overall length [mm] = Motor length + gearhead length + (tacho / encoder / brakes) + assembly parts										
EC-max 16	5			57.9	64.7	71.5	71.5	78.3	78.3	78.3	85.1	85.1	85.1	85.1
EC-max 16	5	MR Encoder	19	62.9	69.7	76.5	76.5	83.3	83.3	83.3	90.1	90.1	90.1	90.1
EC-max 22	6			54.7	61.5	68.3	68.3	75.1	75.1	75.1	81.9	81.9	81.9	81.9
EC-max 22	6	MR Encoder	19	59.7	66.5	73.3	73.3	80.1	80.1	80.1	86.9	86.9	86.9	86.9
EC-max 22	6	Brake 20	22	71.7	78.5	85.3	85.3	92.1	92.1	92.1	98.9	98.9	98.9	98.9
EC-max 22	6	MR Encoder / Brake	19 / 22	76.7	83.5	90.3	90.3	97.1	97.1	97.1	103.9	103.9	103.9	103.9

Planetary Gearhead GP 32 C ∅32 mm, 1.0 - 6.0 Nm

Ceramic Version





M 1:2

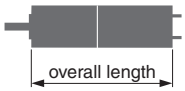
Technical Data

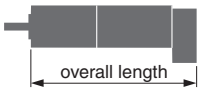
Planetary Gearhead	straight teeth
Output shaft	stainless steel*
Bearing at output	ball bearings
Radial play, 5 mm from flange	max. 0.14 mm
Axial play	max. 0.4 mm
Max. radial load, 12 mm from flange	140 N
Max. permissible axial load	120 N
Max. permissible force for press fits	120 N
Sense of rotation, drive to output	=
Recommended input speed	< 8000 rpm
Recommended temperature range	-15 ... +80°C

*Option: shaft diameter 8 mm

Stock program
Standard program
Special program (on request!)

Gearhead Data													
Order Number		166930	166933	166938	166939	166944	166949	166954	166959	166962	166967	166972	166977
1	Reduction	3.7 : 1	14 : 1	33 : 1	51 : 1	111 : 1	246 : 1	492 : 1	762 : 1	1181 : 1	1972 : 1	2829 : 1	4380 : 1
2	Reduction absolute	$^{26}/_{7}$	$^{676}/_{49}$	$^{529}/_{16}$	$^{17576}/_{343}$	$^{13824}/_{125}$	$^{421824}/_{1715}$	$^{86112}/_{175}$	$^{19044}/_{25}$	$^{1023776}/_{8575}$	$^{8626176}/_{4375}$	$^{495144}/_{175}$	$^{109503}/_{25}$
3	Max. motor shaft diameter mm	6	6	3	6	4	4	3	3	4	4	3	3
Order Number		166931	166934		166940	166945	166950	166955	166960	166963	166968	166973	166978
1	Reduction	4.8 : 1	18 : 1		66 : 1	123 : 1	295 : 1	531 : 1	913 : 1	1414 : 1	2189 : 1	3052 : 1	5247 : 1
2	Reduction absolute	$^{24}/_{5}$	$^{624}/_{35}$		$^{16224}/_{245}$	$^{6877}/_{56}$	$^{101062}/_{343}$	$^{331776}/_{625}$	$^{36501}/_{40}$	$^{2425488}/_{1715}$	$^{536406}/_{245}$	$^{1907712}/_{625}$	$^{839523}/_{160}$
3	Max. motor shaft diameter mm	4	4		4	3	3	4	3	3	3	3	3
Order Number		166932	166935		166941	166946	166951	166956	166961	166964	166969	166974	166979
1	Reduction	5.8 : 1	21 : 1		79 : 1	132 : 1	318 : 1	589 : 1	1093 : 1	1526 : 1	2362 : 1	3389 : 1	6285 : 1
2	Reduction absolute	$^{23}/_{4}$	$^{299}/_{14}$		$^{3887}/_{49}$	$^{3312}/_{25}$	$^{389376}/_{1225}$	$^{20631}/_{35}$	$^{279841}/_{256}$	$^{9345024}/_{6125}$	$^{2066688}/_{875}$	$^{474513}/_{140}$	$^{6436343}/_{1024}$
3	Max. motor shaft diameter mm	3	3		3	3	4	3	3	4	3	3	3
Order Number			166936		166942	166947	166952	166957		166965	166970	166975	
1	Reduction		23 : 1		86 : 1	159 : 1	411 : 1	636 : 1		1694 : 1	2548 : 1	3656 : 1	
2	Reduction absolute		$^{576}/_{25}$		$^{14976}/_{175}$	$^{1587}/_{10}$	$^{359424}/_{875}$	$^{79488}/_{125}$		$^{1162213}/_{686}$	$^{7962624}/_{3125}$	$^{457056}/_{125}$	
3	Max. motor shaft diameter mm		4		4	3	4	3		3	4	3	
Order Number			166937		166943	166948	166953	166958		166966	166971	166976	
1	Reduction		28 : 1		103 : 1	190 : 1	456 : 1	706 : 1		1828 : 1	2623 : 1	4060 : 1	
2	Reduction absolute		$^{138}/_{5}$		$^{3588}/_{35}$	$^{12167}/_{64}$	$^{89401}/_{196}$	$^{158171}/_{224}$		$^{2238912}/_{1225}$	$^{2056223}/_{784}$	$^{3637933}/_{896}$	
3	Max. motor shaft diameter mm		3		3	3	3	3		3	3	3	
4	Number of stages	1	2	2	3	3	4	4	4	5	5	5	5
5	Max. continuous torque Nm	1	3	3	6	6	6	6	6	6	6	6	6
6	Intermittently permissible torque at gear output Nm	1.25	3.75	3.75	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5	7.5
7	Max. efficiency %	80	75	75	70	70	60	60	60	50	50	50	50
8	Weight g	118	162	162	194	194	226	226	226	258	258	258	258
9	Average backlash no load °	0.7	0.8	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
10	Mass inertia gcm²	1.5	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
11	Gearhead length L1 mm	26.4	36.3	36.3	43.0	43.0	49.7	49.7	49.7	56.4	56.4	56.4	56.4



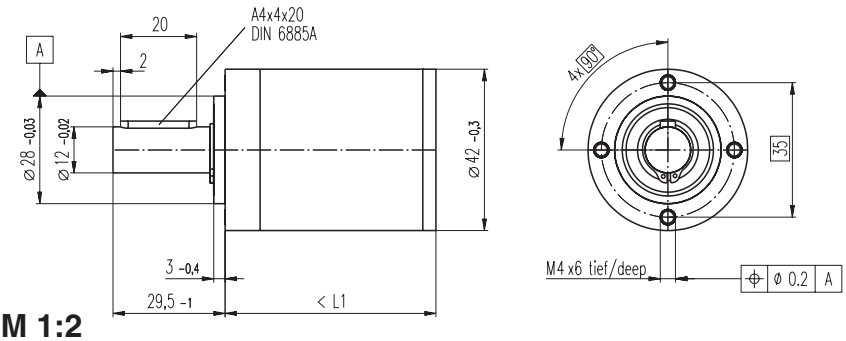


Combination

+ Motor	Page	+ Tacho / Encoder / Brake	Page	Overall length [mm] = Motor length + gearhead length + (tacho / encoder / brakes) + assembly parts											
EC-max 22	7			74.9	84.8	84.8	91.5	91.5	98.2	98.2	98.2	104.9	104.9	104.9	104.9
EC-max 22	7	MR Encoder	19	79.9	89.8	89.8	96.5	96.5	103.2	103.2	103.2	109.9	109.9	109.9	109.9
EC-max 22	7	Brake 20	22	99.9	109.8	109.8	116.5	116.5	123.2	123.2	123.2	129.9	129.9	129.9	129.9
EC-max 22	7	MR Encoder / Brake	19 / 22	104.9	114.8	114.8	121.5	121.5	128.2	128.2	128.2	134.9	134.9	134.9	134.9
EC-max 30	8			68.5	78.4	78.4	85.1	85.1	91.8	91.8	91.8	98.5	98.5	98.5	98.5
EC-max 30	8	MR Encoder	20	83.1	93.0	93.0	99.7	99.7	106.4	106.4	106.4	113.1	113.1	113.1	113.1
EC-max 30	8	HP Encoder	21	89.5	99.4	99.4	106.1	106.1	112.8	112.8	112.8	119.5	119.5	119.5	119.5
EC-max 30	8	Brake 20	22	95.5	105.4	105.4	112.1	112.1	118.8	118.8	118.8	125.5	125.5	125.5	125.5
EC-max 30	8	MR Encoder / Brake	20 / 22	110.1	120.0	120.0	126.7	126.7	133.4	133.4	133.4	140.1	140.1	140.1	140.1
EC-max 30	8	HP Encoder / Brake	21 / 22	116.5	126.4	126.4	133.1	133.1	139.8	139.8	139.8	146.5	146.5	146.5	146.5

Planetary Gearhead GP 42 C ∅42 mm, 3 - 15 Nm

Ceramic Version



M 1:2

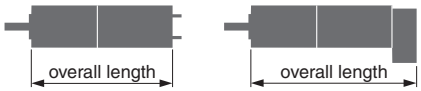
Technical Data

Planetary Gearhead	straight teeth
Output shaft	stainless steel
Bearing at output	ball bearings
Radial play, 12 mm from flange	preloaded
Axial play	preloaded
Max. permissible axial load	150 N
Max. permissible force for press fits	300 N
Sense of rotation, drive to output	=
Recommended input speed	< 8000 rpm
Recommended temperature range	-20 ... +100°C

Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	120 N	150 N	150 N	150 N

Stock program
Standard program
Special program (on request!)

			Order Number						
			203113	203115	203120	203125	203128	203134	203139
Gearhead Data									
1	Reduction		3.5 : 1	12 : 1	43 : 1	91 : 1	150 : 1	319 : 1	546 : 1
2	Reduction absolute		$^{7}/_{2}$	$^{49}/_{4}$	$^{343}/_{8}$	91	$^{2401}/_{16}$	$^{637}/_{2}$	546
3	Mass inertia	gcm²	14	15	15	15	15	15	14
4	Max. motor shaft diameter	mm	10	10	10	10	10	10	10
	Order Number		**203114**	**203116**	203121	**203126**	203130	203135	203140
1	Reduction		4.3 : 1	15 : 1	53 : 1	113 : 1	186 : 1	353 :1	676 : 1
2	Reduction absolute		$^{13}/_{3}$	$^{91}/_{6}$	$^{637}/_{12}$	$^{338}/_{3}$	$^{4459}/_{24}$	$^{28561}/_{81}$	676
3	Mass inertia	gcm²	9.1	15	15	9.4	15	9.4	9.1
4	Max. motor shaft diameter	mm	8	10	10	8	10	8	8
	Order Number			203117	203122	203127	**203131**	203136	203141
1	Reduction			19 : 1	66 : 1	126 : 1	230 : 1	394 : 1	756 : 1
2	Reduction absolute			$^{169}/_{9}$	$^{1183}/_{18}$	126	$^{8281}/_{36}$	$^{1183}/_{3}$	756
3	Mass inertia	gcm²		9.4	15	14	15	15	14
4	Max. motor shaft diameter	mm		8	10	10	10	10	10
	Order Number			203118	**203123**	**203129**	203132	203137	**203142**
1	Reduction			21 : 1	74 : 1	156 : 1	257 : 1	441 : 1	936 : 1
2	Reduction absolute			21	$^{147}/_{2}$	156	$^{1029}/_{4}$	441	936
3	Mass inertia	gcm²		14	15	9.1	15	14	9.1
4	Max. motor shaft diameter	mm		10	10	8	10	10	8
	Order Number			**203119**	203124		203133	203138	
1	Reduction			26 : 1	81 : 1		285 : 1	488 : 1	
2	Reduction absolute			26	$^{2197}/_{27}$		$^{15379}/_{54}$	$^{4394}/_{9}$	
3	Mass inertia	gcm²		9.1	9.4		15	9.4	
4	Max. motor shaft diameter	mm		8	8		10	8	
5	Number of stages		1	2	3	3	4	4	4
6	Max. continuous torque	Nm	3.0	7.5	15	15	15	15	15
7	Intermittently permissible torque at gear output	Nm	4.5	11.3	22.5	22.5	22.5	22.5	22.5
8	Max. efficiency	%	90	81	72	72	64	64	64
9	Weight	g	260	360	460	460	560	560	560
10	Average backlash no load	°	0.3	0.4	0.5	0.5	0.5	0.5	0.5
11	Gearhead length L1	mm	40.9	55.4	69.9	69.9	84.4	84.4	84.4

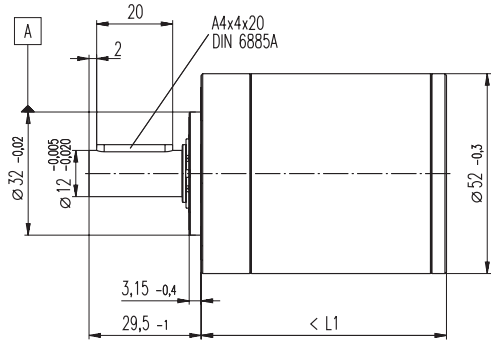


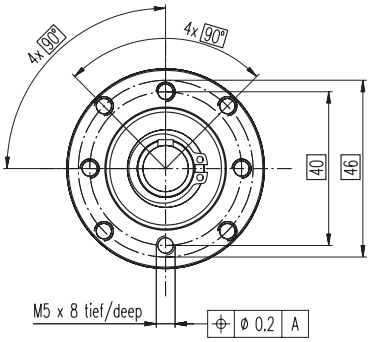
Combination

+ Motor	Page	+ Tacho / Encoder	Page	+ Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (tacho / encoder / brakes) + assembly parts						
EC-max 30	9					96.1	110.6	125.1	125.1	139.6	139.6	139.6
EC-max 30	9	MR Encoder	20			119.6	134.1	148.6	148.6	163.1	163.1	163.1
EC-max 30	9	HP Encoder	21			126.0	140.5	155.0	155.0	169.5	169.5	169.5
EC-max 30	9			Brake 20	22	132.0	146.5	161.0	161.0	175.5	175.5	175.5
EC-max 30	9	MR Encoder	20	Brake 20	22	146.1	160.6	175.1	175.1	189.6	189.6	189.6
EC-max 30	9	HP Encoder	21	Brake 20	22	153.0	167.5	182.0	182.0	196.5	196.5	196.5
EC-max 35	10					92.0	106.5	121.0	121.0	135.5	135.5	135.5
EC-max 35	10	MR Encoder	20			97.0	111.5	126.0	126.0	140.5	140.5	140.5
EC-max 35	10	HP Encoder	21			108.6	123.1	137.6	137.6	152.1	152.1	152.1
EC-max 35	10			Brake 28	23	118.7	133.2	147.7	147.7	162.2	162.2	162.2
EC-max 35	10	MR Encoder	20	Brake 28	23	135.5	150.0	164.5	164.5	179.0	179.0	179.0
EC-max 35	10	HP Encoder	21	Brake 28	23	134.0	148.5	163.0	163.0	177.5	177.5	177.5
EC-max 40	12					99.0	113.5	128.0	128.0	142.5	142.5	142.5
EC-max 40	12	MR Encoder	20			104.0	118.5	133.0	133.0	147.5	147.5	147.5
EC-max 40	12	HP Encoder	21			115.6	130.1	144.6	144.6	159.1	159.1	159.1
EC-max 40	12			Brake 28	23	125.7	140.2	154.7	154.7	169.2	169.2	169.2
EC-max 40	12	MR Encoder	20	Brake 28	23	142.5	157.0	171.5	171.5	186.0	186.0	186.0
EC-max 40	12	HP Encoder	21	Brake 28	23	141.0	155.5	170.0	170.0	184.5	184.5	184.5

Planetary Gearhead GP 52 C ∅52 mm, 4 - 30 Nm

Ceramic Version





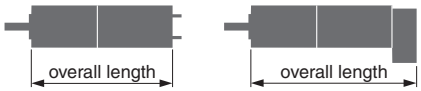
M 1:2

Technical Data

Planetary Gearhead				straight teeth
Output shaft				stainless steel
Bearing at output				preloaded ball bearings
Radial play, 12 mm from flange				max. 0.06 mm
Axial play at axial load	< 5 N			0 mm
	> 5 N			max. 0.3 mm
Max. permissible axial load				200 N
Max. permissible force for press fits				500 N
Sense of rotation, drive to output				=
Recommended input speed				< 6000 rpm
Recommended temperature range				-20 … +80°C
Number of stages	1	2	3	4
Max. radial load, 12 mm from flange	500 N	700 N	900 N	900 N

Stock program
Standard program
Special program (on request!)

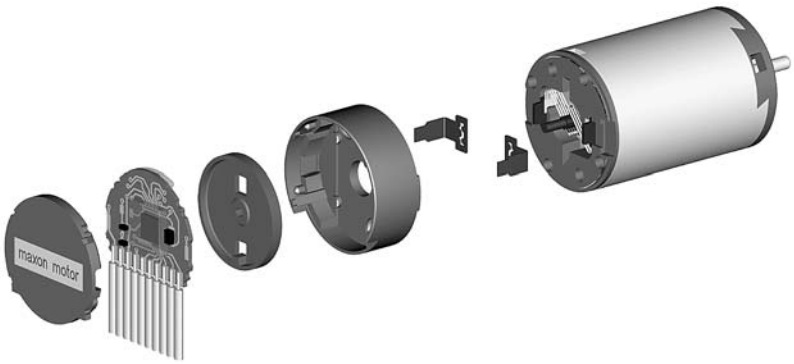
			Order Number						
			223080	223083	223089	223094	223097	223104	223109
Gearhead Data									
1	Reduction		3.5 : 1	12 : 1	43 : 1	91 : 1	150 : 1	319 : 1	546 : 1
2	Reduction absolute		$^{7}/_{2}$	$^{49}/_{4}$	$^{343}/_{8}$	91	$^{2401}/_{16}$	$^{637}/_{2}$	546
3	Mass inertia	gcm²	20.7	17.6	17.3	16.7	17.3	16.8	16.4
4	Max. motor shaft diameter	mm	10	10	10	10	10	10	10
	Order Number		**223081**	223084	223090	223095	223099	**223105**	223110
1	Reduction		4.3 : 1	15 : 1	53 : 1	113 : 1	186 : 1	353 :1	676 : 1
2	Reduction absolute		$^{13}/_{3}$	$^{91}/_{6}$	$^{637}/_{12}$	$^{338}/_{3}$	$^{4459}/_{24}$	$^{28561}/_{81}$	676
3	Mass inertia	gcm²	12	16.8	17.2	9.3	17.3	9.4	9.1
4	Max. motor shaft diameter	mm	8	10	10	8	10	8	8
	Order Number			**223085**	223091	223096	223101	223106	223111
1	Reduction			19 : 1	66 : 1	126 : 1	230 : 1	394 : 1	756 : 1
2	Reduction absolute			$^{169}/_{9}$	$^{1183}/_{18}$	126	$^{8281}/_{36}$	$^{1183}/_{3}$	756
3	Mass inertia	gcm²		9.5	16.7	16.4	16.8	16.7	16.4
4	Max. motor shaft diameter	mm		8	10	10	10	10	10
	Order Number			223086	223092	223098	223102	223107	223112
1	Reduction			21 : 1	74 : 1	156 : 1	257 : 1	441 : 1	936 : 1
2	Reduction absolute			21	$^{147}/_{2}$	156	$^{1029}/_{4}$	441	936
3	Mass inertia	gcm²		16.5	17.2	9.1	17.3	16.5	9.1
4	Max. motor shaft diameter	mm		10	10	8	10	10	8
	Order Number			223087	**223093**		223103	223108	
1	Reduction			26 : 1	81 : 1		285 : 1	488 : 1	
2	Reduction absolute			26	$^{2197}/_{27}$		$^{15379}/_{54}$	$^{4394}/_{9}$	
3	Mass inertia	gcm²		9.1	9.4		16.7	9.4	
4	Max. motor shaft diameter	mm		8	8		10	8	
5	Number of stages		1	2	3	3	4	4	4
6	Max. continuous torque	Nm	4	15	30	30	30	30	30
7	Intermittently permissible torque at gear output	Nm	6	22.5	45	45	45	45	45
8	Max. efficiency	%	91	83	75	75	68	68	68
9	Weight	g	460	620	770	770	920	920	920
10	Gearhead length L1	mm	49.0	65.0	78.5	78.5	92.0	92.0	92.0

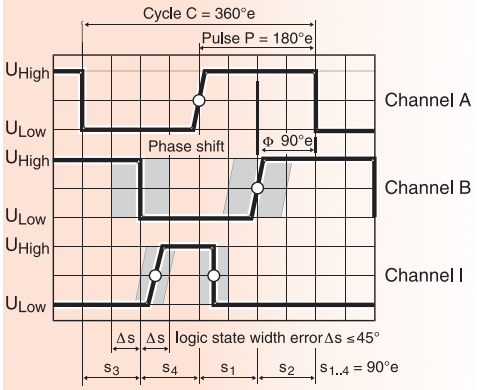


Combination

+ Motor	Page	+ Tacho / Encoder	Page	+ Brake	Page	**Overall length [mm]** = Motor length + gearhead length + (tacho / encoder / brakes) + assembly parts						
EC-max 35	11					126.1	142.1	155.6	155.6	169.1	169.1	169.1
EC-max 35	11	MR Encoder	20			131.1	147.1	160.6	160.6	174.1	174.1	174.1
EC-max 35	11	HP Encoder	21			141.7	157.7	171.2	171.2	184.7	184.7	184.7
EC-max 35	11			Brake 28	23	163.6	179.6	193.1	193.1	206.6	206.6	206.6
EC-max 35	11	MR Encoder	20	Brake 28	23	168.6	184.6	198.1	198.1	211.6	211.6	211.6
EC-max 35	11	HP Encoder	21	Brake 28	23	179.2	195.2	208.7	208.7	222.2	222.2	222.2
EC-max 40	13					137.1	153.1	166.6	166.6	180.1	180.1	180.1
EC-max 40	13	MR Encoder	20			142.1	158.1	171.6	171.6	185.1	185.1	185.1
EC-max 40	13	HP Encoder	21			152.7	168.7	182.2	182.2	195.7	195.7	195.7
EC-max 40	13			Brake 28	23	174.6	190.6	204.1	204.1	217.6	217.6	217.6
EC-max 40	13	MR Encoder	20	Brake 28	23	179.1	195.1	208.6	208.6	222.1	222.1	222.1
EC-max 40	13	HP Encoder	21	Brake 28	23	190.2	206.2	219.7	219.7	233.2	233.2	233.2

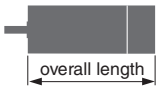
Digital MR Encoder with Line Driver 5 mA, Type M

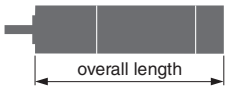




Stock program
Standard program
Special program (on request!)

Order Number	228179	228177	228181	228182	201937	201940
Type						
Counts per turn	128	128	256	256	512	512
Number of channels	2	3	2	3	2	3
Max. operating frequency (kHz)	80	80	160	160	320	320





Combination

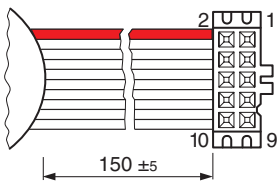
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see: + Gearhead					
EC-max 16, 5 W	4					29.0	29.0	29.0	29.0	29.0	29.0
EC-max 16, 5 W	4	GP 16, 0.1 - 0.3 Nm	14			●	●	●	●	●	●
EC-max 16, 8 W	5					40.2	40.2	40.2	40.2	40.2	40.2
EC-max 16, 8 W	5	GP 22, 0.5 - 2.0 Nm	15			●	●	●	●	●	●
EC-max 22, 12 W	5					37.0	37.0	37.0	37.0	37.0	37.0
EC-max 22, 12 W	6	GP 22, 0.5 - 2.0 Nm	15			●	●	●	●	●	●
EC-max 22, 12 W	6			Brake 20	22	54.0	54.0	54.0	54.0	54.0	54.0
EC-max 22, 12 W	6	GP 22, 0.5 - 2.0 Nm	15	Brake 20	22	●	●	●	●	●	●
EC-max 22, 25 W	7					53.4	53.4	53.4	53.4	53.4	53.4
EC-max 22, 25 W	7	GP 32, 1 - 6 Nm	16			●	●	●	●	●	●
EC-max 22, 25 W	7			Brake 20	22	78.4	78.4	78.4	78.4	78.4	78.4
EC-max 22, 25 W	7	GP 32, 1 - 6 Nm	16	Brake 20	22	●	●	●	●	●	●

Technical Data

Supply voltage V_{CC}	5 V ± 5 %
Output signal	TTL compatible
Index pulse width (nominal)	90°e
Operating temperature range	-25 ... +85°C
Moment of inertia of code wheel	≤ 0.09 gcm²
Output current per channel	max. 5 mA

Attention: The index signal I is synchronised with channel A or B.

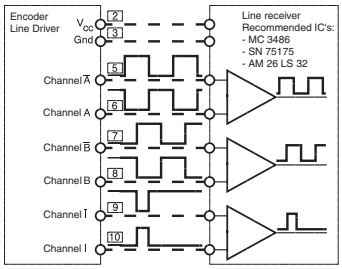
Pin Allocation



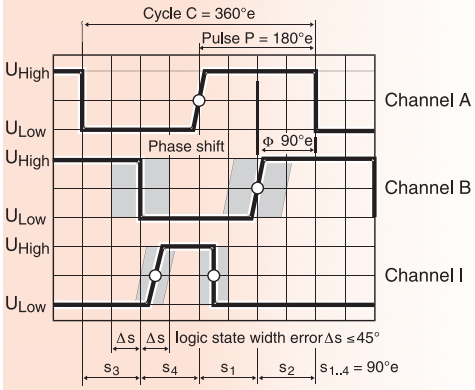
1 Motor +
2 V_{CC}
3 GND
4 Motor -
5 Channel $\overline{A}$
6 Channel A
7 Channel $\overline{B}$
8 Channel B
9* Channel $\overline{I}$ (Index)
10* Channel I (Index)

DIN Connector 41651
Flat band cable AWG 28
* version with 3 channels

Connection example



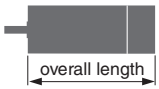
Digital MR Encoder with Line Driver, 5 mA, Type L

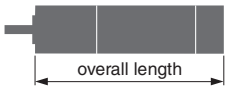


Stock program
Standard program
Special program (on request!)

Order Number				
225783	228452	225785	228456	225787

Type					
Counts per turn	256	500	512	1000	1024
Number of channels	3	3	3	3	3
Max. operating frequency (kHz)	80	200	160	200	320





Combination

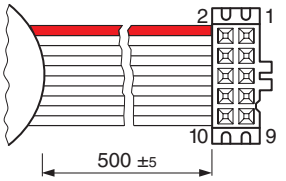
+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see: + Gearhead				
EC-max 30, 40 W	8					56.6			56.6	
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16			●			●	
EC-max 30, 40 W	8			Brake 20	22	83.6			83.6	
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16	Brake 20	22	●			●	
EC-max 30, 60 W	9					78.6			78.6	
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17			●			●	
EC-max 30, 60 W	9			Brake 20	22	105.1			105.1	
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17	Brake 20	22	●			●	
EC-max 35, 50 W	10					56.0			56.0	
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17			●			●	
EC-max 35, 50 W	10			Brake 28	23	94.5			94.5	
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17	Brake 28	23	●			●	
EC-max 35, 100 W	11					82.0			82.0	
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18			●			●	
EC-max 35, 100 W	11			Brake 28	23	119.5			119.5	
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18	Brake 28	23	●			●	
EC-max 40, 70 W	12					63.0			63.0	
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17			●			●	
EC-max 40, 70 W	12			Brake 28	23	101.5			101.5	
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17	Brake 28	23	●			●	
EC-max 40, 120 W	13					93.0			93.0	
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18			●			●	
EC-max 40, 120 W	13			Brake 28	23	130.0			130.0	
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18	Brake 28	23	●			●	

Technical Data

Supply voltage	5 V ± 5 %
Output signal	TTL compatible
Index pulse width (nominal)	90°e
Operating temperature range	-25 ... +85°C
Moment of inertia of code wheel	≤ 1.7 gcm²
Output current per channel	max. 5 mA

Attention: The index signal I is synchronised with channel A or B.

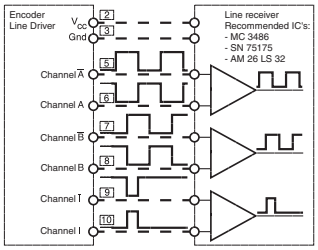
Pin Allocation



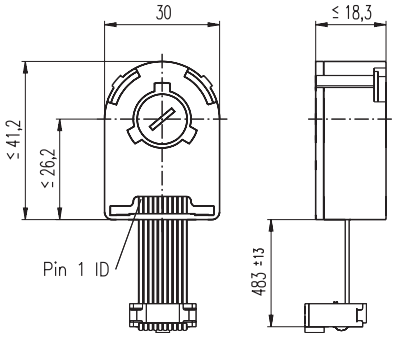
1	N.C.
2	V_{CC}
3	GND
4	N.C.
5	Channel $\overline{A}$
6	Channel A
7	Channel $\overline{B}$
8	Channel B
9	Channel $\overline{I}$ (Index)
10	Channel I (Index)

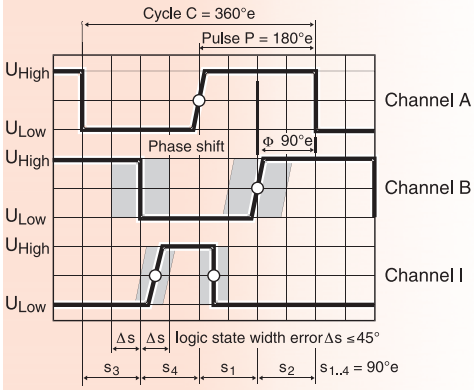
DIN Connector 41651
Flat band cable AWG 28

Connection example



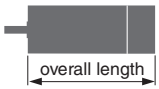
Digital Encoder HEDL 55__ with Line Driver RS 422

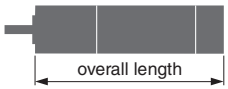




Stock program
Standard program
Special program (on request!)

Order Number			
Type	110512	110514	110516
Shaft diameter mm	3	4	6





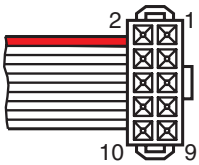
Combination

+ Motor	Page	+ Gearhead	Page	+ Brake	Page	Overall length [mm] / ● see: + Gearhead
EC-max 30, 40 W	8					63.0
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16			●
EC-max 30, 40 W	8			Brake 20	22	90.0
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16	Brake 20	22	●
EC-max 30, 60 W	9					85.0
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17			●
EC-max 30, 60 W	9			Brake 20	22	112.0
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17	Brake 20	22	●
EC-max 35, 50 W	10					67.6
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17			●
EC-max 35, 50 W	10			Brake 28	23	93.0
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17	Brake 28	23	●
EC-max 35, 100 W	11					92.6
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18			●
EC-max 35, 100 W	11			Brake 28	23	130.1
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18	Brake 28	23	●
EC-max 40, 70 W	12					74.6
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17			●
EC-max 40, 70 W	12			Brake 28	23	100.0
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17	Brake 28	23	●
EC-max 40, 120 W	13					103.6
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18			●
EC-max 40, 120 W	13			Brake 28	23	141.1
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18	Brake 28	23	●

Technical Data

Supply voltage	5 V ± 10 %
Output signal	EIA Standard RS 422
drivers used:	DS26LS31
No. of channels 2+1 Index Channel	(not at 1000 CPT)
Counts per turn	500 1000
Phase shift Φ (nominal)	90°e
Logic state width s	min. 45°e
Signal rise time (typical at C_L = 25 pF, R_L = 2.7 kΩ, 25°C)	180 ns
Signal fall time (typical at C_L = 25 pF, R_L = 2.7 kΩ, 25°C)	40 ns
Index pulse width (nominal)	90°e
Operating temperature range	0 ... +70°C
Moment of inertia of code wheel	≤ 0.6 gcm²
Max. acceleration	250 000 rad s⁻²
Output current per channel	min. -1 mA, max. 20 mA
Max. operating frequency	100 kHz

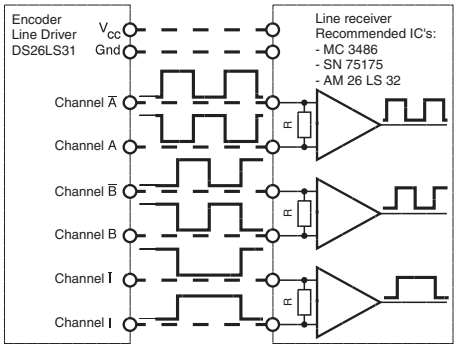
Pin Allocation



1 N.C.
2 V_{CC}
3 GND
4 N.C.
5 Channel $\overline{A}$
6 Channel A
7 Channel $\overline{B}$
8 Channel B
9 Channel $\overline{I}$ (Index)
10 Channel I (Index)

Connector Berg 246770
Flat band cable AWG 28

Connection example



Terminal resistance R = typical 100 Ω

Brake ∅20 mm, 24 VDC, 0.1 Nm

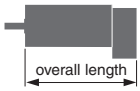
Important Information

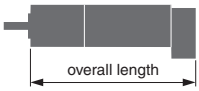
- Permanent magnet - single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not recommended for braking rotating motor shift.
- It is recommended to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.

Stock program
Standard program
Special program (on request!)

Order Number	
301212	301213

Type





Combination

+ Motor	Page	+ Gearhead	Page	+ Tacho	Page	Overall length [mm] / ● see: + Gearhead	
EC-max 22, 12 W	6					49.0	
EC-max 22, 12 W	6	GP 22, 0.5 - 2.0 Nm	15			●	
EC-max 22, 12 W	6			MR Encoder	19	54.0	
EC-max 22, 12 W	6	GP 22, 0.5 - 2.0 Nm	15	MR Encoder	19	●	
EC-max 22, 25 W	7					73.4	
EC-max 22, 25 W	7	GP 32, 1 - 6 Nm	16			●	
EC-max 22, 25 W	7			MR Encoder	19	78.4	
EC-max 22, 25 W	7	GP 32, 1 - 6 Nm	16	MR Encoder	19	●	
EC-max 30, 40 W	8						67.0
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16				●
EC-max 30, 40 W	8			MR Encoder	20		72.0
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16	MR Encoder	20		●
EC-max 30, 40 W	8			HED_55__	21		83.0
EC-max 30, 40 W	8	GP 32, 1 - 6 Nm	16	HED_55__	21		●
EC-max 30, 60 W	9						101.5
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17				●
EC-max 30, 60 W	9			MR Encoder	20		106.5
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17	MR Encoder	20		●
EC-max 30, 60 W	9			HED_55__	21		105.0
EC-max 30, 60 W	9	GP 42, 3 - 15 Nm	17	HED_55__	21		●

Technical Data (provisional)

Static braking moment at 20°C	> 0.1 Nm	Nominal voltage, smoothed	24 VDC ± 10 %
Mass inertia	n.v	Resistance	R_{20} = 269 Ω ± 5 %
Max. permissible speed	49 000 rpm	Duty cycle	100 %
Weight	n.v.	Reaction time – Rise time	n.v.
Ambient temperature range	-10 … +80°C	– Fall time	n.v.

Pin Allocation

Cable (AWG 26)	Designation
red	U_{Brake} + 24 VDC
blue	U_{Brake} GND

Brake ∅28 mm, 24 VDC, 0.4 Nm

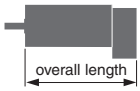
Important Information

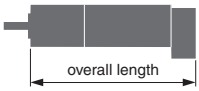
- Permanent magnet - single-face brake for DC (dry operation). Braking in unpowered condition.
- Holding brake, prevents rotation of the shaft at standstill or with turned off motor power.
- Not recommended for braking rotating motor shift.
- It is recommended to lower the voltage applied to the brake after it has been energized, for the purpose of reducing heat loss.

Stock program
Standard program
Special program (on request!)

Order Number	
301214	301215

Type





Combination

+ Motor	Page	+ Gearhead	Page	+ Tacho	Page	Overall length [mm] / ● see: + Gearhead	
EC-max 35, 50 W	10					77.7	
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17			●	
EC-max 35, 50 W	10			MR Encoder	20	94.5	
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17	MR Encoder	20	●	
EC-max 35, 50 W	10			HEDL_55__	21	93.0	
EC-max 35, 50 W	10	GP 42, 3 - 15 Nm	17	HEDL_55__	21	●	
EC-max 35, 100 W	11					114.5	
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18			●	
EC-max 35, 100 W	11			MR Encoder	20	119.5	
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18	MR Encoder	20	●	
EC-max 35, 100 W	11			HEDL_55__	21	130.1	
EC-max 35, 100 W	11	GP 52, 4 - 30 Nm	18	HEDL_55__	21	●	
EC-max 40, 70 W	12						84.7
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17				●
EC-max 40, 70 W	12			MR Encoder	20		101.5
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17	MR Encoder	20		●
EC-max 40, 70 W	12			HEDL_55__	21		100.0
EC-max 40, 70 W	12	GP 42, 3 - 15 Nm	17	HEDL_55__	21		●
EC-max 40, 120 W	13						125.5
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18				●
EC-max 40, 120 W	13			MR Encoder	20		130.0
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18	MR Encoder	20		●
EC-max 40, 120 W	13			HEDL_55__	21		141.1
EC-max 40, 120 W	13	GP 52, 4 - 30 Nm	18	HEDL_55__	21		●

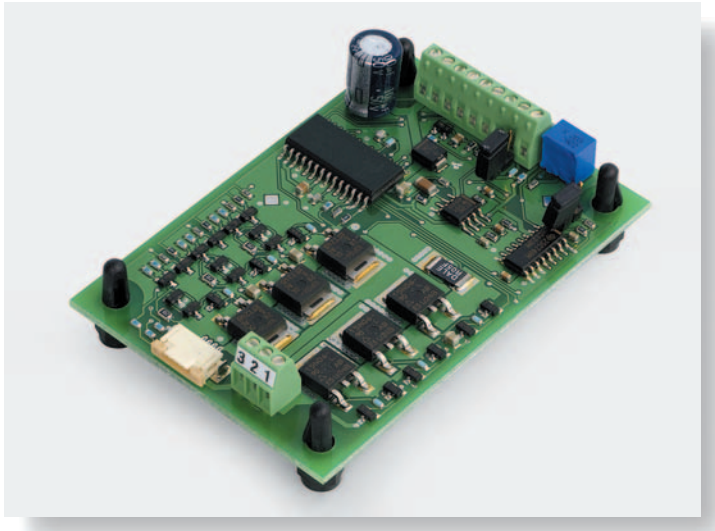
Technical Data

Static braking moment at 20°C	> 0.4 Nm	Nominal voltage, smoothed	24 VDC ± 10%
Mass inertia	10 gcm²	Resistance	R_{20} = 92.5 Ω ± 6 %
Max. permissible speed	16 000 rpm	Duty cycle	100 %
Weight	0.05 kg	Reaction time – Rise time	≤ 13 ms
Ambient temperature range	-5 … +85°C	– Fall time	≤ 27 ms

Pin Allocation

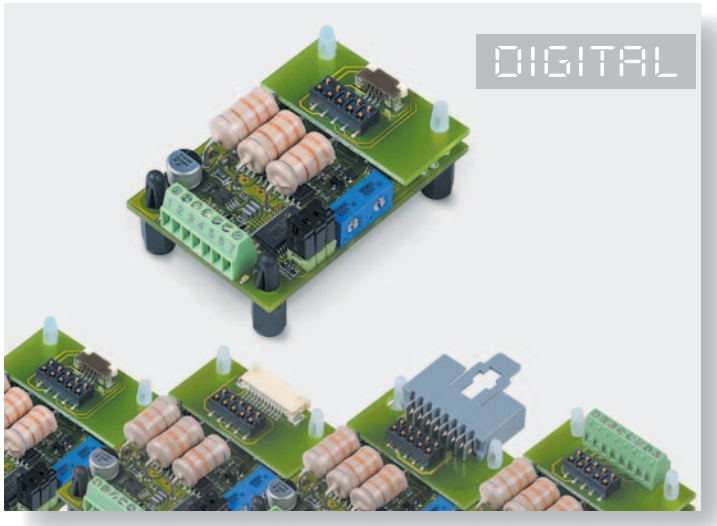
Cable (AWG 26)	Designation
red	U_{Brake} + 24 VDC
blue	U_{Brake} GND

Electronics for maxon EC motor



1-Q-EC amplifier sensorless AECS 35/3

- Analog speed controller with Back-EMF
- Motor speed can be regulated with the built-in potentiometer or an externally predetermined set value
- Brake, direction and disable input
- Ready to connect electronic circuit board
- Max. output current I_{max} 5 A
- Continuous output current I_{cont} 3 A
- Supply voltage V_{CC} 8 - 35 VDC
- **Order number 215738**



249629 **249630** **249631** **249632**

1-Q-EC amplifier DEC 24/1

- Digital speed controller with Hall sensors
- Motor speed can be regulated with the built-in potentiometer or an externally predetermined set value
- Brake, direction and disable input
- Ready to connect electronic circuit board
- Max. output current I_{max} 2 A
- Continuous output current I_{cont} 1 A
- Supply voltage V_{CC} 5 - 24 VDC
- **Order number**

DEC 24/1 with FPC RM 0.5 mm	**249629**
DEC 24/1 with FPC RM 1.0 mm	**249630**
DEC 24/1 with pin connector	**249631**
DEC 24/1 with screw terminal	**249632**

1-Q-EC Amplifier DEC 50/5

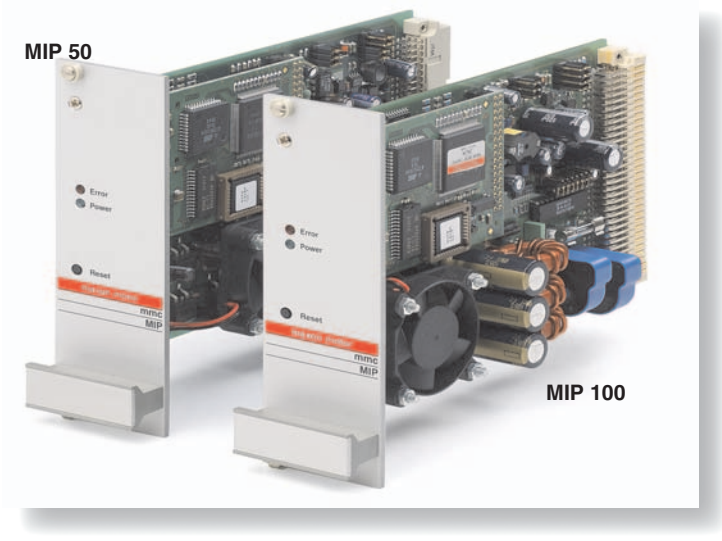
- Digital speed controller with Hall sensors
- Motor speed can be regulated with the built-in potentiometer or an externally predetermined set value
- Brake, direction and disable input
- Connection ready module
- Max. output current I_{max} 10 A
- Continuous output current I_{cont} 5 A
- Supply voltage V_{CC} 10 - 50 VDC
- **Order number 230572**

Electronics for maxon EC motor

4-Q-EC servoamplifier DES

- High quality digital regulation of speed and torque with encoders and Hall sensors.
- Sinusoidal current commutation
- Suitable for positioning applications
- 4-Q operation
- Communication possible by RS232 or CAN
- Connection ready module

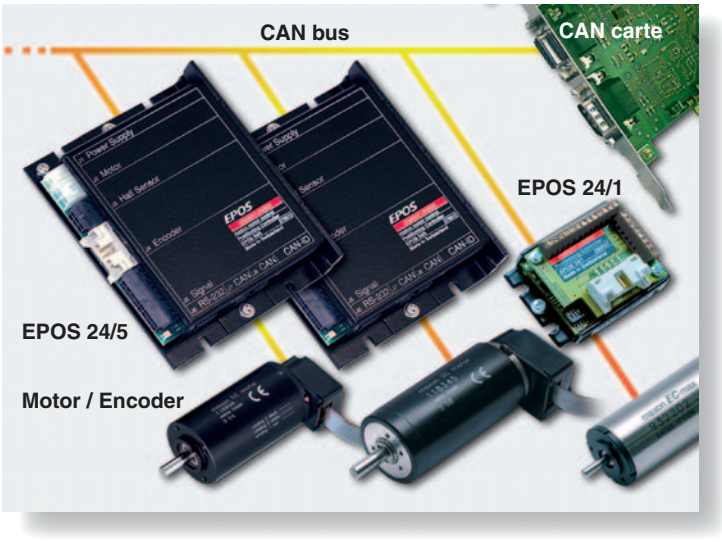
	Standard version DES 50/5	Power version DES 70/10
Max. output current I_{max}	15 A	30 A
Cont. output current I_{cont}	5 A	10 A
Supply voltage V_{CC}	12 - 50 VDC	24 - 70 VDC
Built-in motor choke	yes	no
Order number	**205679**	**228597**



MIP 50 / MIP 100

- Point to point control unit
- 1-Axis controller
- Multiple axis systems by networking over serial data bus
- Software configurable for DC motors and EC motors
- 8 digital inputs
- 6 digital outputs
- Eurocard format
- Supply voltage V_{CC} 24 - 48 VDC

	MIP 50	MIP 100
Max. output current I_{max}	13 A	20 A
Cont. output current I_{cont}	5 A	10 A
Built-in motor choke	yes	no
Order number	**200629**	**246244**
MIP Front panel (3 HE /8 TE)	**200640**	**200640**



EPOS positioning system

- Miniaturised 1-axis positioning system
- Operating modes for positioning, speed and current control
- Communication via RS232 or CAN bus
- CANopen standard CiA DS-301 and CiA DSP-402
- Configurable with software for DC and EC motors
- Sinusoidal commutation of current for EC motors
- In-built motor chokes
- Digital and analog inputs, digital outputs

	EPOS 24/1	EPOS 24/5
Cont. output current I_{cont}	1 A	5 A
Max. output current I_{max}	2 A	10 A
Supply voltage V_{cc}	9 - 24 VDC	11 - 24 VDC
Dimensions	55 x 40 x 25	105 x 83 x 24
Order number	**280937**	**275512**[1)]
for maxon EC 6 motor	**280938**	

[1)] Cable available

Special Versions

For high-precision drives, see the maxon catalogue or visit www.maxonmotor.com

Customer
- Drive problems
- Requirements
- Expectations
- Process Information

maxon Technology Center
- Control, regulation
- Drives
- Sensors
- Know-how in drive and control technology
- Advice
- Quality - ISO 9001

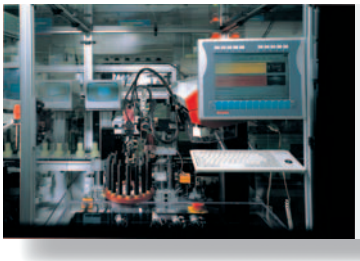
We will design and develop tailor made solutions

Partnership

Our know-how in drive technology and drive electronics is also reflected in the manufacture of special customer-specific versions. We develop special versions to your specifications and supply drive electronics that are compatible with maxon motors and are competitively priced, from the prototype to full-scale production.

Communication
- Analysis
- Defining goals
- Possible solutions
- Evaluation
- Specifications

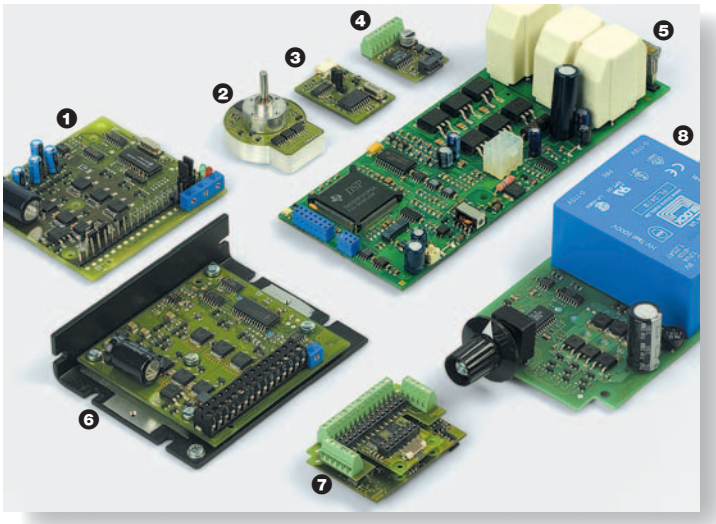
System supplier
- Implementation
- Integration
- Modification
- Submitting tenders



Facts
- Samples
- Joint tests
- Optimisation
- Process supervision

Technology

We use the most up-to-date technology on a case-by-case basis for designing and manufacturing customer-specific servoamplifiers and positioning drive units.
- Analogue
- Digital with . . .
  . . . microprocessors
  . . . signal processors
  . . . software
- SMD modules
- Hybrid technology
- Chip on Board



Examples

maxon's particular strength is configuring special products to meet customer requirements:

❶ 4-Q-EC amplifier – low-cost option

❷ 1-Q-EC amplifier – integrated into the motor

❸ 1-Q-EC amplifier – sensorless miniature version for the maxon EC 6 flat motor

❹ Interface transformer

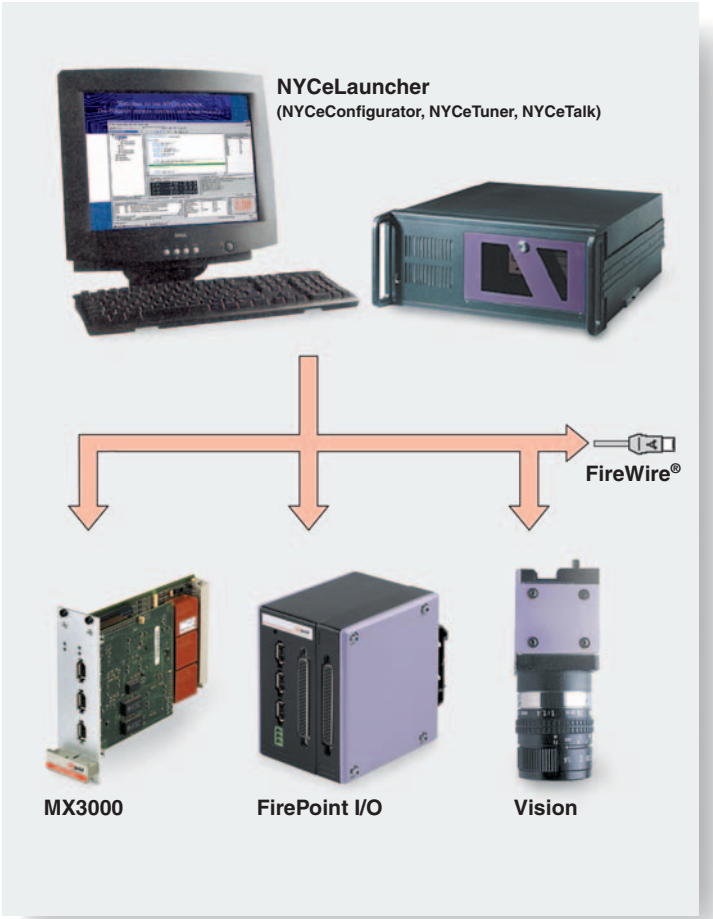
❺ 4-Q-EC servoamplifier for battery operation

❻ 1-Q position control for EC motors

❼ 4-Q-EC servoamplifier – precision servo for miniature positioning drive units

❽ 1-Q-EC amplifier – sensorless – with mains connection

High-end Motion Control



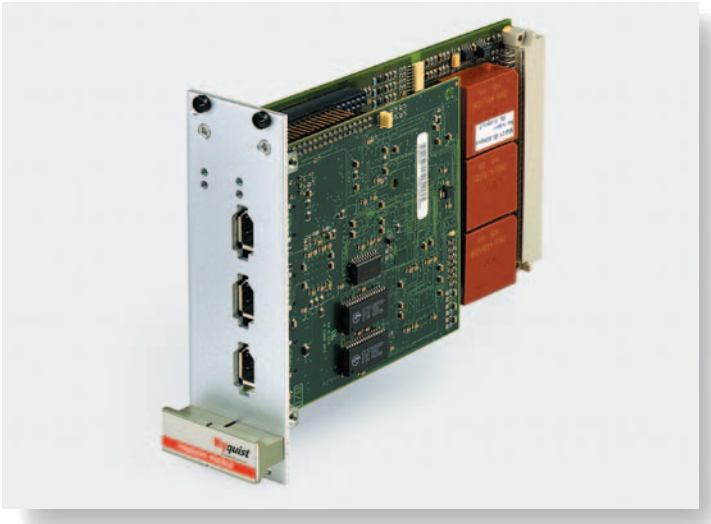
www.maxonmotor.com
www.nyquist.com

High-end motion control

maxon motor collaborates with competent partners for complete solutions. maxon motor and Nyquist Industrial Control have developed high-performance contouring control systems, such as the MX3000/DNA motion controller which is suitable for customer-specific solutions.
This high-end motion control is an open PC-based platform that accommodates installation concepts with motion control units, I/O modules, camera systems (vision) with the support of a comprehensive application development tool.
The software runs on a standard operating system such as Microsoft Windows 2000 or XP.
The FireWire® 1394 real-time data bus guarantees an impressive band width. Pulse-synchronous communication between PC and drives is possible, with the PC's function remaining intact (clean PC concept).

Highlights

- "Smartdrive" motion control with integtrated servoamplifier
- Full digital concept, no analogue interfaces and minimal cabling
- Available for maxon DC and EC motors from 10 to 250 Watt
- Industry standard IEEE-1394 FireWire network connection
- 400 Mbit / s minimal communication speed
- Motion, I/O and picture processing on a FireWire network
- Real-time and deterministic communication between junctions



Software

Equipment and its configuration can easily be set up with Nyquist NYCE3000 software. The Motion Controller MX3000/DNA is fully integrated in the software.
A range of optimisation and analysis tools is available.

Overview of software functions

- Single and group axis commands
- Motion commands such as homing, jogging, point to point positioning and contouring
- Single or coordinated motion
- Feed override - speed change for all axes with a single parameter
- Electronic camming and gearing in all variations
- S-curve acceleration and deceleration
- "On the fly" speed adjustment end position correction and parameter changes
- Cubic spline set point calculations (position, speed and time)
- Programmable master slave offset

maxon motor is member of

1394automation
FireWire® for the Industry

www.1394automation.org

maxon motor

The maxon group is perfoming well despite the worldwide economic turbulence.

With a global workforce of around 1000, this company is a leading supplier of high-precision drive technology up to 500 W output power.

Back on Mars! Yes, and again with maxon motors. After the successful mission with "Sojourner" in 1997, in 2004 both the rovers "Spirit" and "Opportunity" are driven by 39 maxon motors.

maxon motor – at a glance!

maxon DC motors are high quality DC micromotors. The patented moving coil rotor represents the heart of the motor.

The innovative DC motor program with even greater performance and quality data at impressive conditions.

The high-power range DC motor, with top performance and convincing quality. Same design as the innovative and award winning A-max range.

Electronically commutated DC servomotors with no detent for maximum service life.

The new EC motor program picks up the ideology of the successful A-max and RE-max motors. Modular system with gearheads, sensors and brakes.

EC flat motors are brushless motors with a flat design for when space is limited.

Precision spur and planetary gearheads matched to maxon motors.

An extensive range of electronic control systems meets your every need in terms of performance and speed accuracy.

Micro drives less than 10 mm in diameter

High resolution analog and digital tachos through to absolute transmitters guarantee highly dynamic control systems with our precision motors.

High-tech ceramic components – MIM/CIM technology

Order the new maxon catalogue 04/05 with CD-ROM and maxon selection program. 288 pages of comprehensive information on motors, gearheads, tachos and controls.

maxon motor