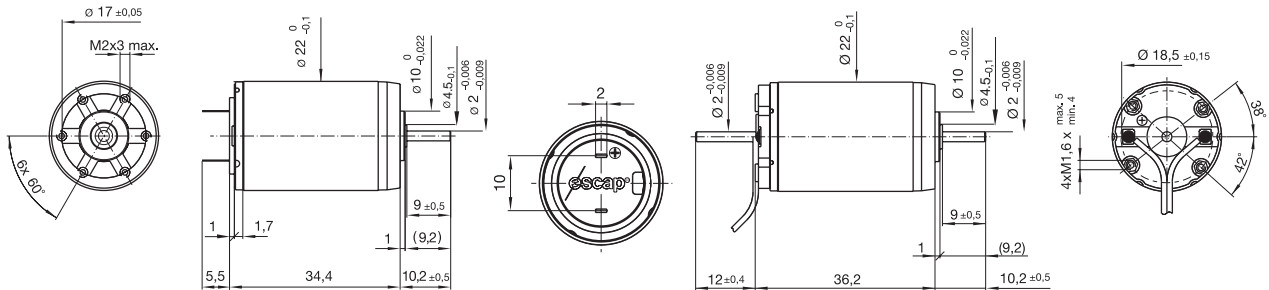


## 22V28/48

### Precious Metal Commutation System - 9 Segments

4.5 Watt

Max screw torque 130 mNm  
Max traction 300N



dimensions in mm  
mass: 68 g

**22V28** ☉☉ • 201

**22V48** ☉☉ • 204

### Winding Type



-213P

-216E

-213E

-210E

-208E

### Measured Values

Parameter	Unit	-213P	-216E	-213E	-210E	-208E
Measuring voltage	V	6.0	9.0	12.0	15.0	24.0
No-load speed	rpm	7100	6700	7600	7500	6300
Stall torque	mNm (oz-in)	16.0 (2.27)	17.1 (2.42)	15.0 (2.13)	11.5 (1.63)	11.5 (1.62)
Average No-load current <sup>1)</sup>	mA	15/22	9/13.5	7.6/11	6.0/9	3.2/4.8
Typical starting voltage <sup>1)</sup>	V	0.08/0.3	0.10/0.4	0.15/0.6	0.24/1.0	0.4/1.6

### Max. Recommended Values

Max. continuous current	A	1.15	0.77	0.58	0.40	0.23
Max. continuous torque	mNm (oz-in)	9.09 (1.29)	9.66 (1.37)	8.48 (1.20)	7.4 (1.05)	8.13 (1.15)
Max. angular acceleration	10 <sup>3</sup> rad/s <sup>2</sup>	113	99	105	102	134

### Intrinsic Parameters

Back-EMF constant	V/1000 rpm	0.84	1.33	1.56	1.97	3.75
Torque constant	mNm/A (oz-in/A)	8.0 (1.13)	12.7 (1.80)	14.9 (2.11)	18.8 (2.66)	35.8 (5.07)
Terminal resistance	ohm	3.00	6.70	11.9	24.5	75.0
Motor regulation R/k <sup>2</sup>	10 <sup>3</sup> /Nms	47	42	54	69	58
Rotor inductance	mH	0.15	0.50	0.55	0.80	3.30
Rotor inertia	kgm <sup>2</sup> 10 <sup>-7</sup>	3.20	3.90	3.20	2.90	2.40
Mechanical time constant	ms	15	16	17	20	14

1) Single Shaft/double shaft

### Executions

Gearbox	Page	Single Shaft		
		22V28	For F16	For E9
R22	239	202	202	225
M22	240	201	201	204
K24	241	202	202	225
K27	242	202	202	225
RG1/8	245	201	201	204
RG1/9	246	201	201	204
K38	244	201	201	204

- Thermal resistance: rotor-body 6°C/W, body-ambient 22°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 +85°C (-22°F to +185°F)
- Viscous damping constant: 0.1 x 10<sup>-6</sup> 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

