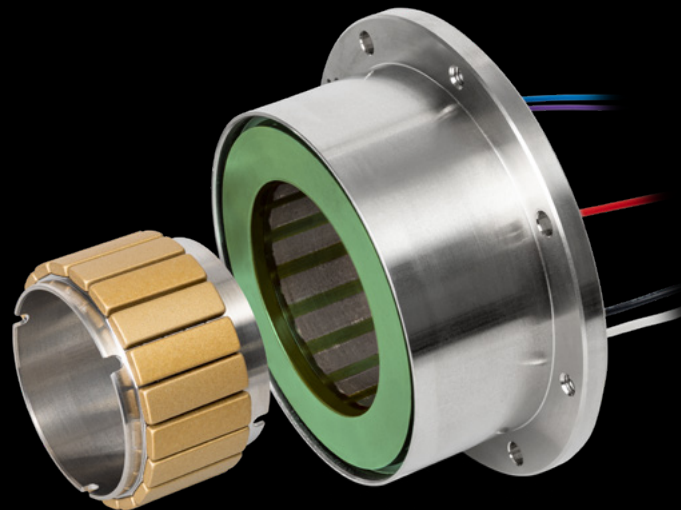


# Frameless BLDC Motors

Frameless BLDC motors consist of a separate stator and rotor. They are the perfect solution for applications with a high degree of system integration, as they can be built directly into customer-specific designs—including individual adaptations such as bearings or cable routing. This makes frameless motors indispensable in systems engineering, robotics, and complex high-end applications. Frameless motors require additional know-how during integration, which maxon provides with comprehensive support. For anyone seeking maximum freedom in design, this is the solution for highest efficiency and performance.




# Frameless BLDC Motors

Maximum torque integrated directly into your application

Standard specification no. 101	100
Terminology explanations	240
EC frameless DT	243-252
EC frameless HT	255-260

# Explanations maxon terminology for frameless BLDC motors

## Dimensional drawings

Presentation of the views according to the projection method E (ISO).  All dimensions in [mm].

## Motor Data

The values in lines 2–15 are valid when using block commutation.

### 1 Nominal voltage $U_N$ [Volt]

is the applied voltage between two powered phases in block commutation. See page 73 for the timing diagram of the voltage in the three phases. All nominal data (lines 2–9) refer to this voltage. Lower and higher voltages are permissible, provided that limits are not exceeded.

### 2 No load speed $n_0$ [rpm] $\pm 10\%$

is the speed at which the unloaded motor runs with the nominal voltage applied. It is approximately proportional to the applied voltage.

### 3 No load current $I_0$ [mA] $\pm 50\%$

This is the typical current that the unloaded motor draws when operating at nominal voltage. It increases with rising speed owing to bearing friction and iron losses. No load friction depends heavily on temperature. In extended operation, the motor heats up and the no load friction and no load current decrease.

### 4 Nominal speed $n_N$ [rpm]

is the speed set for operation at nominal voltage and nominal torque at a motor temperature of 25°C.

### 5 Nominal torque $M_N$ [mNm]

is the torque generated for operation at nominal voltage and nominal current at a motor temperature of 25°C. It is at the limit of the motor's continuous operation range. Higher torques heat up the winding too much.

### 6 Nominal current $I_N$ [A]

is the current in the active phase in block commutation that generates the nominal torque at the given nominal speed (= max. permissible continuous load current). The maximum winding temperature is reached at 25°C ambient temperature in continuous operation with  $I_N$ .  $I_N$  decreases as speed increases due to additional losses in the lamination.

### 7 Stall torque $M_H$ [mNm]

For ironless windings, this is the calculated load torque that brings the shaft to a standstill at nominal voltage. For windings with an iron core, this is the measured value, as they are subject to the saturation effect.

### 8 Stall current $I_A$ [A]

is the quotient from nominal voltage and the motor's terminal resistance. Stall current is equivalent to stall torque. With larger motors,  $I_A$  cannot often be reached due to the amplifier's current limits.

### 9 Max. efficiency $\eta_{\max}$ [%]

is the optimal relationship between input and output power at nominal voltage. It also doesn't always denote the optimal operating point.

### 10 Terminal resistance phase to phase $R$ [ $\Omega$ ]

is determined by the resistance at 25°C between two connections of the default configuration.

### 11 Terminal inductance phase to phase $L$ [mH]

is the winding inductance between two connections. It is measured at 1 kHz, sinusoidal.

### 12 Torque constant $k_M$ [mNm/A]

This may also be referred to as «specific torque» and represents the quotient from generated torque and applicable current.

### 13 Speed constant $k_n$ [rpm/V]

indicates the theoretical no load speed per volt of applied voltage, disregarding friction losses.

### 14 Speed/torque gradient

$$\Delta_n/\Delta_M \text{ [rpm/mNm]}$$

The speed/torque gradient is an indicator of the motor's performance. The smaller the value, the more powerful the motor and consequently the less motor speed varies with load variations. It is based on the quotient of ideal no load speed and ideal stall torque (tolerance  $\pm 20\%$ ).

The real characteristic curve depends on the speed for EC motors with slotted winding (EC flat and EC-i); it is steeper at high speeds and flatter at slow speeds. The real gradient at nominal voltage can be approximated by a straight line between no load speed and the nominal operating point (see page 91).

### 15 Mechanical time constant $\tau_m$ [ms]

is the time required for the rotor to accelerate from standstill to 63% of its no load speed.

### 16 Rotor moment of inertia $J_R$ [gcm<sup>2</sup>]

is the mass moment of inertia of the rotor, based on the axis of rotation.

### 17 Thermal resistance housing-ambient $R_{th2}$ [K/W]

and

### 18 Thermal resistance winding-housing $R_{th1}$ [K/W]

The specified values depend to a great extent on the installation situation of the drive and the heat dissipation. maxon typically measures the contact resistances with the drive mounted on a plastic panel. In some cases, the values are determined on a metal plate, which is specified in the data sheet. For drives with metal flanges, thermal resistance  $R_{th2}$  can decrease by up to 80% when the drive is mounted on a heat-conducting (metallic) mount instead of plastic.

### 19 Thermal time constant winding $\tau_w$ [s]

and

### 20 Thermal time constant motor $\tau_s$ [s]

These are the typical reaction times for a temperature change of winding and motor. It can be seen that the motor reacts much more sluggishly in thermal terms than the winding. The values are calculated from the product of thermal capacity and given heat resistances.

### 21 Ambient temperature [°C]

Operating temperature range. This derives from the heat reliability of the materials used and viscosity of bearing lubrication.

### 22 Max. winding temperature [°C]

Maximum permissible winding temperature.

### 23 Max. speed $n_{\max}$ [rpm]

is the maximum recommended speed based on thermal and mechanical perspectives. A reduced service life can be expected at higher speeds.

### 24 Axial play [mm]

On motors that are not preloaded, these are the tolerance limits for the bearing play. A preload cancels out the axial play up to the specified axial force. When load is applied in the direction of the preload force (away from the flange), the axial play is always zero. The length tolerance of the shaft includes the maximum axial play.

### 25 Radial play [mm]

Radial play is the bearing's radial movement. A spring is utilized to preload the motor's bearings, eliminating radial play up to a given axial load.

### 26/27 Max. axial load [N]

**Dynamic:** axial loading permissible in operation. If different values apply for traction and thrust, the smaller value is given.

**Static:** maximum axial force that does not cause permanent damage when applied to the front of the shaft at standstill.

**Shaft supported:** maximum axial force applying to the shaft at standstill if the force is not input at the other shaft end. This is not possible for motors with only one shaft end.

### 28 Max. radial load [N]

The value is given for a typical distance from the front flange. As the distance increases, this value decreases.

### 29 Number of pole pairs

Number of north poles of the permanent magnet. The phase streams and commutation signals pass through per revolution  $p$  cycles. Servo-controllers require the correct details of the number of pole pairs.

### 30 Number of phases

All maxon EC motors have three phases.

### 31 Weight of motor [g]

### 32 Typical noise level [dBA]

Is the statistical average of the noise level measured in accordance with the maxon standard (10 cm distance radially to the drive, no-load operation at a certain speed. The drive lies freely on a plastic foam mat in the noise chamber).

The acoustic noise level depends on a number of factors, such as component tolerances, and it is greatly influenced by the overall system in which the drive is installed. When the drive is installed in an unfavorable constellation, the noise level may be significantly higher than the noise level of the drive alone.

The acoustic noise level is measured and determined during product qualification. In manufacturing, a structure-borne noise test is performed with defined limits. Impermissible deviations can thus be identified.

### 33 Max. torque $M_{\max}$ [mNm]

Maximum torque the motor can briefly deliver. It is limited by the overload protection of the electronics.

### 34 Max. current $I_{\max}$ [A]

Surge current with which the peak torque is generated at nominal voltage. With an active speed controller, surge current is not proportionate to the torque, but also depends on the supply voltage. As a result, this value only applies at nominal voltage.

### 35 Type of control

«Speed» means that the drive is fitted with an integral speed controller. «Controlled» means that the drive is fitted with true commutation electronics.

### 36 Supply voltage $+V_{CC}$ [V]

Range of supply voltages measured in respect of GND at which the drive functions.

### 37 Speed set value input $U_c$ [V]

Range of analog voltage for set speed value measured in respect of GND. For 2 wire solutions, the supply voltage acts as speed setting at the same time.

### 38 Scaling Set speed value input $k_c$ [rpm/V]

Set speed value  $n_c$  is based on the product  $n_c = k_c \cdot U_c$ .

### 39 Speed range

Achievable speeds in the controlled range.

### 40 Max. acceleration

The set speed value follows a sudden set point change with a ramp. This value indicates the increase in the ramp.

# Frameless BLDC Motors

Standard specification no. 101	100
Terminology explanations	240

EC frameless DT 38 S Ø42 mm, 110 Watt		243
EC frameless DT 38 M Ø42 mm, 240 Watt		244
EC frameless DT 50 S Ø50 mm, 230 Watt	<b>NEW</b>	245
EC frameless DT 50 S Ø54 mm, 220 Watt		246
EC frameless DT 50 M Ø50 mm, 220 Watt	<b>NEW</b>	247
EC frameless DT 50 M Ø54 mm, 210 Watt		248
EC frameless DT 65 S Ø70 mm, 290 Watt		249
EC frameless DT 65 M Ø70 mm, 375 Watt		250
EC frameless DT 85 M Ø90 mm, 570 Watt		251
EC frameless DT 85 L Ø90 mm, 680 Watt		252

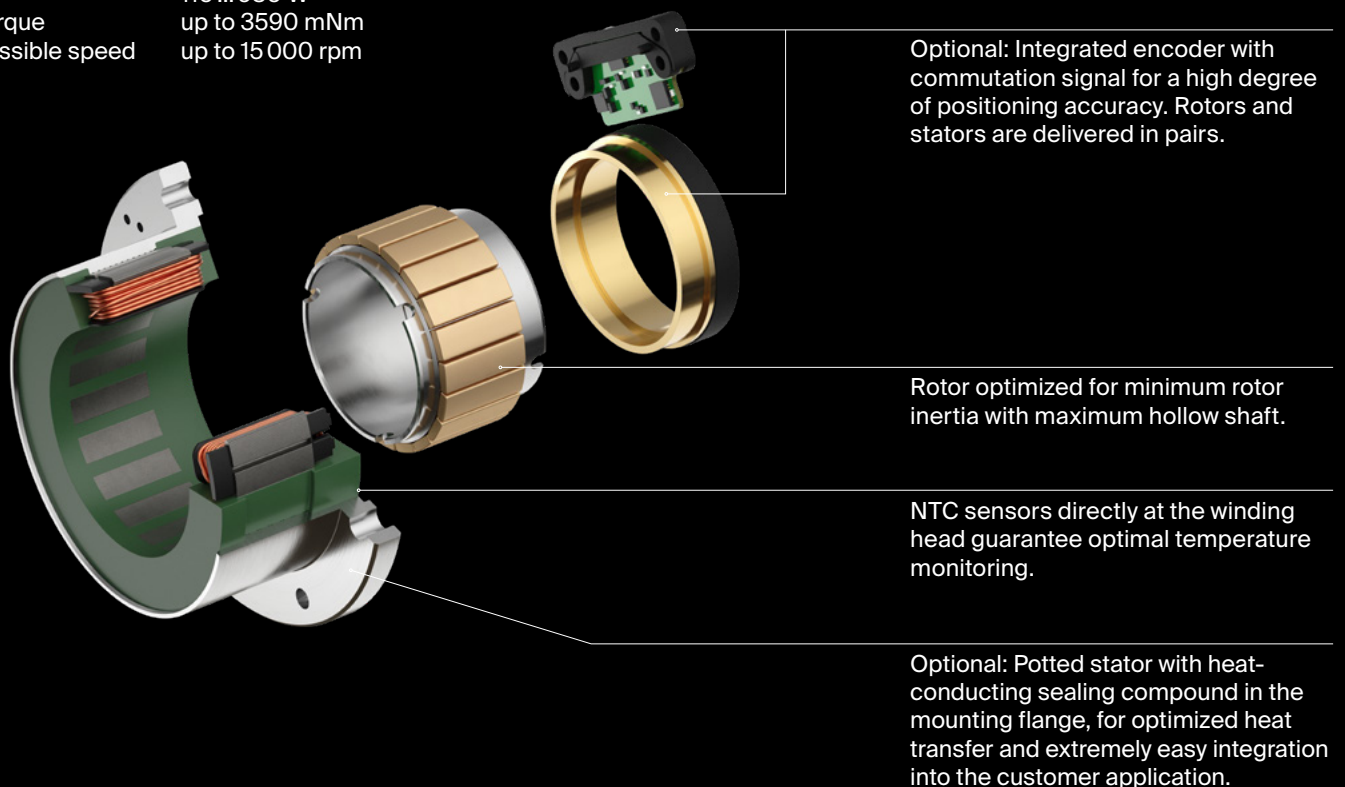
EC frameless HT		
EC frameless HT 60 S Ø60 mm, 240 Watt	<b>NEW</b>	255
EC frameless HT 60 M Ø60 mm, 250 Watt	<b>NEW</b>	256
EC frameless HT 76 S Ø76 mm, 315 Watt	<b>NEW</b>	257
EC frameless HT 76 M Ø76 mm, 430 Watt	<b>NEW</b>	258
EC frameless HT 90 S Ø90 mm, 500 Watt	<b>NEW</b>	259
EC frameless HT 90 M Ø90 mm, 620 Watt	<b>NEW</b>	260

# EC frameless DT

The EC frameless DT motor range offers high torque density and dynamics combined with excellent energy efficiency. The compact design with a generously sized hollow shaft provides great design freedom for integration. An additional mounting flange simplifies installation and removal, while optimized heat dissipation is supported by additional sealing compound. For maximum compactness and reliability, maxon can integrate the motor directly into customer-specific housings.

## Key data

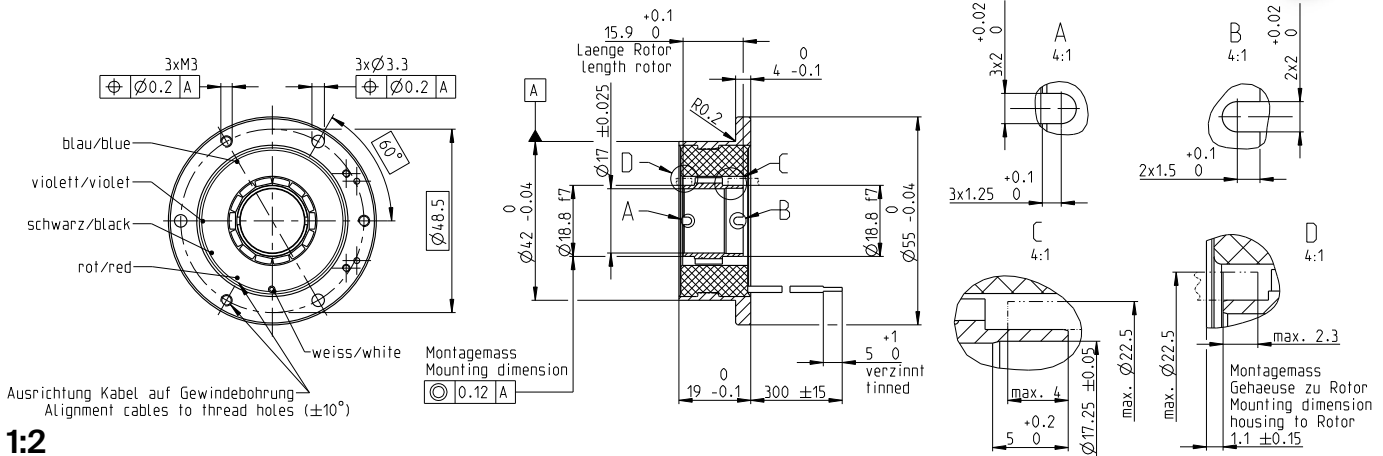
Motor $\varnothing$	42...90 mm
Motor length	18...43 mm
Power	110...680 W
Nominal torque	up to 3590 mNm
Max. permissible speed	up to 15 000 rpm



- Top torque density
- Short length, with large hollow shaft
- Excellent heat dissipation
- Outstanding energy efficiency
- Low cogging torque

# EC frameless DT 38 S $\varnothing 42$ mm, brushless, 110 W

Dynamic Torque, potted in mounting flange



## M 1:2

- Stock program
- Standard program
- Special program (on request)

Part numbers	

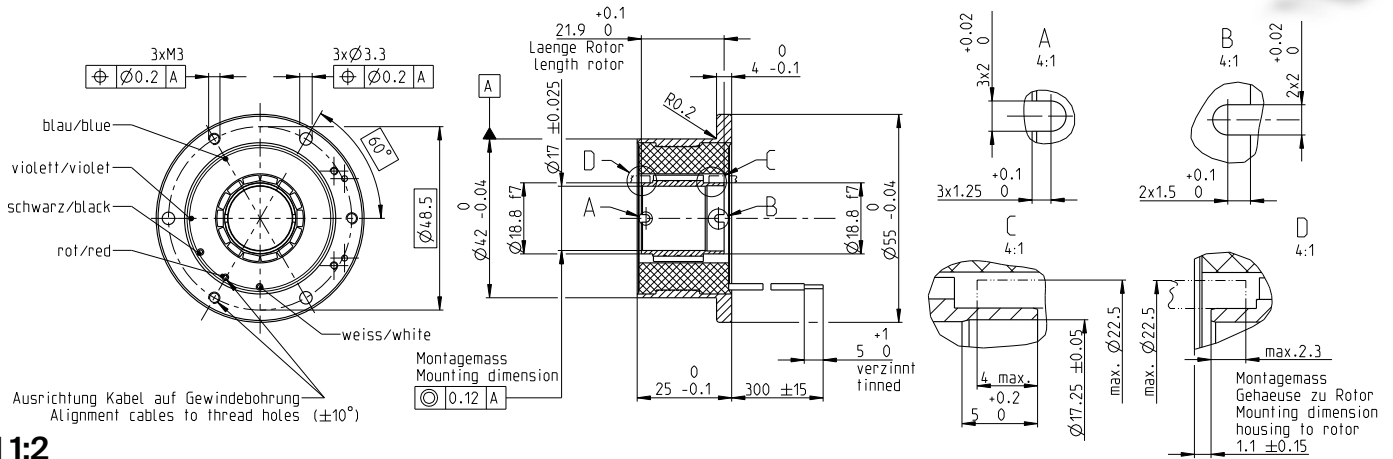
Motor data <sup>1</sup>		sensorless		814370	
<b>Values at nominal voltage</b>					
1	Nominal voltage	V	24		
2	No load speed	rpm	12 400		
3	No load current	mA	261		
4	Nominal speed	rpm	9430		
5	Nominal torque	mNm	134		
6	Nominal current (max. continuous current)	A	6.3		
7	Stall torque	mNm	641		
8	Stall current	A	89.9		
9	Max. efficiency	%	89.5		
<b>Characteristics</b>					
10	Terminal resistance phase to phase	$\Omega$	0.267		
11	Terminal inductance phase to phase	mH	0.182		
12	Torque constant	mNm/A	18.2		
13	Speed constant	rpm/V	524		
14	Speed/torque gradient	rpm/mNm	7.7		
15	Mechanical time constant	ms	0.98		
16	Rotor inertia	gcm <sup>2</sup>	12.2		

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient ( $R_{th2}$ ) 4.5...7.3 K/W 18 Thermal resistance winding-housing 0.6 K/W 19 Thermal time constant winding 4.5 s 20 Thermal time constant motor 451 s 21 Ambient temperature -40...+100°C 22 Max. winding temperature +155°C  <b>Mechanical data</b> 23 Max. speed 15 000 rpm  <b>Other specifications</b> 29 Number of pole pairs 7 30 Number of phases 3 31 Weight of motor 125 g (with mounting flange made of stainless steel) Weight for integration (without mounting flange) 64 g		<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 4.5 K/W.  ■ Continuous operation range at $R_{th2}$ of 7.3 K/W With mounting flange ■ Continuous operation range at $R_{th2}$ of 4.5 K/W Installed in a $\varnothing 48$ mm aluminum housing Mounted on an aluminum plate sized 95x95x6 mm □ Intermittent operation — Assigned power rating

Modular system	Sensors	Control Electronics
Values listed in the table are nominal.  <b>Connection motor</b> (Cable AWG 18) red Motor winding 1 black Motor winding 2 white Motor winding 3  <b>Connection NTC</b> (Cable AWG 24) purple NTC blue NTC Resistance 25°C: 5 k $\Omega$ $\pm$ 1%, beta (25–85°C): 3490 K  <b>Comment</b> For Torque control data, refer to "Installation Manual" available on maxon online shop.	427_TSX 38 MAG with commutation signals	Details on catalog page 60 447_ESCON2 Micro 60/5 454_EPOS4 Micro 24/5 CAN 454_EPOS4 Micro 24/5 EtherCAT 455_EPOS4 Module 50/5 458_EPOS4 Compact 50/5 461_EPOS4 50/5 462_EPOS4 Disk 60/8 CAN 463_EPOS4 Disk 60/8 EtherCAT
<b>Variants</b> maxon integration into customer housing on request. Other coil designs on request.		

# EC frameless DT 38 M $\varnothing 42$ mm, brushless, 240 watt

Dynamic Torque, potted in mounting flange



## M 1:2

- Stock program
- Standard program
- Special program (on request)

Part numbers	
sensorless	800948

Motor data <sup>1</sup>		800948	
<b>Values at nominal voltage</b>			
1 Nominal voltage	V	24	
2 No load speed	rpm	6290	
3 No load current	mA	147	
4 Nominal speed	rpm	4830	
5 Nominal torque	mNm	237	
6 Nominal current (max. continuous current)	A	5.8	
7 Stall torque	mNm	1150	
8 Stall current	A	63.8	
9 Max. efficiency	%	90.6	
<b>Characteristics</b>			
10 Terminal resistance phase to phase	$\Omega$	0.376	
11 Terminal inductance phase to phase	mH	0.312	
12 Torque constant	mNm/A	36.2	
13 Speed constant	rpm/V	264	
14 Speed/torque gradient	rpm/mNm	2.740	
15 Mechanical time constant	ms	0.583	
16 Rotor inertia	gcm <sup>2</sup>	20.3	

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient ( $R_{th2}$ ) 4.5...6.9 K/W 18 Thermal resistance winding-housing 0.33 K/W 19 Thermal time constant winding 3.38 s 20 Thermal time constant motor 574 s 21 Ambient temperature -40...+100°C 22 Max. winding temperature +155°C  <b>Mechanical data</b> 23 Max. speed 15 000 rpm  <b>Other specifications</b> 29 Number of pole pairs 7 30 Number of phases 3 31 Weight of motor (with mounting flange made of stainless steel) 169 g Weight for integration (without mounting flange) 97 g		<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 4.5 K/W.  <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: red; border: 1px solid black; margin-right: 5px;"></span> Continuous operation range at <math>R_{th2}</math> of 6.9 K/W With mounting flange</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: orange; border: 1px solid black; margin-right: 5px;"></span> Continuous operation range at <math>R_{th2}</math> of 4.5 K/W Installed in a <math>\varnothing 48</math> mm aluminum housing Mounted on an aluminum plate sized 95x95x6 mm</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: white; border: 1px solid black; margin-right: 5px;"></span> Intermittent operation</li> <li><span style="display: inline-block; width: 15px; border-bottom: 1px solid black; margin-right: 5px;"></span> Assigned power rating</li> </ul>

Modular system	Sensors	Control Electronics
Values listed in the table are nominal.  <b>Connection motor</b> (Cable AWG 18) red Motor winding 1 black Motor winding 2 white Motor winding 3  <b>Connection NTC</b> (Cable AWG 24) purple NTC blue NTC Resistance 25°C: 5 k $\Omega$ $\pm 1\%$ , beta (25–85°C): 3490 K  <b>Comment</b> For Torque control data, refer to "Installation Manual" available on maxon online shop.	427_TSX 38 MAG with commutation signals	447_ESCON2 Micro 60/5 454_EPOS4 Micro 24/5 CAN 454_EPOS4 Micro 24/5 EtherCAT 455_EPOS4 Module 50/5 458_EPOS4 Compact 50/5 461_EPOS4 50/5 462_EPOS4 Disk 60/8 CAN 463_EPOS4 Disk 60/8 EtherCAT
<b>Variants</b>		
maxon integration into customer housing on request. Other coil designs on request.		

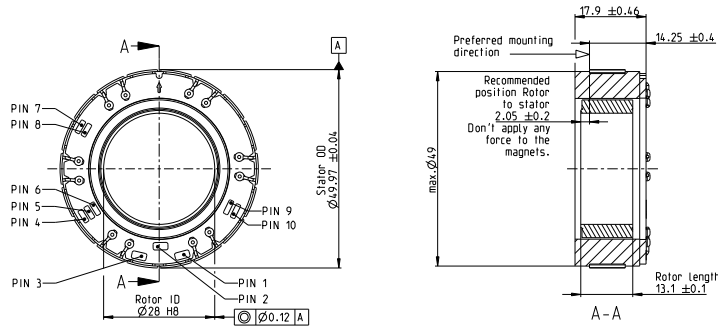
# EC frameless DT 50 S $\varnothing$ 50 mm, brushless, 230 watt

Dynamic Torque

**NEW**



Frameless BLDC Motors



M 1:2

- Stock program
- Standard program
- Special program (on request)

## Part numbers

with Hall sensors 951176

### Motor data<sup>1</sup> (provisional)

Values at nominal voltage	
1 Nominal voltage	V 48
2 No load speed	rpm 6650
3 No load current	mA 150
4 Nominal speed	rpm 5830
5 Nominal torque	mNm 364
6 Nominal current (max. continuous current)	A 6.28
7 Stall torque	mNm 1890
8 Stall current	A 81.2
9 Max. efficiency	% 91.6
Characteristics	
10 Terminal resistance phase to phase	$\Omega$ 0.591
11 Terminal inductance phase to phase	mH 0.384
12 Torque constant	mNm/A 68.5
13 Speed constant	rpm/V 139
14 Speed/torque gradient	rpm/mNm 1.200
15 Mechanical time constant	ms 0.881
16 Rotor inertia	gcm <sup>2</sup> 70

### Specifications

- Thermal data**
- 17 Thermal resistance housing-ambient ( $R_{th2}$ ) 21...4.0 K/W
  - 18 Thermal resistance winding-housing 1.45 K/W
  - 19 Thermal time constant winding 19.8 s
  - 20 Thermal time constant motor 453 s
  - 21 Ambient temperature -40...+100°C
  - 22 Max. winding temperature +155°C

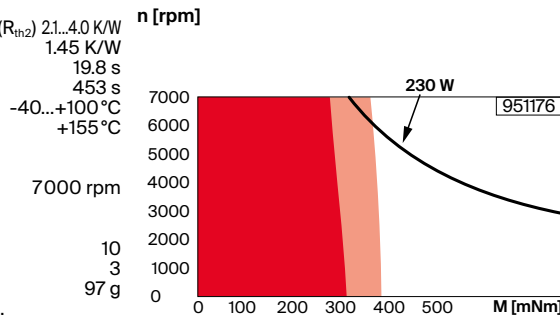
**Mechanical data**

- 23 Max. speed 7000 rpm

**Other specifications**

- 29 Number of pole pairs 10
  - 30 Number of phases 3
  - 31 Weight of motor 97 g
- Values listed in the table are nominal.

### Operating range



### Comments

<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 2.1 K/W.

- Continuous operation range at  $R_{th2}$  of 4.0 K/W  
Installed in a  $\varnothing$ 62 mm aluminum housing
- Continuous operation range at  $R_{th2}$  of 2.1 K/W  
Installed in a  $\varnothing$ 62 mm aluminum housing  
Mounted on an aluminum plate sized 125x125x10 mm
- Intermittent operation
- Assigned power rating

### Connection motor

- Pin 1 Motor winding 1
- Pin 2 Motor winding 2
- Pin 3 Motor winding 3

### Commutation

- Pin 4 Hall sensors 1
- Pin 5 Hall sensors 2
- Pin 6 Hall sensors 3
- Pin 7 GND
- Pin 8  $V_{hall}$  4.5...24 VDC

### Connection NTC

- Pin 9 NTC
- Pin 10 NTC

Resistance 25°C: 5 k $\Omega$   $\pm$ 1%, beta (25–85°C): 3490 K

### Comment

For Torque control data, refer to "Installation Manual" available on maxon online shop.

### Modular system

Other coil designs on request.

### Details on catalog page 60

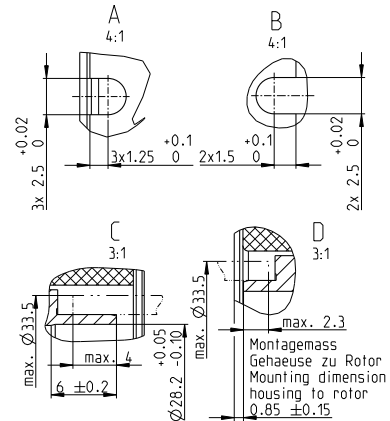
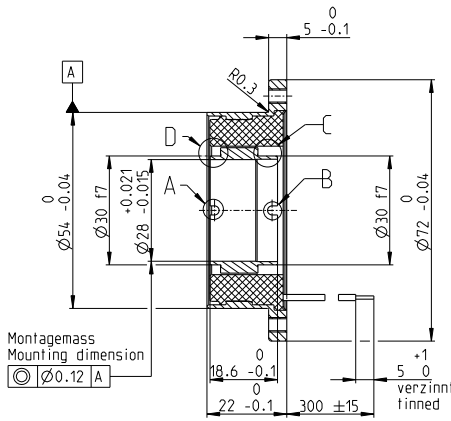
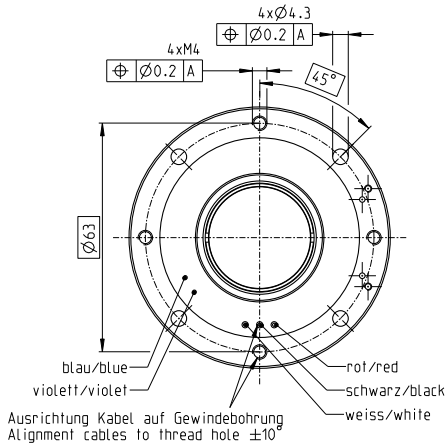
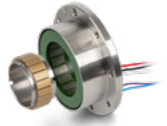
#### Control Electronics

- 447\_ESCON2 Micro 60/5
- 449\_ESCON2 Compact 60/5
- 454\_EPOS4 Micro 24/5 CAN
- 454\_EPOS4 Micro 24/5 EtherCAT
- 455\_EPOS4 Module 50/5
- 458\_EPOS4 Compact 50/5
- 461\_EPOS4 50/5
- 462\_EPOS4 Disk 60/8

### Variants

# EC frameless DT 50 S $\varnothing 54$ mm, brushless, 220 watt

Dynamic Torque, potted in mounting flange



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part numbers	
sensorless	734439

Motor data <sup>1</sup>	
<b>Values at nominal voltage</b>	
1 Nominal voltage	V 48
2 No load speed	rpm 6650
3 No load current	mA 150
4 Nominal speed	rpm 5510
5 Nominal torque	mNm 368
6 Nominal current (max. continuous current)	A 4.9
7 Stall torque	mNm 1890
8 Stall current	A 81.2
9 Max. efficiency	% 91.6
<b>Characteristics</b>	
10 Terminal resistance phase to phase	$\Omega$ 0.591
11 Terminal inductance phase to phase	mH 0.384
12 Torque constant	mNm/A 68.5
13 Speed constant	rpm/V 139
14 Speed/torque gradient	rpm/mNm 1.2
15 Mechanical time constant	ms 0.881
16 Rotor inertia	gcm <sup>2</sup> 70

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient ( $R_{th2}$ ) 2.4..4.0 K/W 18 Thermal resistance winding-housing 1.4 K/W 19 Thermal time constant winding 15.9 s 20 Thermal time constant motor 453 s 21 Ambient temperature -40...+100 °C 22 Max. winding temperature +155 °C  <b>Mechanical data</b> 23 Max. speed 7000 rpm  <b>Other specifications</b> 29 Number of pole pairs 10 30 Number of phases 3 31 Weight of motor 218 g (with mounting flange made of stainless steel) Weight for integration 116 g (without mounting flange)		<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 2.4 K/W.  ■ Continuous operation range at $R_{th2}$ of 4.0 K/W With mounting flange ■ Continuous operation range at $R_{th2}$ of 2.4 K/W Installed in a $\varnothing 62$ mm aluminum housing Mounted on an aluminum plate sized 125x125x10 mm □ Intermittent operation — Assigned power rating

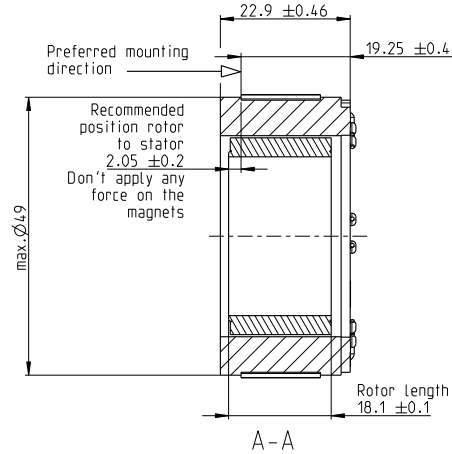
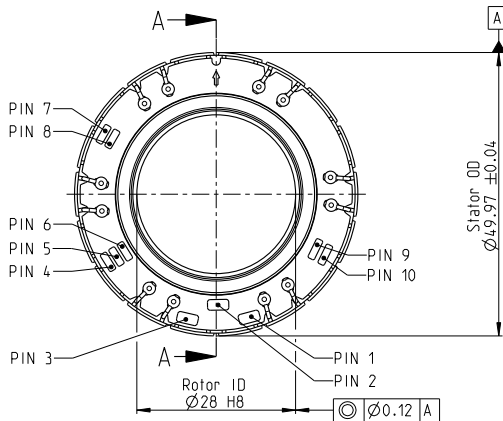
Modular system	Details on catalog page 60
Values listed in the table are nominal.  <b>Connection motor</b> (Cable AWG 18) red Motor winding 1 black Motor winding 2 white Motor winding 3  <b>Connection NTC</b> (Cable AWG 24) purple NTC blue NTC Resistance 25 °C: 5 k $\Omega$ $\pm 1\%$ , beta (25–85 °C): 3490 K  <b>Comment</b> For Torque control data, refer to "Installation Manual" available on maxon online shop.	<b>Sensors</b> 428_TSX 50 MAG with commutation signals  <b>Control Electronics</b> 447_ESCON2 Micro 60/5 454_EPOS4 Micro 24/5 CAN 454_EPOS4 Micro 24/5 EtherCAT 455_EPOS4 Module 50/5 458_EPOS4 Compact 50/5 461_EPOS4 50/5 462_EPOS4 Disk 60/8 CAN 463_EPOS4 Disk 60/8 EtherCAT
<b>Variants</b>	
maxon integration into customer housing on request. Other coil designs on request.	

# EC frameless DT 50 M Ø50 mm, brushless, 220 watt

Dynamic Torque

**NEW**

Frameless BLDC Motors



**M 1:3**

- Stock program
- Standard program
- Special program (on request)

**Part numbers**



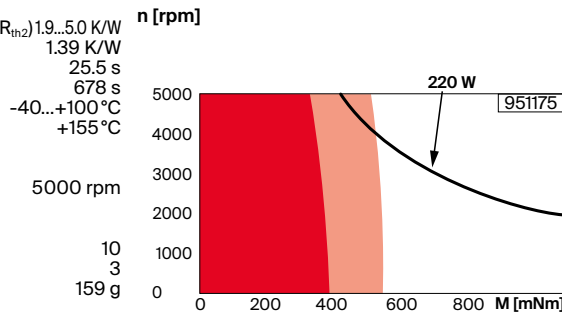
with Hall sensors **951175**

**Motor data<sup>1</sup> (provisional)**

Values at nominal voltage	
1 Nominal voltage	V 48
2 No load speed	rpm 4330
3 No load current	mA 109
4 Nominal speed	rpm 3750
5 Nominal torque	mNm 522
6 Nominal current (max. continuous current)	A 5.85
7 Stall torque	mNm 2770
8 Stall current	A 64.2
9 Max. efficiency	% 91.9
Characteristics	
10 Terminal resistance phase to phase	Ω 0.748
11 Terminal inductance phase to phase	mH 0.571
12 Torque constant	mNm/A 105
13 Speed constant	rpm/V 90.7
14 Speed/torque gradient	rpm/mNm 0.644
15 Mechanical time constant	ms 0.666
16 Rotor inertia	gcm <sup>2</sup> 98.8

**Specifications**      **Operating range**      **Comments**

- Thermal data**
- 17 Thermal resistance housing-ambient ( $R_{th2}$ ) 1.9...5.0 K/W
  - 18 Thermal resistance winding-housing 1.39 K/W
  - 19 Thermal time constant winding 25.5 s
  - 20 Thermal time constant motor 678 s
  - 21 Ambient temperature -40...+100°C
  - 22 Max. winding temperature +155°C
- Mechanical data**
- 23 Max. speed 5000 rpm
- Other specifications**
- 29 Number of pole pairs 10
  - 30 Number of phases 3
  - 31 Weight of motor 159 g



<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 1.9 K/W.

- Continuous operation range at  $R_{th2}$  of 5.0 K/W  
Installed in a Ø62 mm aluminum housing
- Continuous operation range at  $R_{th2}$  of 1.9 K/W  
Installed in a Ø62 mm aluminum housing  
Mounted on an aluminum plate sized 125x125x10 mm
- Intermittent operation
- Assigned power rating**

Values listed in the table are nominal.

**Modular system**      **Details on catalog page 60**

- Connection motor**
- Pin 1 Motor winding 1
  - Pin 2 Motor winding 2
  - Pin 3 Motor winding 3

- Commutation**
- Pin 4 Hall sensors 1
  - Pin 5 Hall sensors 2
  - Pin 6 Hall sensors 3
  - Pin 7 GND
  - Pin 8  $V_{hall}$  4.5...24 VDC

- Connection NTC**
- Pin 9 NTC
  - Pin 10 NTC

Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

**Comment**  
For Torque control data, refer to "Installation Manual" available on maxon online shop.

- Control Electronics**
- 447\_ESCON2 Micro 60/5
  - 449\_ESCON2 Compact 60/5
  - 454\_EPOS4 Micro 24/5 CAN
  - 454\_EPOS4 Micro 24/5 EtherCAT
  - 455\_EPOS4 Module 50/5
  - 458\_EPOS4 Compact 50/5
  - 461\_EPOS4 50/5
  - 462\_EPOS4 Disk 60/8

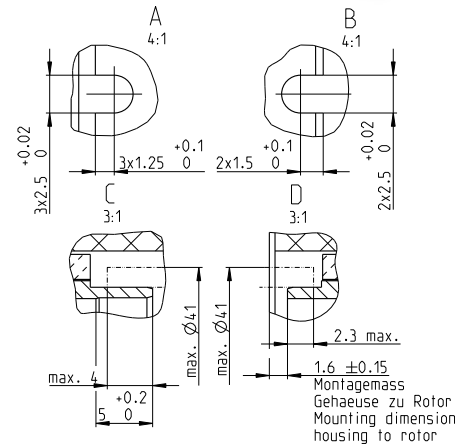
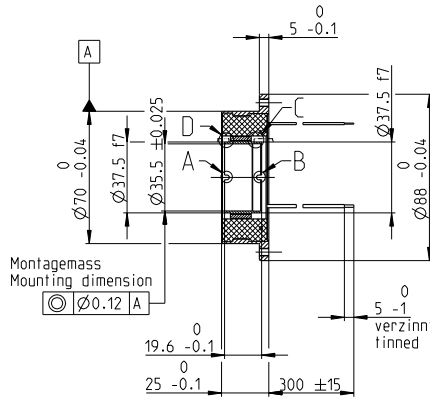
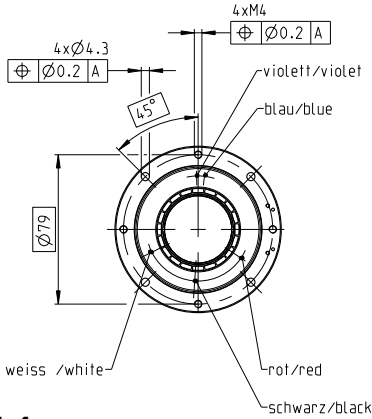
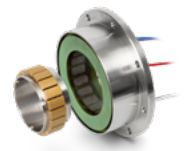
**Variants**  
Other coil designs on request.

Frameless BLDC Motors



# EC frameless DT 65 S $\varnothing 70$ mm, brushless, 290 watt

Dynamic Torque, potted in mounting flange



## M 1:4

- Stock program
- Standard program
- Special program (on request)

### Part numbers

sensorless **783327**

### Motor data<sup>1</sup>

#### Values at nominal voltage

1	Nominal voltage	V	48
2	No load speed	rpm	4570
3	No load current	mA	204
4	Nominal speed	rpm	3590
5	Nominal torque	mNm	978
6	Nominal current (max. continuous current)	A	8.48
7	Stall torque	mNm	4080
8	Stall current	A	145
9	Max. efficiency	%	92.6

#### Characteristics

10	Terminal resistance phase to phase	$\Omega$	0.332
11	Terminal inductance phase to phase	mH	0.458
12	Torque constant	mNm/A	99.7
13	Speed constant	rpm/V	95.8
14	Speed/torque gradient	rpm/mNm	0.319
15	Mechanical time constant	ms	0.569
16	Rotor inertia	gcm <sup>2</sup>	170

### Specifications

#### Thermal data

17	Thermal resistance housing-ambient ( $R_{th2}$ )	1.6...3.6 K/W
18	Thermal resistance winding-housing	0.379 K/W
19	Thermal time constant winding	12.1 s
20	Thermal time constant motor	1330 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C

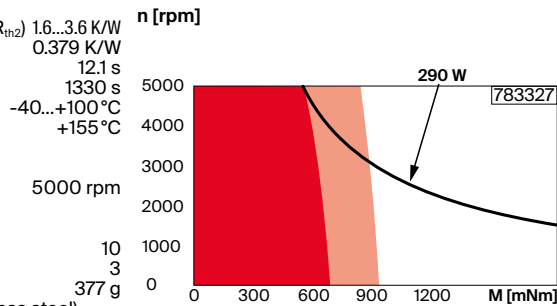
#### Mechanical data

23	Max. speed	5000 rpm
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#### Other specifications

29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor (with mounting flange made of stainless steel)	377 g
	Weight for integration (without mounting flange)	219 g

### Operating range



### Comments

<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 1.6 K/W.

- Continuous operation range at  $R_{th2}$  of 3.6 K/W With mounting flange
- Continuous operation range at  $R_{th2}$  of 1.6 K/W Installed in a  $\varnothing 78$  mm aluminum housing Mounted on an aluminum plate sized 160x160x10 mm
- Intermittent operation
- Assigned power rating

### Modular system

Details on catalog page 60

Values listed in the table are nominal.

#### Connection motor (Cable AWG 18)

red	Motor winding 1
black	Motor winding 2
white	Motor winding 3

#### Connection NTC (Cable AWG 24)

purple	NTC
blue	NTC

Resistance 25°C: 5 k $\Omega$   $\pm$ 1%, beta (25–85°C): 3490 K

#### Comment

For Torque control data, refer to "Installation Manual" available on maxon online shop.

#### Sensors

429\_TSX 65 MAG with commutation signals

#### Control Electronics

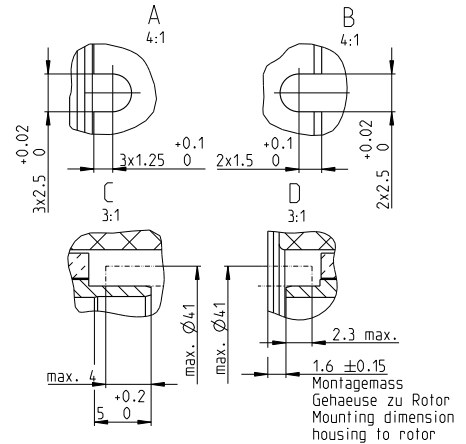
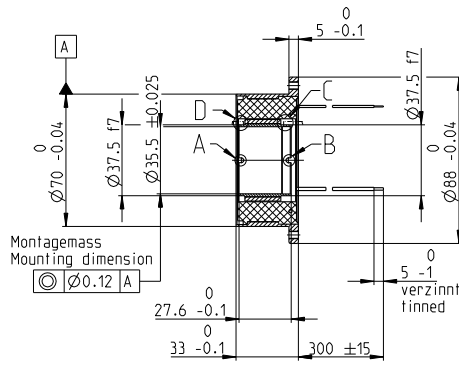
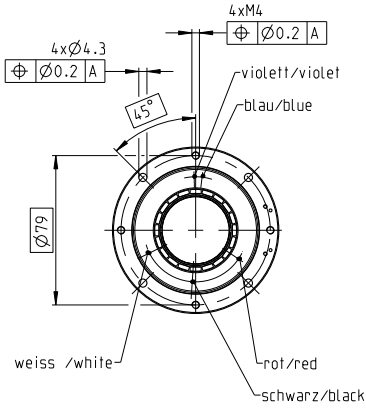
- 447\_ESCON2 Micro 60/5
- 448\_ESCON2 Module 60/12
- 449\_ESCON2 Compact 60/12
- 455\_EPOS4 Module 50/8
- 459\_EPOS4 Compact 50/8
- 462\_EPOS4 70/15
- 462\_EPOS4 Disk 60/8 CAN
- 463\_EPOS4 Disk 60/8 EtherCAT

### Variants

maxon integration into customer housing on request. Other coil designs on request.

# EC frameless DT 65 M $\varnothing 70$ mm, brushless, 375 watt

Dynamic Torque, potted in mounting flange



## M 1:4

- Stock program
- Standard program
- Special program (on request)

Part numbers	
sensorless	783332

Motor data <sup>1</sup>	
<b>Values at nominal voltage</b>	
1 Nominal voltage	V 48
2 No load speed	rpm 2590
3 No load current	mA 150
4 Nominal speed	rpm 2050
5 Nominal torque	mNm 1500
6 Nominal current (max. continuous current)	A 7.56
7 Stall torque	mNm 5660
8 Stall current	A 103
9 Max. efficiency	% 92.4
<b>Characteristics</b>	
10 Terminal resistance phase to phase	$\Omega$ 0.466
11 Terminal inductance phase to phase	mH 0.779
12 Torque constant	mNm/A 176
13 Speed constant	rpm/V 54.2
14 Speed/torque gradient	rpm/mNm 0.143
15 Mechanical time constant	ms 0.41
16 Rotor inertia	gcm <sup>2</sup> 275

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient ( $R_{th2}$ ) 1.6...3.4 K/W 18 Thermal resistance winding-housing 0.207 K/W 19 Thermal time constant winding 9.1 s 20 Thermal time constant motor 1250 s 21 Ambient temperature -40...+100°C 22 Max. winding temperature +155°C  <b>Mechanical data</b> 23 Max. speed 5000 rpm  <b>Other specifications</b> 29 Number of pole pairs 10 30 Number of phases 3 31 Weight of motor (with mounting flange made of stainless steel) 524 g Weight for integration (without mounting flange) 332 g	<b>n [rpm]</b> <p>375 W 783332</p> <p>M [mNm]</p>	<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 1.6 K/W.  <ul style="list-style-type: none"> <li><span style="color: red;">■</span> Continuous operation range at <math>R_{th2}</math> of 3.4 K/W With mounting flange</li> <li><span style="color: orange;">■</span> Continuous operation range at <math>R_{th2}</math> of 1.6 K/W Installed in a <math>\varnothing 78</math> mm aluminum housing Mounted on an aluminum plate sized 160x160x10 mm</li> <li><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> Intermittent operation</li> <li><span style="color: black;">—</span> Assigned power rating</li> </ul>

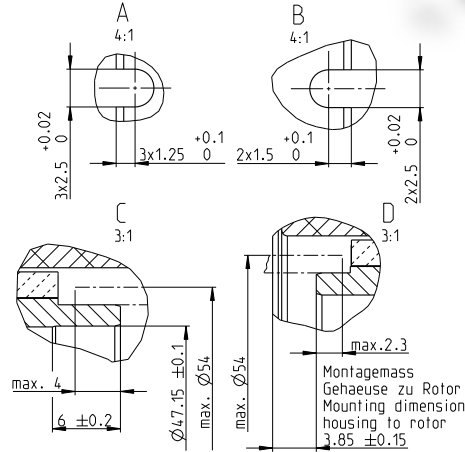
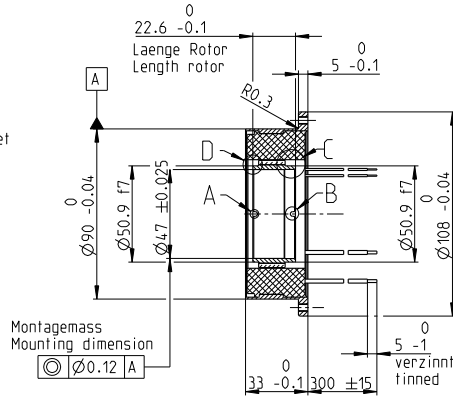
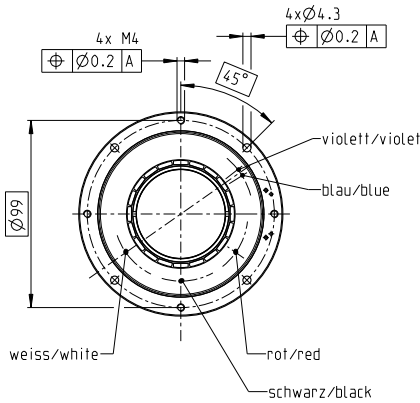
Modular system	Details on catalog page 60
Values listed in the table are nominal.  <b>Connection motor</b> (Cable AWG 18) red Motor winding 1 black Motor winding 2 white Motor winding 3  <b>Connection NTC</b> (Cable AWG 24) purple NTC blue NTC Resistance 25°C: 5 k $\Omega$ $\pm 1\%$ , beta (25–85°C): 3490 K  <b>Comment</b> For Torque control data, refer to "Installation Manual" available on maxon online shop.	<b>Sensors</b> 429_TSX 65 MAG with commutation signals  <b>Control Electronics</b> 447_ESCON2 Micro 60/5 448_ESCON2 Module 60/12 449_ESCON2 Compact 60/12 455_EPOS4 Module 50/8 459_EPOS4 Compact 50/8 462_EPOS4 70/15 462_EPOS4 Disk 60/8 CAN 463_EPOS4 Disk 60/8 EtherCAT
<b>Variants</b>	
maxon integration into customer housing on request. Other coil designs on request.	

# EC frameless DT 85 M Ø90 mm, brushless, 570 watt

Dynamic Torque, potted in mounting flange



Frameless BLDC Motors



- Stock program
- Standard program
- Special program (on request)

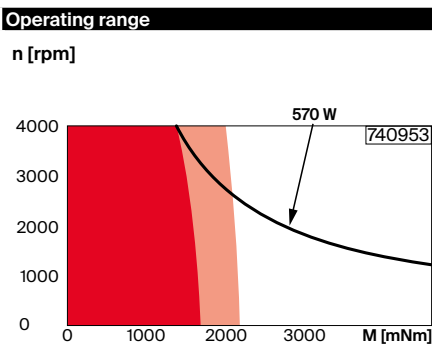
## Part numbers

Motor data <sup>1</sup>	sensorless	740953
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Values at nominal voltage		
1 Nominal voltage	V	48
2 No load speed	rpm	3410
3 No load current	mA	283
4 Nominal speed	rpm	2760
5 Nominal torque	mNm	2190
6 Nominal current (max. continuous current)	A	14.3
7 Stall torque	mNm	11500
8 Stall current	A	306
9 Max. efficiency	%	93.9
Characteristics		
10 Terminal resistance phase to phase	Ω	0.16
11 Terminal inductance phase to phase	mH	0.367
12 Torque constant	mNm/A	134
13 Speed constant	rpm/V	71.4
14 Speed/torque gradient	rpm/mNm	0.084
15 Mechanical time constant	ms	0.57
16 Rotor inertia	gcm <sup>2</sup>	650

## Specifications

Thermal data	
17 Thermal resistance housing-ambient (R <sub>th2</sub> )	1.1...2.4 K/W
18 Thermal resistance winding-housing	0.3 K/W
19 Thermal time constant winding	21 s
20 Thermal time constant motor	810 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C
Mechanical data	
23 Max. speed	4000 rpm
Other specifications	
29 Number of pole pairs	10
30 Number of phases	3
31 Weight of motor (with mounting flange made of stainless steel)	741 g
Weight for integration (without mounting flange)	517 g



**Comments**  
<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient (R<sub>th2</sub>) of 1.1 K/W.

- Continuous operation range at R<sub>th2</sub> of 2.4 K/W With mounting flange
- Continuous operation range at R<sub>th2</sub> of 1.1 K/W Installed in a Ø93 mm aluminum housing Mounted on an aluminum plate sized 210x210x10 mm
- Intermittent operation
- Assigned power rating

## Modular system

Values listed in the table are nominal.

**Connection motor** (Cable AWG 16)  
 red Motor winding 1  
 black Motor winding 2  
 white Motor winding 3

**Connection NTC** (Cable AWG 24)  
 purple NTC  
 blue NTC  
 Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K

**Comment**  
 For Torque control data, refer to "Installation Manual" available on maxon online shop.

**Sensors**  
 430\_TSX 85 MAG with commutation signals

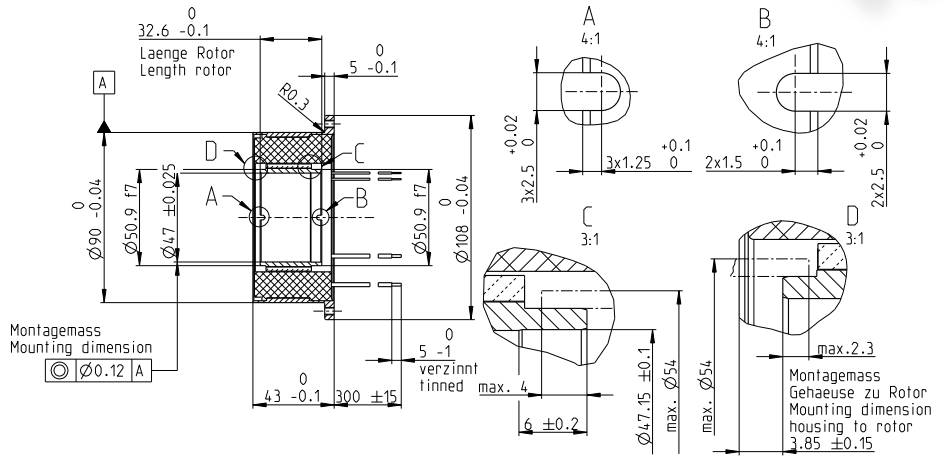
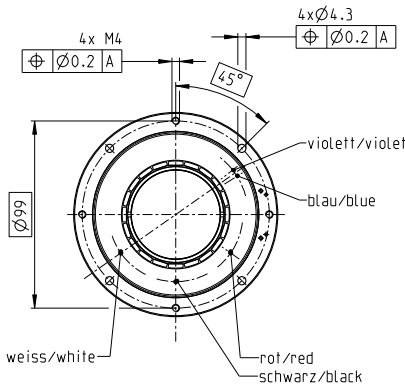
**Variants**  
 maxon integration into customer housing on request.  
 Other coil designs on request.

**Control Electronics**  
 447\_ESCON2 Micro 60/5  
 448\_ESCON2 Module 60/30  
 449\_ESCON2 Compact 60/12  
 450\_ESCON2 Compact 60/30  
 456\_EPOS4 Module 50/15  
 460\_EPOS4 Compact 50/15  
 462\_EPOS4 70/15  
 462\_EPOS4 Disk 60/8 CAN  
 463\_EPOS4 Disk 60/8 EtherCAT  
 463\_EPOS4 Disk 60/12 CAN  
 463\_EPOS4 Disk 60/12 EtherCAT

Frameless BLDC Motors

# EC frameless DT 85 L Ø90 mm, brushless, 680 watt

Dynamic Torque, potted in mounting flange



## M 1:4

- Stock program
- Standard program
- Special program (on request)



sensorless	759875
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Motor data <sup>1</sup>	
<b>Values at nominal voltage</b>	
1 Nominal voltage	V 48
2 No load speed	rpm 1920
3 No load current	mA 204
4 Nominal speed	rpm 1560
5 Nominal torque	mNm 3590
6 Nominal current (max. continuous current)	A 13.4
7 Stall torque	mNm 18600
8 Stall current	A 220
9 Max. efficiency	% 93.9
<b>Characteristics</b>	
10 Terminal resistance phase to phase	Ω 0.218
11 Terminal inductance phase to phase	mH 0.586
12 Torque constant	mNm/A 238
13 Speed constant	rpm/V 40.2
14 Speed/torque gradient	rpm/mNm 0.037
15 Mechanical time constant	ms 0.398
16 Rotor inertia	gcm <sup>2</sup> 1030

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient (R <sub>th2</sub> ) 1.0...2.2 K/W 18 Thermal resistance winding-housing 0.205 K/W 19 Thermal time constant winding 20 s 20 Thermal time constant motor 760 s 21 Ambient temperature -40...+100°C 22 Max. winding temperature +155°C  <b>Mechanical data</b> 23 Max. speed 3000 rpm  <b>Other specifications</b> 29 Number of pole pairs 10 30 Number of phases 3 31 Weight of motor (with mounting flange made of stainless steel) 1040 g Weight for integration (without mounting flange) 765 g		<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient (R <sub>th2</sub> ) of 1.0 K/W.  ■ Continuous operation range at R <sub>th2</sub> of 2.2 K/W With mounting flange ■ Continuous operation range at R <sub>th2</sub> of 1.1 K/W Installed in a Ø93 mm aluminum housing Mounted on an aluminum plate sized 210x210x10 mm □ Intermittent operation — Assigned power rating

Modular system	Details on catalog page 60
Values listed in the table are nominal.  <b>Connection motor</b> (Cable AWG 16) red Motor winding 1 black Motor winding 2 white Motor winding 3  <b>Connection NTC</b> (Cable AWG 24) purple NTC blue NTC Resistance 25°C: 5 kΩ ±1%, beta (25–85°C): 3490 K  <b>Comment</b> For Torque control data, refer to "Installation Manual" available on maxon online shop.	<b>Sensors</b> 430_TSX 85 MAG with commutation signals  <b>Control Electronics</b> 447_ESCON2 Micro 60/5 448_ESCON2 Module 60/30 449_ESCON2 Compact 60/12 450_ESCON2 Compact 60/30 456_EPOS4 Module 50/15 460_EPOS4 Compact 50/15 462_EPOS4 70/15 462_EPOS4 Disk 60/8 CAN 463_EPOS4 Disk 60/8 EtherCAT 463_EPOS4 Disk 60/12 CAN 463_EPOS4 Disk 60/12 EtherCAT
<b>Variants</b> maxon integration into customer housing on request. Other coil designs on request.	

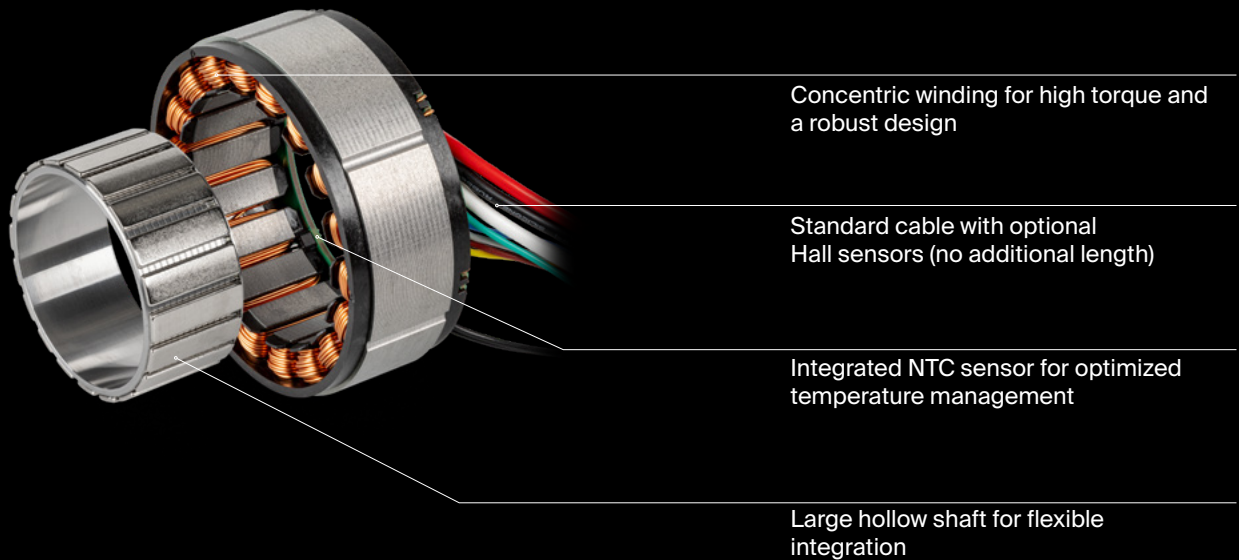


# EC frameless HT

The EC frameless HT motor range provides high torque in a compact and light frameless design and is a versatile and cost-efficient solution. The short axial length enables very compact system designs, while the optimized electromagnetic layout delivers minimal cogging torque and smooth, precise motion in a wide variety of applications.

## Key data

Motor Ø	60...90 mm
Motor length	21...35.4 mm
Power	240...620 W
Nominal torque	up to 2700 mNm
Max. permissible speed	8000 rpm



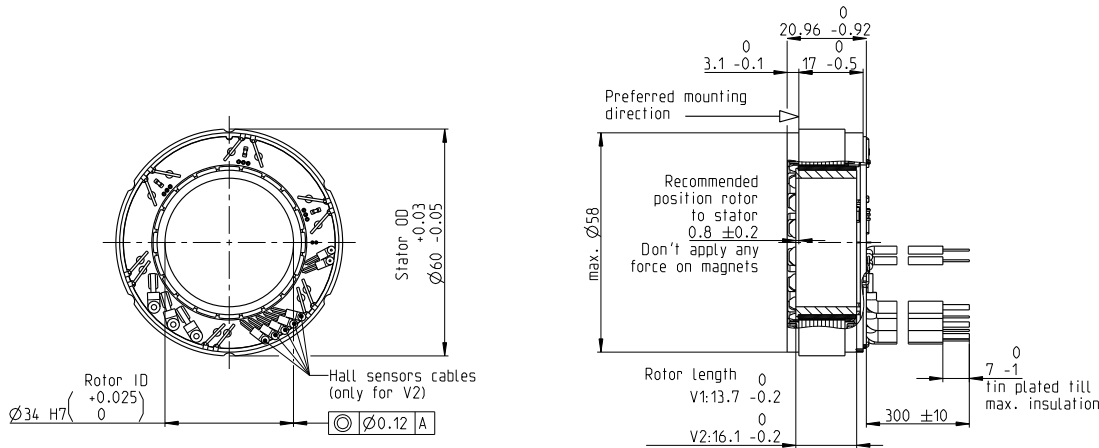
- High torque density
- Cost-optimized design
- Short length with large hollow shaft
- Low cogging torque

# EC frameless HT 60 S $\varnothing 60$ mm, brushless, 240 watt

High Torque

**NEW**

Frameless BLDC Motors



M 1:2

- Stock program
- Standard program
- Special program (on request)

### Part numbers

V1 sensorless	935952
V2 with Hall sensors	935979

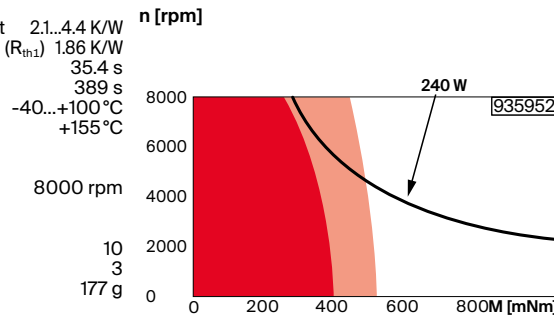
### Motor data<sup>1</sup> (provisional)

Values at nominal voltage		
1	Nominal voltage	V 48
2	No load speed	rpm 5470
3	No load current	mA 259
4	Nominal speed	rpm 4520
5	Nominal torque	mNm 489
6	Nominal current (max. continuous current)	A 5.41
7	Stall torque	mNm 2610
8	Stall current	A 95.2
9	Max. efficiency	% 89.7
Characteristics		
10	Terminal resistance phase to phase	$\Omega$ 0.504
11	Terminal inductance phase to phase	mH 0.45
12	Torque constant	mNm/A 83
13	Speed constant	rpm/V 115
14	Speed/torque gradient	rpm/mNm 0.699
15	Mechanical time constant	ms 0.878
16	Rotor inertia	gcm <sup>2</sup> 120

### Specifications

Thermal data	
17	Thermal resistance housing-ambient 2.1...4.4 K/W
18	Thermal resistance winding-housing ( $R_{th1}$ ) 1.86 K/W
19	Thermal time constant winding 35.4 s
20	Thermal time constant motor 389 s
21	Ambient temperature -40...+100°C
22	Max. winding temperature +155°C
Mechanical data	
23	Max. speed 8000 rpm
Other specifications	
29	Number of pole pairs 10
30	Number of phases 3
31	Weight of motor 177 g

### Operating range



### Comments

<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 2.1 K/W.

- Continuous operation range at  $R_{th2}$  of 4.4 K/W  
Installed in a  $\varnothing 73$  mm aluminum housing
- Continuous operation range at  $R_{th2}$  of 2.1 K/W  
Installed in a  $\varnothing 73$  mm aluminum housing  
Mounted on an aluminum plate sized 150x150x6 mm
- Intermittent operation
- Assigned power rating

Values listed in the table are nominal.

### Connection motor (cable AWG 16)

	V1	V2
red	Motor winding 1	Motor winding 1
black	Motor winding 2	Motor winding 2
white	Motor winding 3	Motor winding 3

### Commutation (cable AWG 26)

yellow	Hall sensors 1
brown	Hall sensors 2
grey	Hall sensors 3
blue	GND
green	$V_{hall}$ 4.5...24 VDC

### Connection NTC (cable AWG 26)

black	NTC
black	NTC
Resistance 25°C: 10 k $\Omega$ $\pm$ 1%, beta (25-85°C): 3480 K	

### Modular system

Details on catalog page 60

### Control Electronics

- 447\_ESCON2 Micro 60/5
- 449\_ESCON2 Compact 60/5
- 454\_EPOS4 Micro 24/5 CAN
- 454\_EPOS4 Micro 24/5 EtherCAT
- 455\_EPOS4 Module 50/5
- 458\_EPOS4 Compact 50/5
- 461\_EPOS4 50/5
- 462\_EPOS4 Disk 60/8

### Variants

Other coil designs on request.

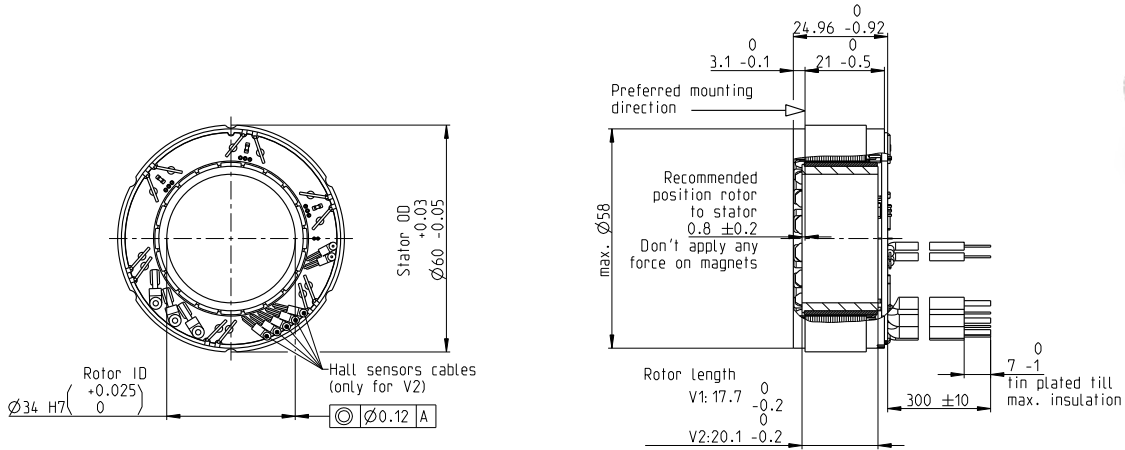
### Comment

For Torque control data, refer to "Installation Manual" available on maxon online shop.

# EC frameless HT 60 M $\varnothing 60$ mm, brushless, 250 watt

High Torque

**NEW**



**M 1:2**

- Stock program
- Standard program
- Special program (on request)

**Part numbers**

V1 sensorless	935982
V2 with Hall sensors	936176

**Motor data<sup>1</sup> (provisional)**

Values at nominal voltage		
1 Nominal voltage	V	48
2 No load speed	rpm	4660
3 No load current	mA	242
4 Nominal speed	rpm	3860
5 Nominal torque	mNm	613
6 Nominal current (max. continuous current)	A	5.78
7 Stall torque	mNm	3440
8 Stall current	A	96.9
9 Max. efficiency	%	90.2
Characteristics		
10 Terminal resistance phase to phase	$\Omega$	0.495
11 Terminal inductance phase to phase	mH	0.47
12 Torque constant	mNm/A	97.6
13 Speed constant	rpm/V	97.8
14 Speed/torque gradient	rpm/mNm	0.496
15 Mechanical time constant	ms	0.811
16 Rotor inertia	gcm <sup>2</sup>	156

**Specifications**

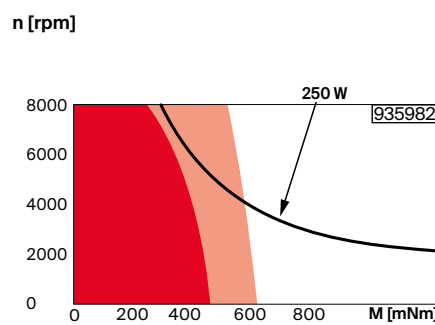
Thermal data	
17 Thermal resistance housing-ambient	2.0...4 K/W
18 Thermal resistance winding-housing ( $R_{th1}$ )	1.65 K/W
19 Thermal time constant winding	36.8 s
20 Thermal time constant motor	440 s
21 Ambient temperature	-40...+100°C
22 Max. winding temperature	+155°C

Mechanical data	
23 Max. speed	8000 rpm

Other specifications	
29 Number of pole pairs	10
30 Number of phases	3
31 Weight of motor	220 g

Values listed in the table are nominal.

**Operating range**



**Comments**

<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 2.0 K/W.

- Continuous operation range at  $R_{th2}$  of 4.0 K/W  
Installed in a  $\varnothing 73$  mm aluminum housing
- Continuous operation range at  $R_{th2}$  of 2.0 K/W  
Installed in a  $\varnothing 73$  mm aluminum housing  
Mounted on an aluminum plate sized 150x150x6 mm
- Intermittent operation
- Assigned power rating

**Connection motor (cable AWG 16)**

V1		V2	
red	Motor winding 1	Motor winding 1	
black	Motor winding 2	Motor winding 2	
white	Motor winding 3	Motor winding 3	

**Commutation (cable AWG 26)**

yellow	Hall sensors 1
brown	Hall sensors 2
grey	Hall sensors 3
blue	GND
green	$V_{hall}$ 4.5...24 VDC

**Connection NTC (cable AWG 26)**

black	NTC
black	NTC

Resistance 25 °C: 10 k $\Omega$   $\pm$ 1%, beta (25–85 °C): 3480 K

**Comment**

For Torque control data, refer to "Installation Manual" available on maxon online shop.

**Modular system**

Details on catalog page 60

**Control Electronics**

- 447\_ESCON2 Micro 60/5
- 449\_ESCON2 Compact 60/5
- 454\_EPOS4 Micro 24/5 CAN
- 454\_EPOS4 Micro 24/5 EtherCAT
- 455\_EPOS4 Module 50/5
- 458\_EPOS4 Compact 50/5
- 461\_EPOS4 50/5
- 462\_EPOS4 Disk 60/8

**Variants**

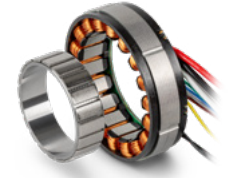
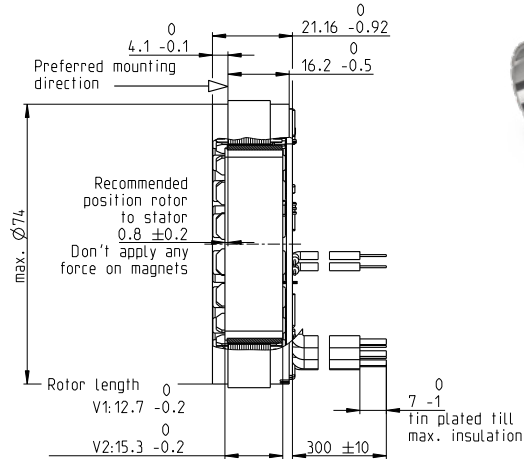
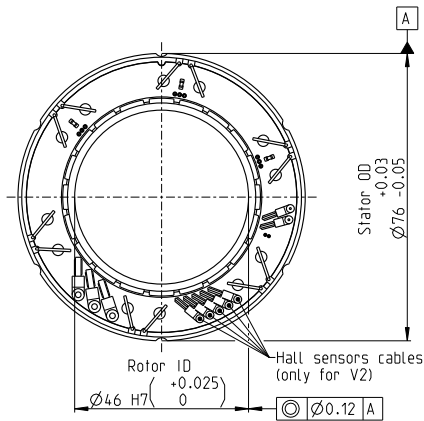
Other coil designs on request.

# EC frameless HT 76 S $\varnothing 76$ mm, brushless, 315 watt

High Torque

**NEW**

Frameless BLDC Motors



M 1:2

- Stock program
- Standard program
- Special program (on request)

### Part numbers

V1 sensorless	908849
V2 with Hall sensors	934887

### Motor data<sup>1</sup> (provisional)

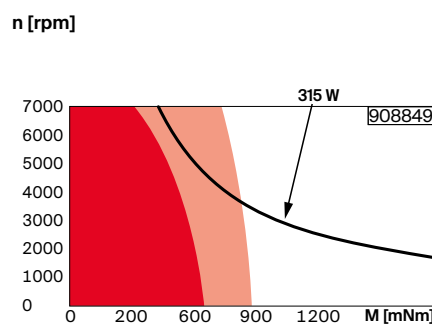
Values at nominal voltage		
1	Nominal voltage	V 48
2	No load speed	rpm 4310
3	No load current	mA 273
4	Nominal speed	rpm 3490
5	Nominal torque	mNm 864
6	Nominal current (max. continuous current)	A 7.26
7	Stall torque	mNm 4190
8	Stall current	A 145
9	Max. efficiency	% 91.4
Characteristics		
10	Terminal resistance phase to phase	$\Omega$ 0.332
11	Terminal inductance phase to phase	mH 0.51
12	Torque constant	mNm/A 106
13	Speed constant	rpm/V 90.5
14	Speed/torque gradient	rpm/mNm 0.285
15	Mechanical time constant	ms 0.74
16	Rotor inertia	gcm <sup>2</sup> 248

### Specifications

Thermal data	
17	Thermal resistance housing-ambient 1.6...3.5 K/W
18	Thermal resistance winding-housing ( $R_{th1}$ ) 1.65 K/W
19	Thermal time constant winding 48.7 s
20	Thermal time constant motor 3070 s
21	Ambient temperature -40...+100°C
22	Max. winding temperature +155°C
Mechanical data	
23	Max. speed 7000 rpm
Other specifications	
29	Number of pole pairs 10
30	Number of phases 3
31	Weight of motor 244 g

Values listed in the table are nominal.

### Operating range



### Comments

<sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 1.6 K/W.

- Continuous operation range at  $R_{th2}$  of 3.5 K/W  
Installed in a  $\varnothing 89$  mm aluminum housing
- Continuous operation range at  $R_{th2}$  of 1.6 K/W  
Installed in a  $\varnothing 89$  mm aluminum housing  
Mounted on an aluminum plate sized 190x190x10 mm
- Intermittent operation
- Assigned power rating

### Connection motor (cable AWG 16)

	V1	V2
red	Motor winding 1	Motor winding 1
black	Motor winding 2	Motor winding 2
white	Motor winding 3	Motor winding 3

### Commutation (cable AWG 26)

yellow	Hall sensors 1
brown	Hall sensors 2
grey	Hall sensors 3
blue	GND
green	$V_{hall}$ 4.5...24 VDC

### Connection NTC (cable AWG 26)

black	NTC
black	NTC

Resistance 25°C: 10 k $\Omega$   $\pm$ 1%, beta (25-85°C): 3480 K

### Modular system

Details on catalog page 60

### Control Electronics

- 447\_ESCON2 Micro 60/5
- 448\_ESCON2 Module 60/12
- 449\_ESCON2 Compact 60/5
- 449\_ESCON2 Compact 60/12
- 450\_ESCON2 60/12
- 455\_EPOS4 Module 50/8
- 459\_EPOS4 Compact 50/8
- 462\_EPOS4 70/15
- 462\_EPOS4 Disk 60/8

### Variants

Other coil designs on request.

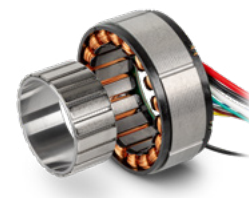
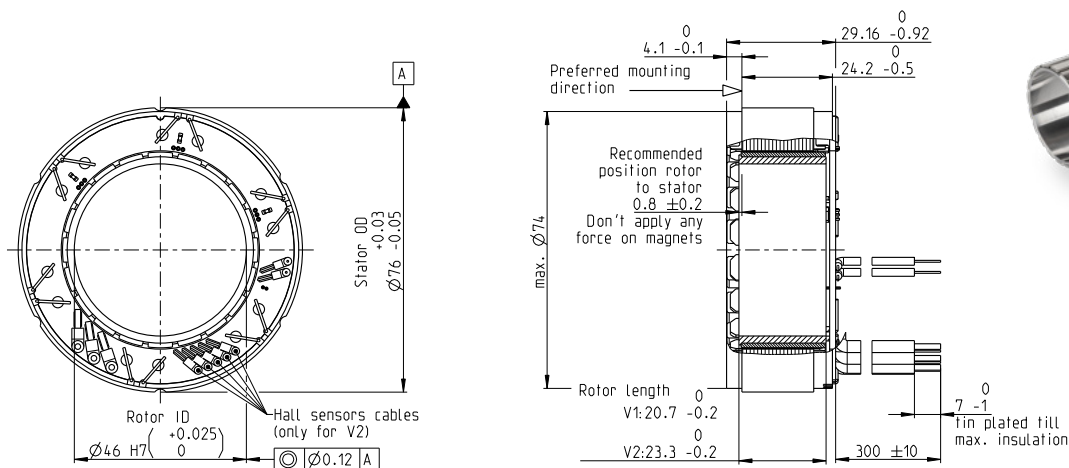
### Comment

For Torque control data, refer to "Installation Manual" available on maxon online shop.

# EC frameless HT 76 M $\varnothing 76$ mm, brushless, 430 watt

High Torque

**NEW**



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part numbers	
V1 sensorless	934904
V2 with Hall sensors	934928

Motor data <sup>1</sup> (provisional)			
Values at nominal voltage			
1	Nominal voltage	V	48
2	No load speed	rpm	4010
3	No load current	mA	379
4	Nominal speed	rpm	3350
5	Nominal torque	mNm	1230
6	Nominal current (max. continuous current)	A	9.82
7	Stall torque	mNm	6540
8	Stall current	A	223
9	Max. efficiency	%	91.8
Characteristics			
10	Terminal resistance phase to phase	$\Omega$	0.215
11	Terminal inductance phase to phase	mH	0.349
12	Torque constant	mNm/A	114
13	Speed constant	rpm/V	84.1
14	Speed/torque gradient	rpm/mNm	0.16
15	Mechanical time constant	ms	0.684
16	Rotor inertia	gcm <sup>2</sup>	409

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient 1.5...2.9 K/W 18 Thermal resistance winding-housing ( $R_{th1}$ ) 1.26 K/W 19 Thermal time constant winding 49.7 s 20 Thermal time constant motor 2550 s 21 Ambient temperature -40...+100°C 22 Max. winding temperature +155°C  <b>Mechanical data</b> 23 Max. speed 7000 rpm  <b>Other specifications</b> 29 Number of pole pairs 10 30 Number of phases 3 31 Weight of motor 367 g	<b>Operating range</b> 	<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 1.5 K/W.  ■ Continuous operation range at $R_{th2}$ of 2.9 K/W Installed in a $\varnothing 89$ mm aluminum housing ■ Continuous operation range at $R_{th2}$ of 1.5 K/W Installed in a $\varnothing 89$ mm aluminum housing Mounted on an aluminum plate sized 190x190x10 mm □ Intermittent operation — Assigned power rating

Values listed in the table are nominal.

- Connection motor** (cable AWG 16)
- |       | V1              | V2              |
|-------|-----------------|-----------------|
| red   | Motor winding 1 | Motor winding 1 |
| black | Motor winding 2 | Motor winding 2 |
| white | Motor winding 3 | Motor winding 3 |
- Commutation** (cable AWG 26)
- |        |                         |
|--------|-------------------------|
| yellow | Hall sensors 1          |
| brown  | Hall sensors 2          |
| grey   | Hall sensors 3          |
| blue   | GND                     |
| green  | $V_{hall}$ 4.5...24 VDC |
- Connection NTC** (cable AWG 26)
- |       |     |
|-------|-----|
| black | NTC |
| black | NTC |
- Resistance 25°C: 10 k $\Omega$   $\pm$ 1%, beta (25-85°C): 3480 K

Modular system	Details on catalog page 60
	<b>Control Electronics</b>
	447_ESCON2 Micro 60/5
	448_ESCON2 Module 60/12
	449_ESCON2 Compact 60/5
	449_ESCON2 Compact 60/12
	450_ESCON2 60/12
	455_EPOS4 Module 50/8
	459_EPOS4 Compact 50/8
	462_EPOS4 70/15
	462_EPOS4 Disk 60/8

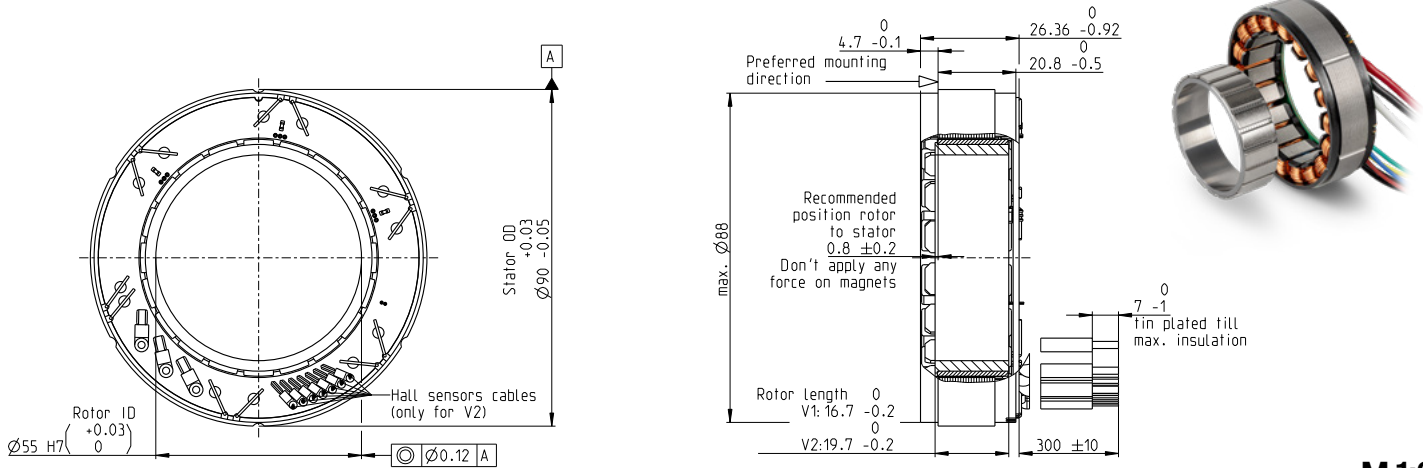
**Variants**  
Other coil designs on request.

# EC frameless HT 90 S $\varnothing 90$ mm, brushless, 500 watt

High Torque

**NEW**

Frameless BLDC Motors



M 1:2

- Stock program
- Standard program
- Special program (on request)

Part numbers	
V1 sensorless	937560
V2 with Hall sensors	937587

Motor data <sup>1</sup> (provisional)			
Values at nominal voltage			
1	Nominal voltage	V	48
2	No load speed	rpm	3230
3	No load current	mA	372
4	Nominal speed	rpm	2710
5	Nominal torque	mNm	1760
6	Nominal current (max. continuous current)	A	11.3
7	Stall torque	mNm	7310
8	Stall current	A	267
9	Max. efficiency	%	92.6
Characteristics			
10	Terminal resistance phase to phase	$\Omega$	0.18
11	Terminal inductance phase to phase	mH	0.37
12	Torque constant	mNm/A	141
13	Speed constant	rpm/V	67.7
14	Speed/torque gradient	rpm/mNm	0.086
15	Mechanical time constant	ms	0.63
16	Rotor inertia	gcm <sup>2</sup>	696

Specifications	Operating range	Comments
<b>Thermal data</b> 17 Thermal resistance housing-ambient 14...26 K/W 18 Thermal resistance winding-housing ( $R_{th1}$ ) 1.26 K/W 19 Thermal time constant winding 66.5 s 20 Thermal time constant motor 577 s 21 Ambient temperature $-40...+100^{\circ}\text{C}$ 22 Max. winding temperature $+155^{\circ}\text{C}$  <b>Mechanical data</b> 23 Max. speed 5000 rpm  <b>Other specifications</b> 29 Number of pole pairs 10 30 Number of phases 3 31 Weight of motor 444 g Values listed in the table are nominal.		<sup>1</sup> The nominal data refer to a thermal resistance, housing-ambient ( $R_{th2}$ ) of 1.4 K/W.  ■ Continuous operation range at $R_{th2}$ of 2.6 K/W Installed in a $\varnothing 103$ mm aluminum housing ■ Continuous operation range at $R_{th2}$ of 1.4 K/W Installed in a $\varnothing 103$ mm aluminum housing Mounted on an aluminum plate sized 225x225x10 mm □ Intermittent operation — Assigned power rating

Connection motor (cable AWG 14)		
red	V1 Motor winding 1	V2 Motor winding 1
black	Motor winding 2	Motor winding 2
white	Motor winding 3	Motor winding 3
Commutation (cable AWG 26)		
yellow	Hall sensors 1	
brown	Hall sensors 2	
grey	Hall sensors 3	
blue	GND	
green	$V_{hall}$ 4.5...24 VDC	
Connection NTC (cable AWG 26)		
black	NTC	
black	NTC	
Resistance 25°C: 10 k $\Omega$ $\pm 1\%$ , beta (25–85°C): 3480 K		

Modular system	Details on catalog page 60
	<b>Control Electronics</b>
	448_ESCON2 Module 60/30
	449_ESCON2 Compact 60/12
	450_ESCON2 Compact 60/30
	450_ESCON2 60/12
	456_EPOS4 Module 50/15
	457_EPOS4 Module 60/20 STO
	460_EPOS4 Compact 50/15
	461_EPOS4 Compact 60/20 STO
	462_EPOS4 70/15
	463_EPOS4 Disk 60/12

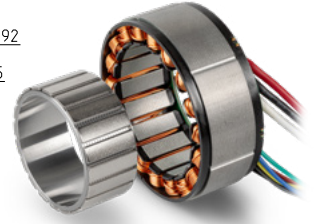
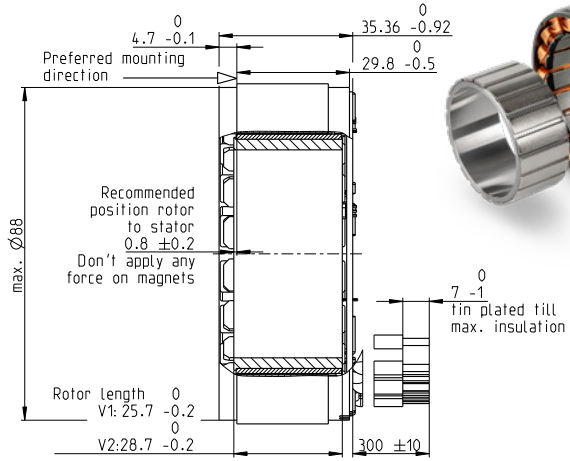
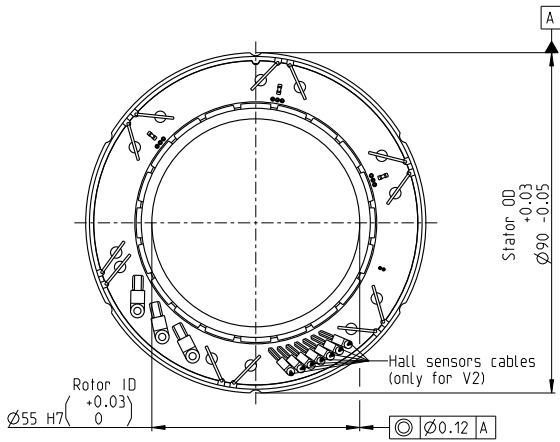
**Variants**  
Other coil designs on request.

**Comment**  
For Torque control data, refer to "Installation Manual" available on maxon online shop.

# EC frameless HT 90 M Ø90 mm, brushless, 620 watt

High Torque

**NEW**



**M 1:2**

- Stock program
- Standard program
- Special program (on request)

Part numbers	
V1 sensorless	937604
V2 with Hall sensors	937612

**Motor data<sup>1</sup> (provisional)**

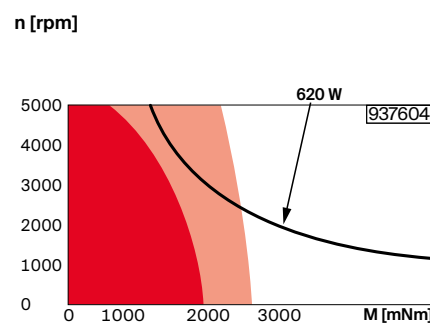
Values at nominal voltage			
1	Nominal voltage	V	48
2	No load speed	rpm	2590
3	No load current	mA	452
4	Nominal speed	rpm	2190
5	Nominal torque	mNm	2700
6	Nominal current (max. continuous current)	A	14.1
7	Stall torque	mNm	10200
8	Stall current	A	321
9	Max. efficiency	%	92.5
Characteristics			
10	Terminal resistance phase to phase	Ω	0.149
11	Terminal inductance phase to phase	mH	0.338
12	Torque constant	mNm/A	176
13	Speed constant	rpm/V	54.3
14	Speed/torque gradient	rpm/mNm	0.046
15	Mechanical time constant	ms	0.521
16	Rotor inertia	gcm <sup>2</sup>	1080

**Specifications**

Thermal data		
17	Thermal resistance housing-ambient	1.0...2.3 K/W
18	Thermal resistance winding-housing (R <sub>th1</sub> )	1.08 K/W
19	Thermal time constant winding	75 s
20	Thermal time constant motor	728 s
21	Ambient temperature	-40...+100°C
22	Max. winding temperature	+155°C
Mechanical data		
23	Max. speed	5000 rpm
Other specifications		
29	Number of pole pairs	10
30	Number of phases	3
31	Weight of motor	633 g

Values listed in the table are nominal.

**Operating range**



**Comments**

- <sup>1</sup>The nominal data refer to a thermal resistance, housing-ambient (R<sub>th2</sub>) of 1.0 K/W.
- Continuous operation range at R<sub>th2</sub> of 2.3 K/W  
Installed in a Ø103 mm aluminum housing
  - Continuous operation range at R<sub>th2</sub> of 1.0 K/W  
Installed in a Ø103 mm aluminum housing  
Mounted on an aluminum plate sized 225x225x10 mm
  - Intermittent operation
  - Assigned power rating

**Connection motor (cable AWG 14)**

	V1	V2
red	Motor winding 1	Motor winding 1
black	Motor winding 2	Motor winding 2
white	Motor winding 3	Motor winding 3

**Commutation (cable AWG 26)**

yellow	Hall sensors 1
brown	Hall sensors 2
grey	Hall sensors 3
blue	GND
green	V <sub>hall</sub> 4.5...24 VDC

**Connection NTC (cable AWG 26)**

black NTC  
black NTC  
Resistance 25 °C: 10 kΩ ±1%, beta (25–85 °C): 3480 K

**Modular system**

Details on catalog page 60

**Variants**  
Other coil designs on request.

**Control Electronics**

- 448\_ESCON2 Module 60/12
- 448\_ESCON2 Module 60/30
- 449\_ESCON2 Compact 60/12
- 450\_ESCON2 Compact 60/30
- 450\_ESCON2 60/12
- 456\_EPOS4 Module 50/15
- 457\_EPOS4 Module 60/20 STO
- 460\_EPOS4 Compact 50/15
- 461\_EPOS4 Compact 60/20 STO
- 462\_EPOS4 70/15
- 463\_EPOS4 Disk 60/12

