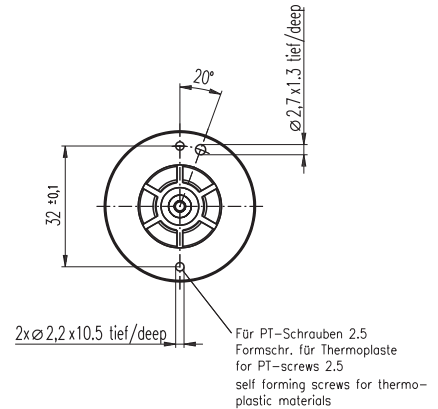
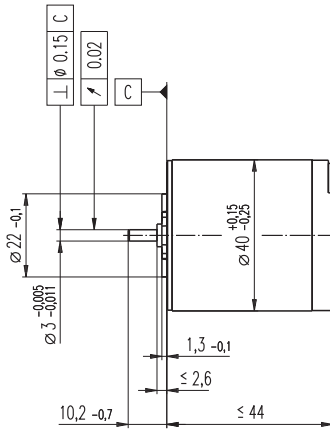
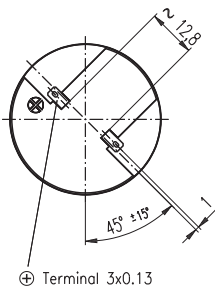


# F 2140 Ø40 mm, Precious Metal Brushes CLL, 4 Watt, CE approved

maxon special program



M 1:2

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

### Order Number

2140. ... -22.112-050 (Insert winding number)

Winding number

|     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 931 | 932 | 933 | 934 | 935 | 936 | 937 | 939 |
|-----|-----|-----|-----|-----|-----|-----|-----|

| Motor Data                       |   | 931              | 932   | 933   | 934   | 935   | 936   | 937   | 939   |       |
|----------------------------------|---|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Values at nominal voltage</b> |   |                  |       |       |       |       |       |       |       |       |
| 1                                | Nominal voltage                           | V                | 6.0   | 9.0   | 9.0   | 12.0  | 15.0  | 18.0  | 24.0  | 36.0  |
| 2                                | No load speed                             | rpm              | 3940  | 4630  | 3740  | 4090  | 4080  | 3850  | 4110  | 4130  |
| 3                                | No load current                           | mA               | 23.1  | 20.1  | 14.2  | 12.3  | 9.77  | 7.43  | 6.19  | 4.17  |
| 4                                | Nominal speed                             | rpm              | 2270  | 2990  | 2080  | 2430  | 2410  | 2160  | 2420  | 2400  |
| 5                                | Nominal torque (max. continuous torque)   | mNm              | 13.8  | 13.9  | 13.9  | 13.9  | 13.8  | 13.6  | 13.6  | 13.3  |
| 6                                | Nominal current (max. continuous current) | A                | 0.974 | 0.773 | 0.624 | 0.508 | 0.404 | 0.314 | 0.251 | 0.164 |
| 7                                | Stall torque                              | mNm              | 32.6  | 39.5  | 31.6  | 34.2  | 33.9  | 31.2  | 33.1  | 31.8  |
| 8                                | Starting current                          | A                | 2.26  | 2.15  | 1.39  | 1.23  | 0.974 | 0.706 | 0.601 | 0.387 |
| 9                                | Max. efficiency                           | %                | 81    | 82    | 81    | 82    | 81    | 81    | 81    | 81    |
| <b>Characteristics</b>           |   |                  |       |       |       |       |       |       |       |       |
| 10                               | Terminal resistance                       | Ω                | 2.65  | 4.19  | 6.47  | 9.73  | 15.4  | 25.5  | 40.0  | 93.0  |
| 11                               | Terminal inductance                       | mH               | 0.341 | 0.558 | 0.853 | 1.27  | 1.99  | 3.21  | 5.02  | 11.2  |
| 12                               | Torque constant                           | mNm / A          | 14.4  | 18.4  | 22.7  | 27.8  | 34.8  | 44.1  | 55.2  | 82.3  |
| 13                               | Speed constant                            | rpm / V          | 664   | 519   | 420   | 344   | 275   | 216   | 173   | 116   |
| 14                               | Speed / torque gradient                   | rpm / mNm        | 122   | 118   | 120   | 121   | 122   | 125   | 125   | 131   |
| 15                               | Mechanical time constant                  | ms               | 32.2  | 31.9  | 31.9  | 31.9  | 32.0  | 32.1  | 32.1  | 32.5  |
| 16                               | Rotor inertia                             | gcm <sup>2</sup> | 25.1  | 25.7  | 25.5  | 25.3  | 25.1  | 24.6  | 24.5  | 23.6  |

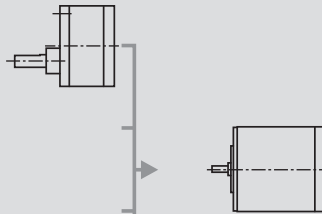
| Specifications  | Operating Range   | Comments  |
|---|---|---|
| <b>Thermal data</b><br>17 Thermal resistance housing-ambient 10.4 K / W<br>18 Thermal resistance winding-housing 8.8 K / W<br>19 Thermal time constant winding 45.5 s<br>20 Thermal time constant winding 988 s<br>21 Ambient temperature -20 ... +65°C<br>22 Max. permissible winding temperature +85°C<br><br><b>Mechanical data (sleeve bearings)</b><br>23 Max. permissible speed 6400 rpm<br>24 Axial play 0.2 - 0.3 mm<br>25 Radial play 0.025 mm<br>26 Max. axial load (dynamic) 0.5 N<br>27 Max. force for press fits (static) 50 N<br>28 Max. radial loading, 5 mm from flange 2.5 N | <b>Operating Range</b><br>n [rpm]<br><br>M [mNm]<br>I [A] | <b>Comments</b><br><span style="color: red;">■</span> <b>Continuous operation</b><br>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.<br>= Thermal limit.<br><br><span style="border: 1px solid black; display: inline-block; width: 10px; height: 10px;"></span> <b>Short term operation</b><br>The motor may be briefly overloaded (recurring).<br><br>— <b>Assigned power rating</b> |

- Other specifications**
- 29 Number of pole pairs 1
  - 30 Number of commutator segments 7
  - 31 Weight of motor 190 g
- CLL = Capacitor Long Life
- Values listed in the table are nominal.  
Explanation of the figures on page 49.
- Option**  
Ball bearings in place of sleeve bearings

### maxon Modular System

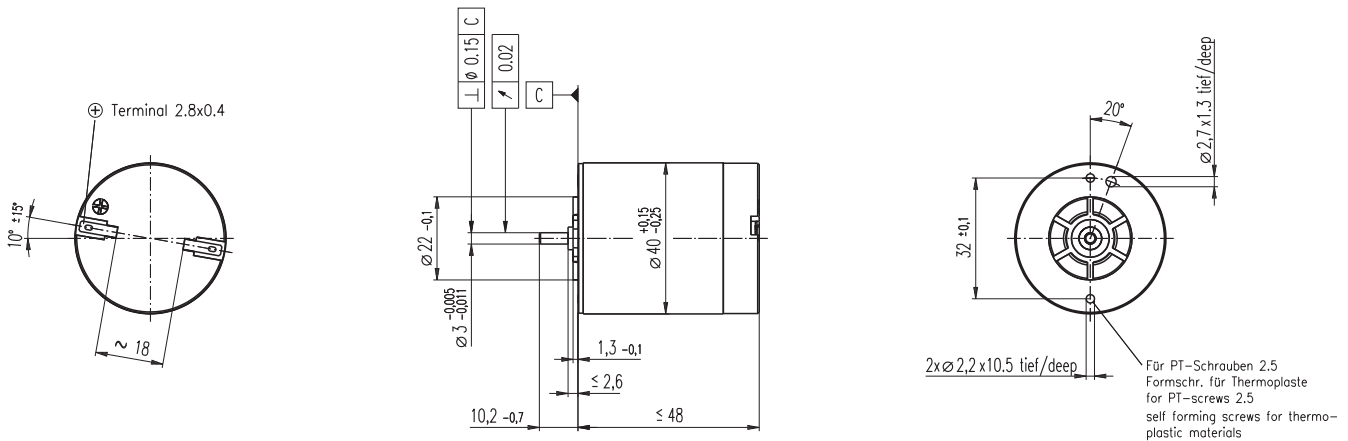
Overview on page 16 - 21

**Spur Gearhead**  
 Ø38 mm  
 0.1 - 0.6 Nm  
 Page 237



**Recommended Electronics:**  
 LSC 30/2 Page 282  
 Notes 18

# F 2140 Ø40 mm, Graphite Brushes, 6 Watt, CE approved



## M 1:2

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

### Order Number

2140. ... -22.116-050 (Insert winding number)

Winding number

|     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 931 | 932 | 933 | 934 | 935 | 936 | 937 | 939 |
|-----|-----|-----|-----|-----|-----|-----|-----|

### Motor Data

| Values at nominal voltage |   | 931              | 932   | 933   | 934   | 935   | 936   | 937   | 939   |       |
|---------------------------|---|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1                         | Nominal voltage                           | V                | 6.0   | 9.0   | 9.0   | 12.0  | 15.0  | 18.0  | 24.0  | 36.0  |
| 2                         | No load speed                             | rpm              | 3550  | 4320  | 3500  | 3880  | 3910  | 3710  | 3990  | 4030  |
| 3                         | No load current                           | mA               | 53.3  | 45.6  | 33.5  | 28.7  | 23.0  | 17.7  | 14.6  | 9.87  |
| 4                         | Nominal speed                             | rpm              | 1900  | 2720  | 1880  | 2270  | 2300  | 2080  | 2360  | 2380  |
| 5                         | Nominal torque (max. continuous torque)   | mNm              | 11.1  | 11.7  | 12.1  | 12.3  | 12.5  | 12.5  | 12.6  | 12.5  |
| 6                         | Nominal current (max. continuous current) | A                | 0.815 | 0.672 | 0.560 | 0.466 | 0.377 | 0.298 | 0.240 | 0.160 |
| 7                         | Stall torque                              | mNm              | 26.3  | 34.4  | 27.9  | 31.2  | 31.6  | 29.5  | 31.9  | 31.1  |
| 8                         | Starting current                          | A                | 1.83  | 1.87  | 1.23  | 1.13  | 0.909 | 0.669 | 0.578 | 0.378 |
| 9                         | Max. efficiency                           | %                | 61    | 66    | 65    | 68    | 69    | 69    | 70    | 70    |
| Characteristics           |   |                  | 931   | 932   | 933   | 934   | 935   | 936   | 937   | 939   |
| 10                        | Terminal resistance                       | Ω                | 3.28  | 4.81  | 7.35  | 10.7  | 16.5  | 26.9  | 41.5  | 95.2  |
| 11                        | Terminal inductance                       | mH               | 0.341 | 0.558 | 0.853 | 1.27  | 1.99  | 3.21  | 5.02  | 11.2  |
| 12                        | Torque constant                           | mNm / A          | 14.4  | 18.4  | 22.7  | 27.8  | 34.8  | 44.1  | 55.2  | 82.3  |
| 13                        | Speed constant                            | rpm / V          | 664   | 519   | 420   | 344   | 275   | 216   | 173   | 116   |
| 14                        | Speed / torque gradient                   | rpm / mNm        | 152   | 136   | 136   | 132   | 130   | 132   | 130   | 134   |
| 15                        | Mechanical time constant                  | ms               | 37.9  | 34.9  | 34.4  | 33.3  | 32.6  | 32.2  | 31.7  | 31.5  |
| 16                        | Rotor inertia                             | gcm <sup>2</sup> | 23.9  | 24.5  | 24.2  | 24.0  | 23.9  | 23.3  | 23.2  | 22.4  |

### Specifications

| Thermal data                      |                                       |               |
|-----------------------------------|---------------------------------------|---------------|
| 17                                | Thermal resistance housing-ambient    | 10.4 K / W    |
| 18                                | Thermal resistance winding-housing    | 8.8 K / W     |
| 19                                | Thermal time constant winding         | 45.5 s        |
| 20                                | Thermal time constant winding         | 988 s         |
| 21                                | Ambient temperature                   | -20 ... +65°C |
| 22                                | Max. permissible winding temperature  | +85°C         |
| Mechanical data (sleeve bearings) |                                       |               |
| 23                                | Max. permissible speed                | 11000 rpm     |
| 24                                | Axial play                            | 0.2 - 0.3 mm  |
| 25                                | Radial play                           | 0.014 mm      |
| 26                                | Max. axial load (dynamic)             | 0.5 N         |
| 27                                | Max. force for press fits (static)    | 50 N          |
| 28                                | Max. radial loading, 5 mm from flange | 2.5 N         |

| Mechanical data (ball bearings) |                                       |              |
|---------------------------------|---------------------------------------|--------------|
| 23                              | Max. permissible speed                | 11000 rpm    |
| 24                              | Axial play                            | 0.2 - 0.3 mm |
| 25                              | Radial play                           | 0.025 mm     |
| 26                              | Max. axial load (dynamic)             | 1.5 N        |
| 27                              | Max. force for press fits (static)    | 50 N         |
| 28                              | Max. radial loading, 5 mm from flange | 7.5 N        |

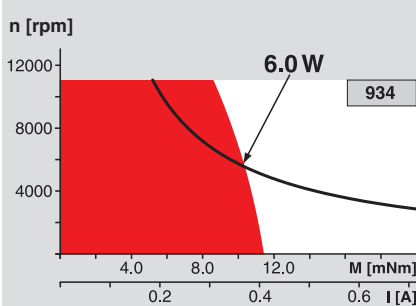
| Other specifications |                               |       |
|----------------------|-------------------------------|-------|
| 29                   | Number of pole pairs          | 1     |
| 30                   | Number of commutator segments | 7     |
| 31                   | Weight of motor               | 190 g |

Values listed in the table are nominal.  
Explanation of the figures on page 49.

### Option

Ball bearings in place of sleeve bearings

### Operating Range



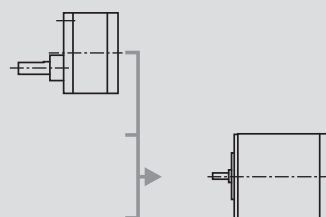
### Comments

- Continuous operation**  
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.  
= Thermal limit.
- Short term operation**  
The motor may be briefly overloaded (recurring).
- Assigned power rating**

### maxon Modular System

Overview on page 16 - 21

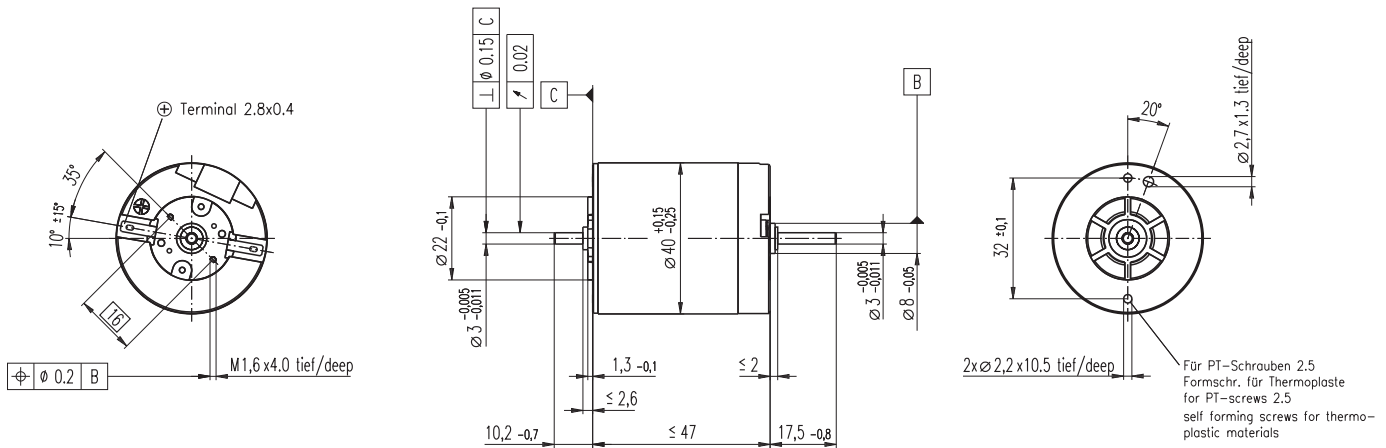
**Spur Gearhead**  
Ø38 mm  
0.1 - 0.6 Nm  
Page 237



**Recommended Electronics:**  
LSC 30/2 Page 282  
Notes 18

# F 2140 $\varnothing 40$ mm, Graphite Brushes, 6 Watt, CE approved

maxon special program



**M 1:2**

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

### Order Number

2140. ... -58.236-050 (Insert winding number)

Winding number

|     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|
| 931 | 932 | 933 | 934 | 935 | 936 | 937 | 939 |
|-----|-----|-----|-----|-----|-----|-----|-----|

### Motor Data

| Values at nominal voltage |   | 931              | 932   | 933   | 934   | 935   | 936   | 937   | 939   |       |
|---------------------------|---|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| 1                         | Nominal voltage                           | V                | 6.0   | 9.0   | 9.0   | 12.0  | 15.0  | 18.0  | 24.0  | 36.0  |
| 2                         | No load speed                             | rpm              | 3540  | 4310  | 3490  | 3880  | 3900  | 3710  | 3980  | 4030  |
| 3                         | No load current                           | mA               | 55.5  | 46.6  | 34.9  | 29.7  | 23.7  | 18.4  | 15.1  | 10.2  |
| 4                         | Nominal speed                             | rpm              | 1900  | 2730  | 1880  | 2270  | 2300  | 2080  | 2360  | 2380  |
| 5                         | Nominal torque (max. continuous torque)   | mNm              | 11.0  | 11.6  | 12.0  | 12.2  | 12.4  | 12.5  | 12.5  | 12.4  |
| 6                         | Nominal current (max. continuous current) | A                | 0.814 | 0.671 | 0.559 | 0.465 | 0.377 | 0.298 | 0.240 | 0.160 |
| 7                         | Stall torque                              | mNm              | 26.3  | 34.4  | 27.9  | 31.2  | 31.6  | 29.5  | 31.9  | 31.1  |
| 8                         | Starting current                          | A                | 1.83  | 1.87  | 1.23  | 1.13  | 0.909 | 0.669 | 0.578 | 0.378 |
| 9                         | Max. efficiency                           | %                | 61    | 66    | 65    | 67    | 68    | 68    | 69    | 70    |
| Characteristics           |   | 931              | 932   | 933   | 934   | 935   | 936   | 937   | 939   |       |
| 10                        | Terminal resistance                       | $\Omega$         | 3.28  | 4.81  | 7.35  | 10.7  | 16.5  | 26.9  | 41.5  | 95.2  |
| 11                        | Terminal inductance                       | mH               | 0.341 | 0.558 | 0.853 | 1.27  | 1.99  | 3.21  | 5.02  | 11.2  |
| 12                        | Torque constant                           | mNm / A          | 14.4  | 18.4  | 22.7  | 27.8  | 34.8  | 44.1  | 55.2  | 82.3  |
| 13                        | Speed constant                            | rpm / V          | 664   | 519   | 420   | 344   | 275   | 216   | 173   | 116   |
| 14                        | Speed / torque gradient                   | rpm / mNm        | 152   | 136   | 136   | 132   | 130   | 132   | 130   | 134   |
| 15                        | Mechanical time constant                  | ms               | 37.9  | 34.9  | 34.4  | 33.3  | 32.6  | 32.2  | 31.7  | 31.5  |
| 16                        | Rotor inertia                             | gcm <sup>2</sup> | 23.9  | 24.5  | 24.2  | 24.0  | 23.9  | 23.3  | 23.2  | 22.4  |

### Specifications

| Thermal data                    |  |               |
|---------------------------------|--|---------------|
| 17                              | Thermal resistance housing-ambient                           | 10.4 K / W    |
| 18                              | Thermal resistance winding-housing                           | 8.8 K / W     |
| 19                              | Thermal time constant winding                                | 45.5 s        |
| 20                              | Thermal time constant winding                                | 988 s         |
| 21                              | Ambient temperature  | -20 ... +65°C |
| 22                              | Max. permissible winding temperature                         | +85°C         |
| Mechanical data (ball bearings) |  |               |
| 23                              | Max. permissible speed                                       | 11000 rpm     |
| 24                              | Axial play   | 0.2 - 0.3 mm  |
| 25                              | Radial play  | 0.025 mm      |
| 26                              | Max. axial load (dynamic)                                    | 1.5 N         |
| 27                              | Max. force for press fits (static) (static, shaft supported) | 50 N / 700 N  |
| 28                              | Max. radial loading, 5 mm from flange                        | 7.5 N         |

### Other specifications

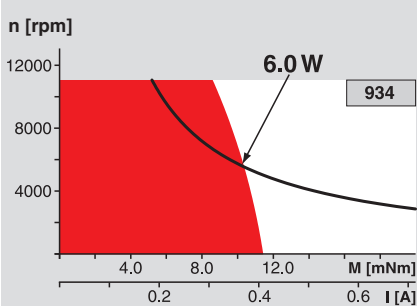
|    |                               |       |
|----|-------------------------------|-------|
| 29 | Number of pole pairs          | 1     |
| 30 | Number of commutator segments | 7     |
| 31 | Weight of motor               | 190 g |

Values listed in the table are nominal.  
Explanation of the figures on page 49.

### Option

Preloaded ball bearings

### Operating Range



### Comments

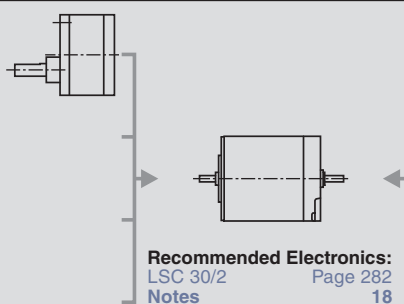
- **Continuous operation**  
In observation of above listed thermal resistance (lines 17 and 18) the maximum permissible winding temperature will be reached during continuous operation at 25°C ambient.  
= Thermal limit.
- Short term operation**  
The motor may be briefly overloaded (recurring).
- **Assigned power rating**

### maxon Modular System

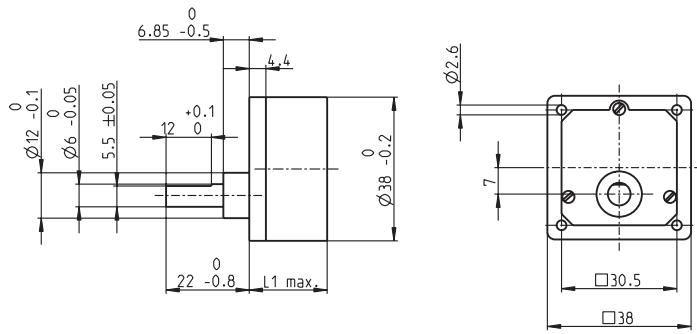
**Spur Gearhead**  
 $\varnothing 38$  mm  
0.1 - 0.6 Nm  
Page 237

### Overview on page 16 - 21

**Encoder Enc**  
22 mm  
100 CPT, 2 channels  
Page 265



# Spur Gearhead GS 38 A $\varnothing 38$ mm, 0.1 - 0.6 Nm



## Technical Data

|                                       |                 |
|---------------------------------------|-----------------|
| Spur Gearhead                         | straight teeth  |
| Output shaft                          | stainless steel |
| Bearing at output                     | sleeve bearing  |
| Radial play, 12 mm from flange        | max. 0.1 mm     |
| Axial play                            | 0.03 - 0.2 mm   |
| Max. radial load, 12 mm from flange   | 50 N            |
| Max. permissible axial load           | 30 N            |
| Max. permissible force for press fits | 500 N           |
| Recommended input speed               | < 5000 rpm      |
| Recommended temperature range         | -5 ... +80°C    |

M 1:2

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

## Order Number

| Gearhead Data   | Order Number |        |        |        |        |         |         |         |         |  |
|---|--------------|--------|--------|--------|--------|---------|---------|---------|---------|--|
|   | 110451       | 110452 | 110453 | 110454 | 110455 | 110456  | 110457  | 110458  | 110459  |  |
| 1 Reduction   | 6 : 1        | 10 : 1 | 18 : 1 | 30 : 1 | 60 : 1 | 100 : 1 | 200 : 1 | 500 : 1 | 900 : 1 |  |
| 2 Reduction absolute                                  | 6            | 10     | 18     | 30     | 60     | 100     | 200     | 500     | 900     |  |
| 3 Max. motor shaft diameter mm                        | 3            | 3      | 3      | 3      | 3      | 3       | 3       | 3       | 3       |  |
| 4 Number of stages                                    | 2            | 2      | 3      | 3      | 4      | 4       | 5       | 6       | 6       |  |
| 5 Max. continuous torque Nm                           | 0.1          | 0.1    | 0.2    | 0.2    | 0.3    | 0.3     | 0.6     | 0.6     | 0.6     |  |
| 6 Intermittently permissible torque at gear output Nm | 0.3          | 0.3    | 0.6    | 0.6    | 0.9    | 0.9     | 1.8     | 1.8     | 1.8     |  |
| 12 Sense of rotation, drive to output                 | =            | =      | ≠      | ≠      | =      | =       | ≠       | =       | =       |  |
| 7 Max. efficiency %                                   | 81           | 81     | 73     | 73     | 66     | 66      | 59      | 53      | 53      |  |
| 8 Weight g  | 55           | 55     | 60     | 60     | 65     | 65      | 70      | 75      | 75      |  |
| 9 Average backlash no load °                          | 1.0          | 1.0    | 1.5    | 1.5    | 2.0    | 2.0     | 2.5     | 3.0     | 3.0     |  |
| 10 Mass inertia gcm <sup>2</sup>                      | 0.7          | 0.6    | 0.4    | 0.4    | 0.3    | 0.3     | 0.2     | 0.2     | 0.2     |  |
| 11 Gearhead length L1* mm                             | 20.6         | 20.6   | 23.1   | 23.1   | 25.6   | 25.6    | 28.1    | 30.6    | 30.6    |  |

\*for EC 32 flat L1 is + 2.0 mm



## maxon Modular System

| + Motor               | Page    | + Sensor / Brake | Page    | Overall length [mm] = Motor length + gearhead length + (sensor / brake) + assembly parts |       |       |       |       |       |       |       |       |  |  |  |  |  |  |  |  |
|-----------------------|---------|------------------|---------|--|-------|-------|-------|-------|-------|-------|-------|-------|--|--|--|--|--|--|--|--|
| A-max 26              | 101-108 |                  |         | 65.4   | 65.4  | 67.9  | 67.9  | 70.4  | 70.4  | 72.9  | 75.4  | 75.4  |  |  |  |  |  |  |  |  |
| A-max 26              | 102-108 | MEnc 13          | 274     | 72.5   | 72.5  | 75.0  | 75.0  | 77.5  | 77.5  | 80.0  | 82.5  | 82.5  |  |  |  |  |  |  |  |  |
| A-max 26              | 102-108 | MR               | 262     | 74.2   | 74.2  | 76.7  | 76.7  | 79.2  | 79.2  | 81.7  | 84.2  | 84.2  |  |  |  |  |  |  |  |  |
| A-max 26              | 102-108 | Enc 22           | 265     | 79.8   | 79.8  | 82.3  | 82.3  | 84.8  | 84.8  | 87.3  | 89.8  | 89.8  |  |  |  |  |  |  |  |  |
| A-max 26              | 102-108 | HED_ 5540        | 267/269 | 84.2   | 84.2  | 86.7  | 86.7  | 89.2  | 89.2  | 91.7  | 94.2  | 94.2  |  |  |  |  |  |  |  |  |
| A-max 32              | 109/111 |                  |         | 83.6   | 83.6  | 86.1  | 86.1  | 88.6  | 88.6  | 91.1  | 93.6  | 93.6  |  |  |  |  |  |  |  |  |
| A-max 32              | 110/112 |                  |         | 82.2   | 82.2  | 84.7  | 84.7  | 87.2  | 87.2  | 89.7  | 92.2  | 92.2  |  |  |  |  |  |  |  |  |
| A-max 32              | 110/112 | MR               | 263     | 93.4   | 93.4  | 95.9  | 95.9  | 98.4  | 98.4  | 100.9 | 103.4 | 103.4 |  |  |  |  |  |  |  |  |
| A-max 32              | 110/112 | HED_ 5540        | 267/269 | 103.0  | 103.0 | 105.5 | 105.5 | 108.0 | 108.0 | 110.5 | 113.0 | 113.0 |  |  |  |  |  |  |  |  |
| RE-max 21             | 123/124 |                  |         | 49.6   | 49.6  | 52.1  | 52.1  | 54.6  | 54.6  | 57.1  | 59.6  | 59.6  |  |  |  |  |  |  |  |  |
| RE-max 21, 3.5 W      | 124     | MR               | 259/261 | 54.7   | 54.7  | 57.2  | 57.2  | 59.7  | 59.7  | 62.2  | 64.7  | 64.7  |  |  |  |  |  |  |  |  |
| RE-max 21             | 125/126 |                  |         | 52.2   | 52.2  | 54.7  | 54.7  | 57.2  | 57.2  | 59.7  | 62.2  | 62.2  |  |  |  |  |  |  |  |  |
| RE-max 21, 6 W        | 126     | MR               | 259/261 | 56.5   | 56.5  | 59.0  | 59.0  | 61.5  | 61.5  | 64.0  | 66.5  | 66.5  |  |  |  |  |  |  |  |  |
| RE-max 24             | 127-130 |                  |         | 52.6   | 52.6  | 55.1  | 55.1  | 57.6  | 57.6  | 60.1  | 62.6  | 62.6  |  |  |  |  |  |  |  |  |
| RE-max 24             | 128/130 | MR               | 259/261 | 57.6   | 57.6  | 60.1  | 60.1  | 62.6  | 62.6  | 65.1  | 67.6  | 67.6  |  |  |  |  |  |  |  |  |
| EC 32 flat, 15 W      | 188     |                  |         | 38.6   | 38.6  | 41.1  | 41.1  | 43.6  | 43.6  | 46.1  | 48.6  | 48.6  |  |  |  |  |  |  |  |  |
| EC 32 flat, IE, IP 00 | 189     |                  |         | 48.7   | 48.7  | 51.2  | 51.2  | 53.7  | 53.7  | 56.2  | 58.7  | 58.7  |  |  |  |  |  |  |  |  |
| EC 32 flat, IE, IP 40 | 189     |                  |         | 50.4   | 50.4  | 52.9  | 52.9  | 55.4  | 55.4  | 57.9  | 60.4  | 60.4  |  |  |  |  |  |  |  |  |