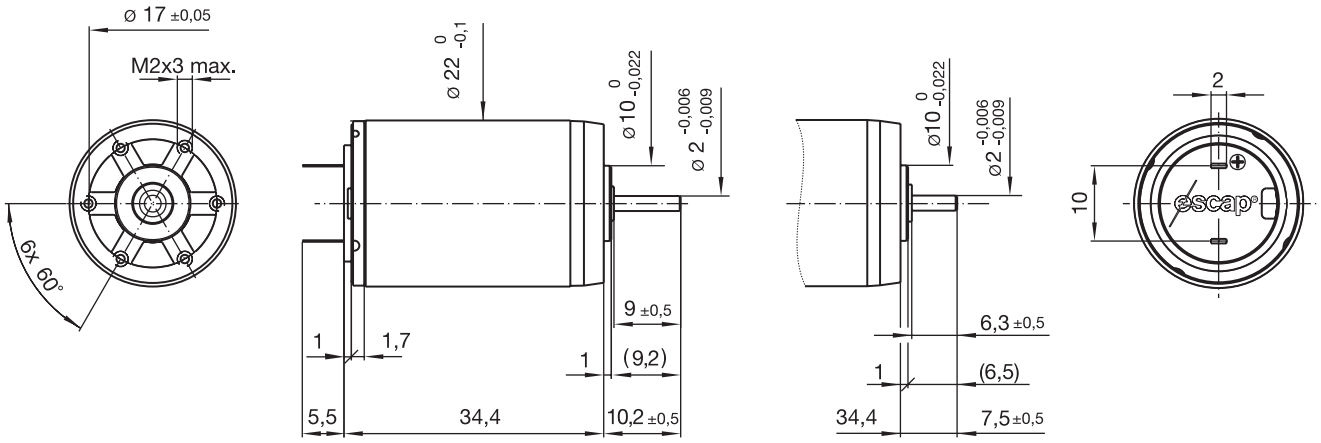
# escap 22V28

Precious metal commutation system - 9 segments

**D.C. Motor**
**4.2 Watt**



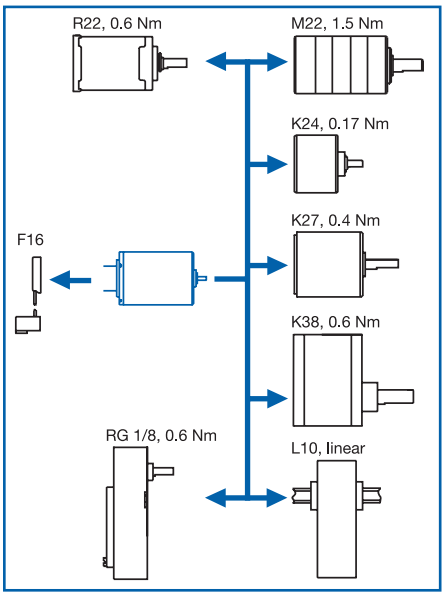

scale : 1:1
dimensions in mm
mass : 68 g

22V28 ▪▪▪▪ • 201

22V28 ▪▪▪▪ • 202

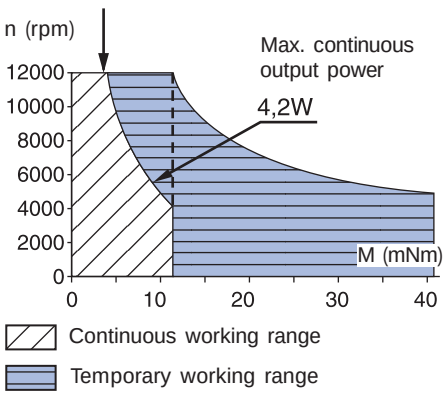
| Winding types | ▪▪▪▪ | -216P | -213P | -216E | -213E | -210E | -208E |
|---|---|---|---|---|---|---|---|
| Measured values | | | | | | | |
| 1 Measuring voltage | V | 4.5 | 6.0 | 9.0 | 12.0 | 15.0 | 24.0 |
| 2 No-load speed | rpm | 6400 | 7100 | 6700 | 7600 | 7500 | 6300 |
| 3 Stall torque | mNm (oz-in) | 18.2 (2.59) | 16.0 (2.27) | 17.1 (2.42) | 15.0 (2.13) | 11.5 (1.63) | 11.5 (1.62) |
| 4 Average no-load current | mA | 18 | 15 | 9 | 7.6 | 6.0 | 3.2 |
| 5 Typical starting voltage | V | 0.06 | 0.08 | 0.10 | 0.15 | 0.15 | 0.20 |
| Max. recommended values | | | | | | | |
| 6 Max. continuous current | A | 1.55 | 1.15 | 0.77 | 0.58 | 0.40 | 0.23 |
| 7 Max. continuous torque | mNm (oz-in) | 10.27(1.45) | 9.09 (1.29) | 9.66 (1.37) | 8.48 (1.20) | 7.4 (1.05) | 8.13 (1.15) |
| 8 Max. angular acceleration | $10^3$ rad/s$^2$ | 66 | 71 | 62 | 66 | 64 | 85 |
| Intrinsic parameters | | | | | | | |
| 9 Back-EMF constant | V/1000 rpm | 0.70 | 0.84 | 1.33 | 1.56 | 1.97 | 3.75 |
| 10 Torque constant | mNm/A (oz-in/A) | 6.7 (0.95) | 8.0 (1.13) | 12.7 (1.80) | 14.9 (2.11) | 18.8 (2.66) | 35.8 (5.07) |
| 11 Terminal resistance | ohm | 1.65 | 3.00 | 6.70 | 11.9 | 24.5 | 75.0 |
| 12 Motor regulation R/k$^2$ | $10^3$/Nms | 37 | 47 | 42 | 54 | 69 | 58 |
| 13 Rotor inductance | mH | 0.10 | 0.15 | 0.50 | 0.55 | 0.80 | 3.30 |
| 14 Rotor inertia | kgm$^2$ . $10^{-7}$ | 3.90 | 3.20 | 3.90 | 3.20 | 2.90 | 2.40 |
| 15 Mechanical time constant | ms | 14 | 15 | 16 | 17 | 20 | 14 |

Availability: see enclosed document at the end of the catalogue




- Thermal resistance :
  rotor-body 6 °C/W
  body-ambient 20 °C/W
- Thermal time constant - rotor / stator :
  10 s / 460 s
- Max. rated coil temperature : 100°C (210°F)
- Recom. ambient temperature range :
  -30 °C to +65 °C (-22 °F to +150 °F)
- Viscous damping constant :
  0.05 x $10^{-6}$ Nms
- Max. axial static force for press-fit : 150 N
- End play : ≤ 150 µm
  Radial play : ≤ 30 µm
  Shaft runout : ≤ 10 µm
- Max. side load at 5 mm from mounting face
  - sleeve bearings 3 N
  - ball bearings 6 N
- Motor fitted with sleeve bearings
  (ball bearings optional)

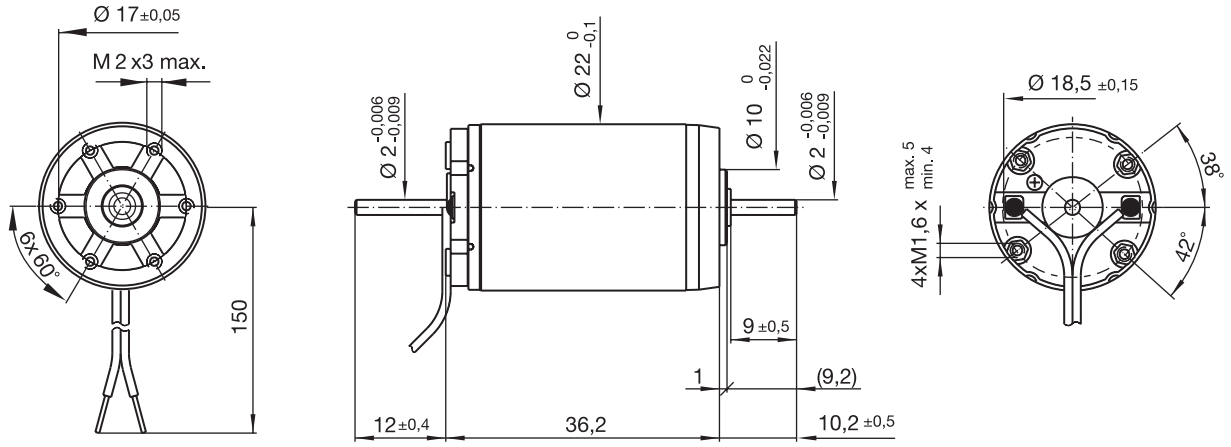
Max. recommended speed




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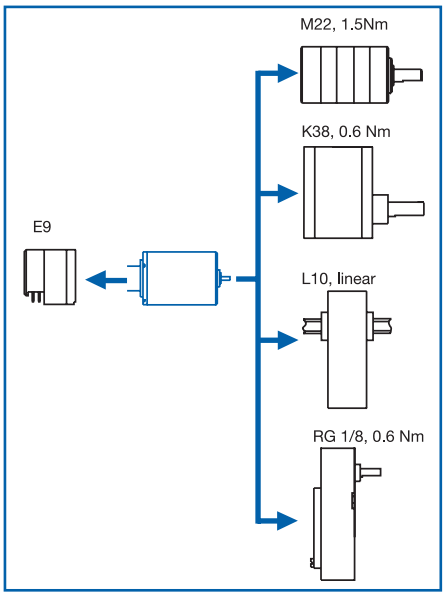



scale : 1:1
dimensions in mm
mass : 68 g

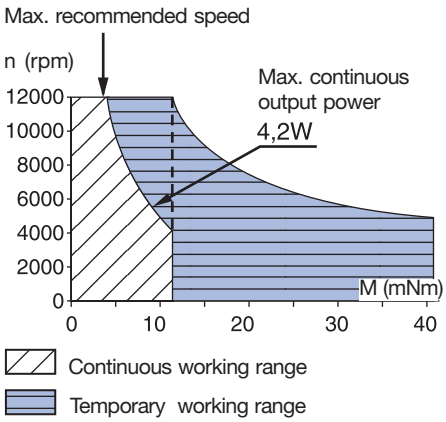
**22V48 ▪▪▪▪ • 204**

| Winding types | ▪▪▪▪ | -216P | -213P | -216E | -213E | -210E | -208E |
|---|---|---|---|---|---|---|---|
| **Measured values** | | | | | | | |
| 1 Measuring voltage | V | 4.5 | 6.0 | 9.0 | 12.0 | 15.0 | 24.0 |
| 2 No-load speed | rpm | 6400 | 7100 | 6700 | 7600 | 7500 | 6300 |
| 3 Stall torque | mNm (oz-in) | 18.2 (2.59) | 16.0 (2.27) | 17.1 (2.42) | 15.0 (2.13) | 11.5 (1.63) | 11.5 (1.62) |
| 4 Average no-load current | mA | 27 | 22 | 13.5 | 11 | 9 | 4.8 |
| 5 Typical starting voltage | V | 0.06 | 0.08 | 0.10 | 0.15 | 0.15 | 0.20 |
| **Max. recommended values** | | | | | | | |
| 6 Max. continuous current | A | 1.55 | 1.15 | 0.77 | 0.58 | 0.40 | 0.23 |
| 7 Max. continuous torque | mNm (oz-in) | 10.2 (1.45) | 9.0 (1.29) | 9.6 (1.37) | 8.5 (1.20) | 7.4 (1.05) | 8.1 (1.15) |
| 8 Max. angular acceleration | $10^3$ rad/s² | 66 | 71 | 62 | 66 | 64 | 85 |
| **Intrinsic parameters** | | | | | | | |
| 9 Back-EMF constant | V/1000 rpm | 0.70 | 0.84 | 1.33 | 1.56 | 1.97 | 3.75 |
| 10 Torque constant | mNm/A (oz-in/A) | 6.7 (0.95) | 8.0 (1.13) | 12.7 (1.80) | 14.9 (2.11) | 18.8 (2.66) | 35.8 (5.07) |
| 11 Terminal resistance | ohm | 1.65 | 3.00 | 6.70 | 11.9 | 24.5 | 75.0 |
| 12 Motor regulation R/k² | $10^3$/Nms | 37 | 47 | 42 | 54 | 69 | 58 |
| 13 Rotor inductance | mH | 0.10 | 0.15 | 0.50 | 0.55 | 0.80 | 3.30 |
| 14 Rotor inertia | kgm² . $10^{-7}$ | 3.90 | 3.20 | 3.90 | 3.20 | 2.90 | 2.40 |
| 15 Mechanical time constant | ms | 14 | 15 | 16 | 17 | 20 | 14 |

Availability: see enclosed document at the end of the catalogue



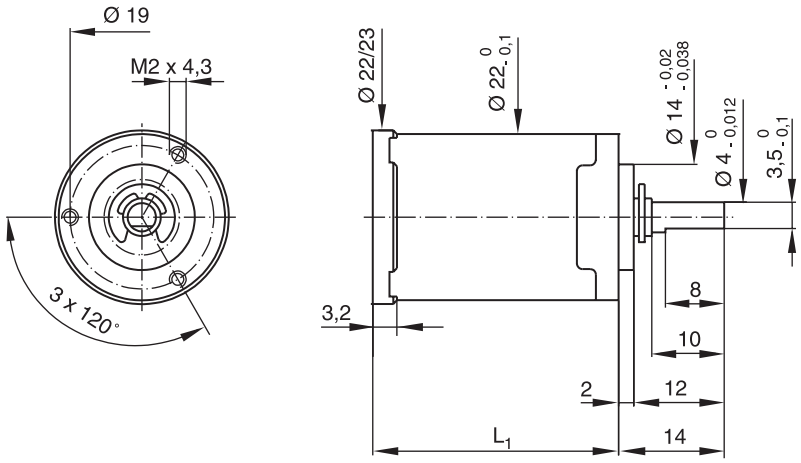

- Thermal resistance :
  rotor-body 6 °C/W
  body-ambient 20 °C/W
- Thermal time constant - rotor / stator :
  10 s / 460 s
- Max. rated coil temperature : 100°C (210°F)
- Recom. ambient temperature range :
  -30 °C to +65 °C (-22 °F to +150 °F)
- Viscous damping constant :
  0.05 x $10^{-6}$ Nms
- Max. axial static force for press-fit : 150 N
- End play : ≤ 150 µm
  Radial play : ≤ 30 µm
  Shaft runout : ≤ 10 µm
- Max. side load at 5 mm from mounting face
  - sleeve bearings 3 N
  - ball bearings 6 N
- Motor fitted with sleeve bearings
  (ball bearings optional)




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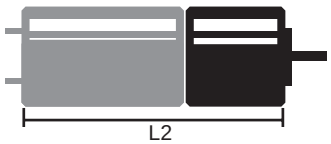



scale 1:1
dimensions in mm

**R22 • 0 ••••**

| Ratio •••• | 5.75 | 16.2 | 19.4 | 27.6 | 33.1 | 65.5 | 93.2 | 111 | 132 | 159 | 190 | 376 | 641 | 1090 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 No. of gear stages | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 4 | 4 |
| 2 Dir. of rotation | = | = | = | = | = | = | = | = | = | = | = | = | = | = |
| 3 Efficiency | 0.8 | 0.7 | 0.7 | 0.7 | 0.7 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.5 | 0.5 | 0.5 |
| 4 L1 (mm) | 25 | 32.5 | 32.5 | 32.5 | 32.5 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| 5 Mass (g) | 20 | 25 | 25 | 25 | 25 | 30 | 30 | 30 | 30 | 30 | 30 | 33 | 33 | 33 |
| 6 **Available with motor** | **L2- length with motor (mm)** | | | | | | | | | | | | | |
| **22S28 • 1** | 48.8 | 56.3 | 56.3 | 56.3 | 56.3 | 63.8 | 63.8 | 63.8 | 63.8 | 63.8 | 63.8 | 63.8 | 63.8 | 63.8 |
| **22N28 • 201** | 54.8 | 62.3 | 62.3 | 62.3 | 62.3 | 69.8 | 69.8 | 69.8 | 69.8 | 69.8 | 69.8 | 69.8 | 69.8 | 69.8 |
| **22V28 • 202** | 59.4 | 66.9 | 66.9 | 66.9 | 66.9 | 74.4 | 74.4 | 74.4 | 74.4 | 74.4 | 74.4 | 74.4 | 74.4 | 74.4 |
| **23LT12 • 45** | 62.1 | 69.6 | 69.6 | 69.6 | 69.6 | 77.1 | 77.1 | 77.1 | 77.1 | 77.1 | 77.1 | 77.1 | 77.1 | 77.1 |
| **23V58 • 4** | 73.8 | 81.3 | 81.3 | 81.3 | 81.3 | 88.8 | 88.8 | 88.8 | 88.8 | 88.8 | 88.8 | 88.8 | 88.8 | 88.8 |
| **23DT12 • 38** | 75.5 | 83 | 83 | 83 | 83 | 90.5 | 90.5 | 90.5 | 90.5 | 90.5 | 90.5 | 90.5 | 90.5 | 90.5 |
| **26N 28 • 5 / •9** | 68.3 | 75.8 | 75.8 | 75.8 | 75.8 | 83.3 | 83.3 | 83.3 | 83.3 | 83.3 | 83.3 | 83.3 | 83.3 | 83.3 |
| **28L28 • 164** | 68.5 | 76 | 76 | 76 | 76 | 83.5 | 83.5 | 83.5 | 83.5 | 83.5 | 83.5 | 83.5 | 83.5 | 83.5 |
| **28LT12 • 164** | 68.2 | 75.7 | 75.7 | 75.7 | 75.7 | 83.2 | 83.2 | 83.2 | 83.2 | 83.2 | 83.2 | 83.2 | 83.2 | 83.2 |
| **P310 • 09** | 46.7 | 54.2 | 54.2 | 54.2 | 54.2 | 61.7 | 61.7 | 61.7 | 61.7 | 61.7 | 61.7 | 61.7 | 61.7 | 61.7 |

## Motor + gearbox = L2

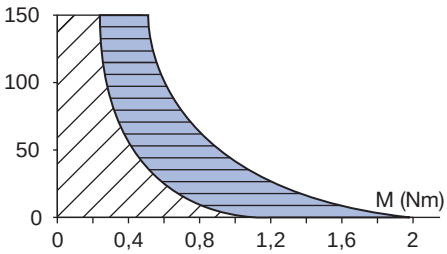



Availability: see enclosed document at the end of the catalogue

## Characteristics

| | | | R22 • 0 | R22 2R • 0 |
|---|---|---|---|---|
| 7 | Bearing type | | sleeve bearings | ball bearings |
| 8 | Max. static torque | Nm (oz-in) | 2 (283) | 2 (283) |
| 9 | Max. radial force at 8 mm from mounting face | N (lb) | 10 (2.2) | 15 (3.3) |
| 10 | Max. axial force | N (lb) | 10 (2.2) | 10 (2.2) |
| 11 | Force for press-fit | N (lb) | 300 (67.4) | 300 (67.4) |
| 12 | Average backlash at no-load | | 1.5° | 1.5° |
| 13 | Average backlash at 0,3 Nm | | 3° | 3° |
| 14 | Radial play | µm | ≤ 25 | ≤ 10 |
| 15 | Axial play | µm | 50 -150 | 50 -150 |
| 16 | Max. recom. input speed | rpm | 5000 | 5000 |
| 17 | Operating temperature range | °C (°F) | -30 ... +65 (-22...+150) | |

n (rpm) **Dynamic torque**




Values at the output shaft
Continuous working range
Temporary working range

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