

STEPPING MOTORS

2-Phase Hybrid Type | 0.017 - 0.93 Nm

1.8°, 0.9° and 0.45° Full Step Angle

SCHRITTMOTOREN

2-Phasen Hybrid-Schrittmotoren | 0,017 - 0,93 Nm

1,8°, 0,9° und 0,45° Vollschrittwinkel

STEPPING MOTORS

SPECIFICATIONS

Full Step Series	Model A = Single Shaft B = Double Shaft	Bipolar				Unipolar				Length [mm]	Page
		Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]		
1.8° HECM □ 20 mm	HECM213-F0.5 (A/B)	0.017	0.50	4.2	1.8					33.5	4
	HECM213-F0.4 (A/B)	0.017	0.35	8.5	3.4	only bipolar drive available				33.5	
	HECM215-F0.5 (A/B)	0.034	0.47	9.8	4.3	nur in bipolarer Ausführung erhältlich				46.5	
	HECM215-F0.4 (A/B)	0.034	0.35	16.0	7.0					46.5	
1.8° HECM □ 28 mm	HECM223-F1.2 (A/B)	0.078	1.2	1.6	1.6					33.5	5
	HECM223-F0.7 (A/B)	0.078	0.7	4.2	3.9	only bipolar drive available				33.5	
	HECM225-F1.2 (A/B)	0.140	1.2	2.2	2.0	nur in bipolarer Ausführung erhältlich				47.5	
	HECM225-F0.7 (A/B)	0.140	0.7	6.2	5.7					47.5	
1.8° SECM □ 28 mm	SECM223-S1.5 (A/B)	0.075	1.0	1.4	1.2	0.050	1.5	0.7	0.3	33.5	
	SECM223-S1.0 (A/B)	0.080	0.67	5.4	4.8	0.060	0.95	2.7	1.2	33.5	
	SECM225-S1.4 (A/B)	0.130	1.0	2.0	2.2	0.090	1.4	1.0	0.55	47.5	
1.8° HECM □ 42 mm	HECM244-F1.3 (A/B)	0.50	1.3	3.6	6.0					41	6 / 7
	HECM244-F0.9 (A/B)	0.50	0.85	8.0	14.0					41	
	HECM245-F1.3 (A/B)	0.62	1.3	3.8	6	only bipolar drive available				49	
	HECM245-F0.9 (A/B)	0.62	0.85	9.8	15.0	nur in bipolarer Ausführung erhältlich				49	
	HECM246-F1.3 (A/B)	0.93	1.3	5.2	10.0					61	
	HECM246-F0.9 (A/B)	0.93	0.85	12.0	24.0					61	
1.8° SECM □ 42 mm	SECM243-S1.0 (A/B)	0.21	0.67	8.4	11.2	0.16	0.95	4.2	2.8	33	8 / 9
	SECM243-S0.4 (A/B)	0.21	0.28	48.0	60.0	0.16	0.40	24.0	15.0	33	
	SECM243-S0.3 (A/B)	0.21	0.22	80	88.0	0.16	0.30	40.0	22.0	33	
	SECM243-F1.3 (A/B)	0.22	1.30	2.2	3.3	only bipolar drive available				33	
	SECM244-S1.2 (A/B)	0.33	0.85	6.6	14.4	0.26	1.20	3.3	3.6	39	
	SECM244-S0.8 (A/B)	0.33	0.57	16.0	30.4	0.26	0.80	8.0	7.6	39	
	SECM244-S0.4 (A/B)	0.33	0.28	60.0	120.0	0.26	0.40	30.0	30.0	39	
	SECM244-S0.2 (A/B)	0.33	0.14	240.0	424.0	0.26	0.20	120.0	106.0	39	
	SECM244-F1.1 (A/B)	0.37	1.13	3.7	7.8	nur in bipolarer Ausführung erhältlich				39	
	SECM245-S1.2 (A/B)	0.41	0.85	6.6	12.0	0.32	1.20	3.3	3.0	47	
	SECM245-S0.8 (A/B)	0.41	0.57	18.0	38.0	0.32	0.80	9.0	9.5	47	
	SECM245-S0.4 (A/B)	0.41	0.28	60.0	116.0	0.32	0.40	30.0	29.0	47	
0.9°ECM □ 42 mm	ECM243M-S0.9 (A/B)	0.10	0.64	8.8	10.0	0.08	0.90	4.4	2.5	33	10 / 11
	ECM243M-S0.3 (A/B)	0.10	0.21	80.0	84.0	0.08	0.30	40.0	21.0	33	
0.9°-0.45° □ 39 mm	ECM232M-F0.3 (A/B)	0.050	0.32	38.0	19.0	only bipolar drive available				22	
	ECM232N-F0.3 (A/B)	0.046	0.30	40.0	25.0	nur in bipolarer Ausführung erhältlich				22	
Stepping Motor with Encoder											
1.8° SECM □ 42 mm	SECM243-S1.0H2200	0.21	0.67	8.4	11.2	0.16	0.95	4.2	2.8	50	12
	SECM243-S1.0P2200	0.21	0.67	8.4	11.2	0.16	0.95	4.2	2.8	52	
	SECM244-S1.2H2200	0.33	0.85	6.6	14.4	0.26	1.20	3.3	3.6	56	
	SECM244-S1.2P2200	0.33	0.85	6.6	14.4	0.26	1.20	3.3	3.6	58	
	SECM245-S1.2H2200	0.41	0.85	6.6	12.0	0.32	1.20	3.3	3.0	64	
	SECM245-S1.2P2200	0.41	0.85	6.6	12.0	0.32	1.20	3.3	3.0	66	

Planetary Gear see Page 13 -15

Planetengetriebe siehe Seite 13 - 15

Driver Electronics see Page 16

Treiberelektronik siehe Seite 16

Our quality system for motion control components has been examined and officially certified by TÜV Germany according to DIN EN ISO 9001:2000

Unser Qualitätssystem wurde hinsichtlich des Bereiches Vertrieb von Antriebskomponenten hin überprüft und offiziell mit dem TÜV Zertifikat DIN EN ISO 9001:2000 ausgezeichnet.



Our stepping motors are certified according to EN 61000-6-2:2001 and EN 61000-6-3:2001. EMC standards.

Unsere Schrittmotoren wurden zertifiziert nach EMV-Standard EN61000-6-2:2001 und EN61000-6-3:2001.

PRODUCT NUMBER CODE

S E C M 2 4 3 M - S 1.0 A

Shaft Type: A = Single Shaft Welle: A = Einzelwelle
 B = Double Shaft B = Doppelwelle
 P = Encoder P = Encoder

Current per phase
 Strom pro Phase

S = 6 Leadwires / Anschlußdrähte
 F = 4 Leadwires / Anschlußdrähte

Full Step Angle: No Letter = 1.8°, M = 0.9°, N = 0.45°
 Vollschrtrittwinkel: Ohne Buchstabe = 1,8°, M = 0,9°, N = 0,45°

Length of Motor: ex. 2 = approx. 22 mm
 Motorlänge: z. B. 2 = ca. 22 mm

Mounting Size: 1 = 20x20 mm, 2 = 28x28 mm, 3 = 39x39 mm, 4 = 42x42 mm
 Flanschmaß: 1 = 20x20 mm, 2 = 28x28 mm, 3 = 39x39 mm, 4 = 42x42 mm

Number of phase: 2 = 2 phase motor
 Anzahl der Phasen: 2 = 2 Phasenmotor

EC Motion Stepping Motor

S or H = High Torque Series
 S oder H = Drehmomentverstärkte Serie
 No Letter = Standard Series
 Ohne Buchstabe = Standardserie

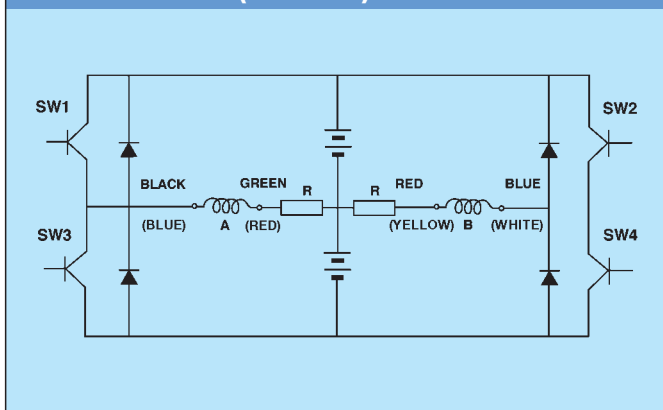
Operation of 2 phase Stepping Motor

Stepping Motors operate on Phase-Switched DC Power. The motor shaft advances 200 (400, 800) steps per revolution with 1.8° (0.9°, 0.45°) motor when a Full-Step mode is used. When a Half-Step mode is used, 400 (800, 1600) steps per revolution with 1.8° (0.9°, 0.45°) motor.

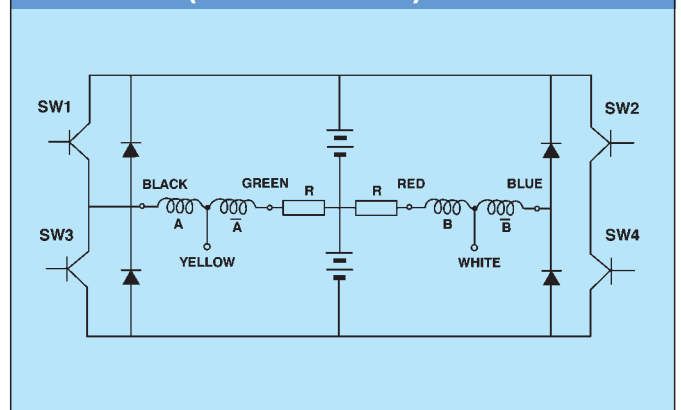
Arbeitsweise der 2-Phasen Schrittmotoren

Schrittmotoren benötigen zum Betrieb eine geschaltete Gleichspannung. Die Motorwelle eines 1,8° (0,9°, 0,45°) Schrittmotors führt beim Vollschrtrittbetrieb 200 (400, 800) Schritte pro Umdrehung aus. Bei Halbschrtrittbetrieb verdoppeln sich die oben angegebenen Schritte auf 400 (800, 1600) Schritte bei einem 1,8° (0,9°, 0,45°) Schrittmotor.

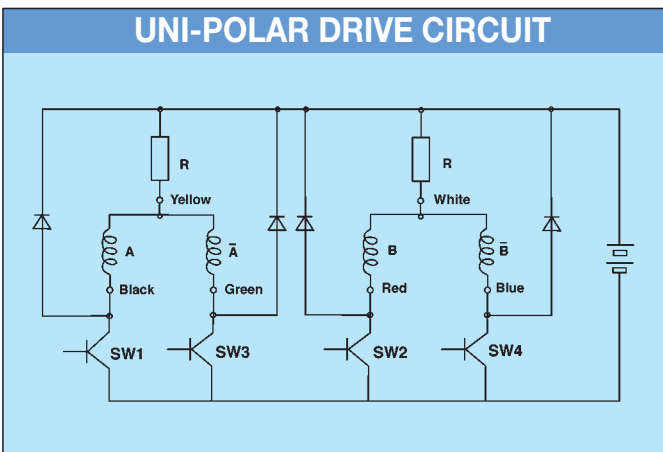
Bi-POLAR (4 Leads) DRIVE CIRCUIT



Bi-POLAR (6 Leads Series) DRIVE CIRCUIT



UNI-POLAR DRIVE CIRCUIT



Bipolar (4 Leads/6 Leads Series)

Drive Circuit for:

Stepping Motor with 4 or 6 Leadwires

Bipolarer (4 Leiter/6 Leiter Seriell)

Treiberanschluß für:

Schrittmotoren mit 4 oder 6 Anschlußdrähten

Unipolar Drive Circuit for:

Stepping Motor with 6 Leadwires

Unipolarer Treiberanschluß für:

Schrittmotoren mit 6 Anschlußdrähten

STEPPING MOTORS

□ 20 and 28 mm HECM-/SECM-SPECIFICATIONS

1.8° HIGH-TORQUE 2 PHASE STEPPING MOTOR

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
HECM213-F0.5 (A/B)	0.017	0.50	4.2	1.8	-	-	-	-	(A1)
HECM213-F0.4 (A/B)	0.017	0.35	8.5	3.4	-	-	-	-	(A2)
HECM215-F0.5 (A/B)	0.034	0.47	9.8	4.3	-	-	-	-	(A3)
HECM215-F0.4 (A/B)	0.034	0.35	16.0	7.0	-	-	-	-	(A4)

Number of Leads	Weight of Motor		Size Length		Rotor Inertia	
	HECM213	HECM215	HECM213	HECM215	HECM213	HECM215
4	0.05 kg	0.08 kg	30 mm	46.5 mm	$1.9 \times 10^{-7} \text{ kgm}^2$	$4 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
HECM223-F1.2 (A/B)	0.078	1.2	1.6	1.6	-	-	-	-	(B1)
HECM223-F0.7 (A/B)	0.078	0.7	4.2	3.9	-	-	-	-	(B2)
HECM225-F1.2 (A/B)	0.140	1.2	2.2	2.0	-	-	-	-	(B3)
HECM225-F0.7 (A/B)	0.140	0.7	6.2	5.7	-	-	-	-	(B4)

Number of Leads	Weight of Motor		Size Length		Rotor Inertia	
	HECM223	HECM225	HECM223	HECM225	HECM223	HECM225
4	0.12 kg	0.17 kg	33.5 mm	47.5 mm	$8 \times 10^{-7} \text{ kgm}^2$	$18 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

Model A = Single Shaft B = Double Shaft	● Bipolar (Series)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
SECM223-S1.5 (A/B)	0.075	1.0	1.4	1.2	0.050	1.5	0.7	0.3	(C1)
SECM223-S1.0 (A/B)	0.080	0.67	5.4	4.8	0.060	0.95	2.7	1.2	(C2)
SECM225-S1.4 (A/B)	0.130	1.0	2.0	2.2	0.090	1.4	1.0	0.55	(C3)

Number of Leads	Weight of Motor		Size Length		Rotor Inertia	
	SECM223	SECM225	SECM223	SECM225	SECM223	SECM225
6	0.12 kg	0.17 kg	33.5 mm	47.5 mm	$8 \times 10^{-7} \text{ kgm}^2$	$18 \times 10^{-7} \text{ kgm}^2$

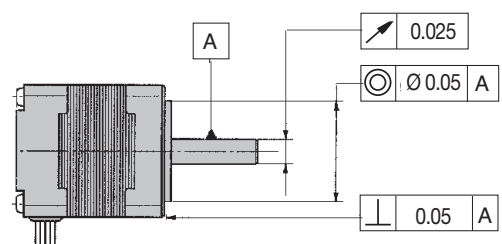
Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

HECM / SECM-Series



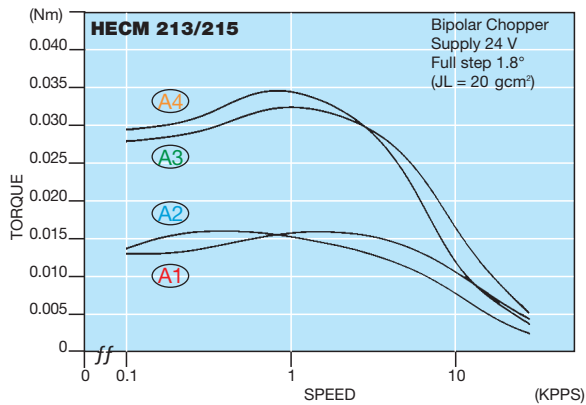
GENERAL SPECIFICATIONS

Items	Specifications
Shaft Runout	0.025 mm Max. T.I.R.
Shaft Radial Play	0.030 mm Max. (0.5 kgf)
Shaft Axial Play	0.075 mm Max. (0.5 kgf)
Insulation Resistance	100 M Ω (DC 500 V)
Dielectric Strength	500 V AC (1 Minute)
Insulation Class	CLASS B
Temperature Rise	80° C MAX. (2 PHASE ON)
Working Temperature	-20° C ~ +50° C



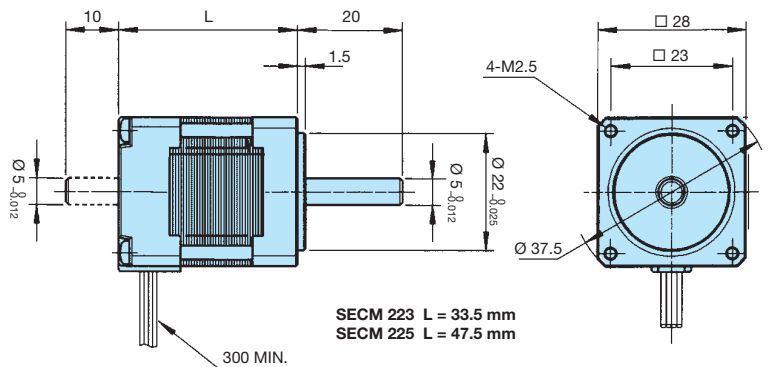
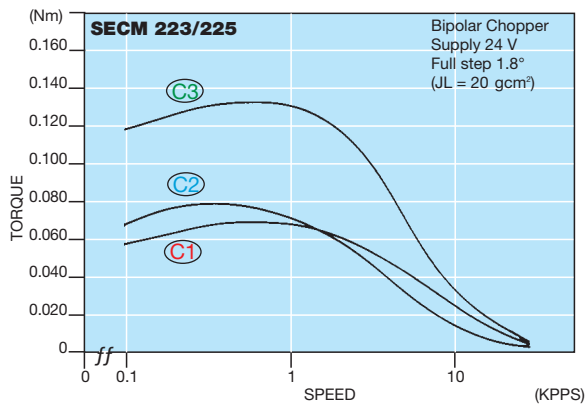
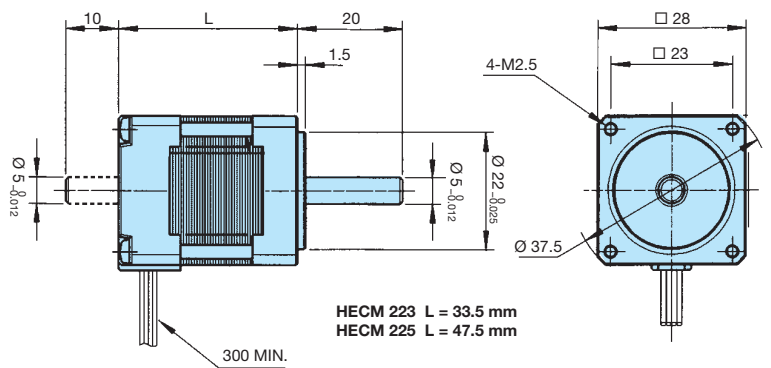
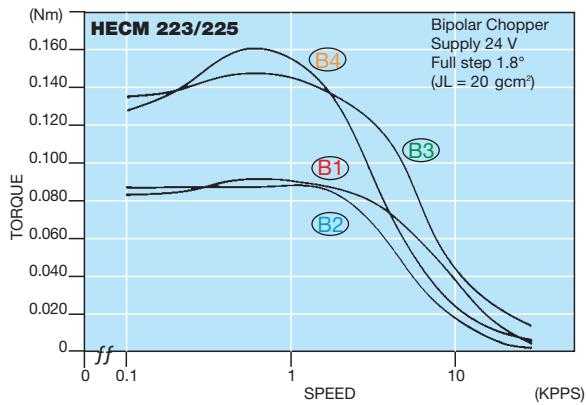
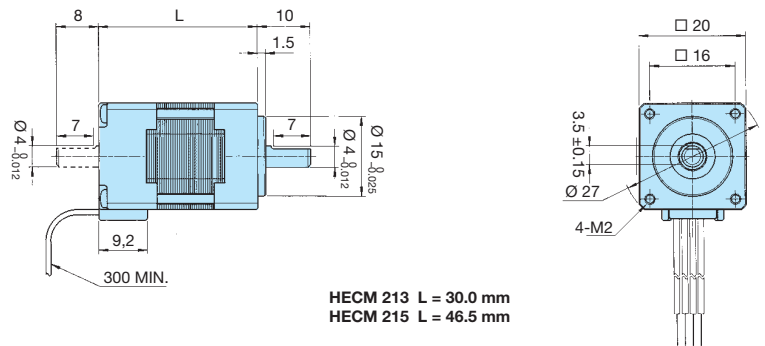
TORQUE VS. SPEED CHARACTERISTIC

Nm/KPPS (1000 PULSE/SECOND)

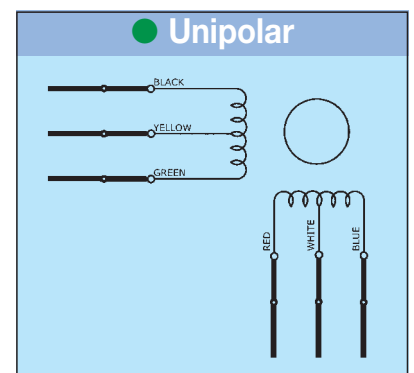
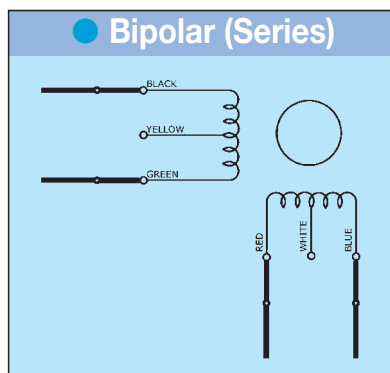
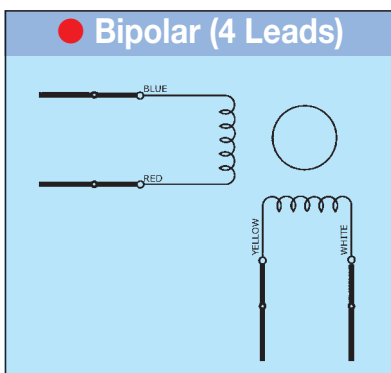


DIMENSIONS

UNIT = mm



COLOR OF LEAD WIRES



STEPPING MOTORS

□ 42 mm HECM-SPECIFICATIONS

1.8° HIGH-TORQUE 2 PHASE STEPPING MOTOR

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
HECM244-F1.3 (A/B)	0.50	1.3	3.6	6.0	–	–	–	–	(G1)
HECM244-F0.9 (A/B)	0.50	0.85	8.0	14.0	–	–	–	–	(G2)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
4	0.25 kg	41 mm	$57 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
HECM245-F1.3 (A/B)	0.62	1.3	3.8	6.0	–	–	–	–	(H1)
HECM245-F0.9 (A/B)	0.62	0.85	9.8	15.0	–	–	–	–	(H2)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
4	0.35 kg	49 mm	$76 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
HECM246-F1.3 (A/B)	0.93	1.3	5.2	10.0	–	–	–	–	(I1)
HECM246-F0.9 (A/B)	0.93	0.85	12.0	24.0	–	–	–	–	(I2)

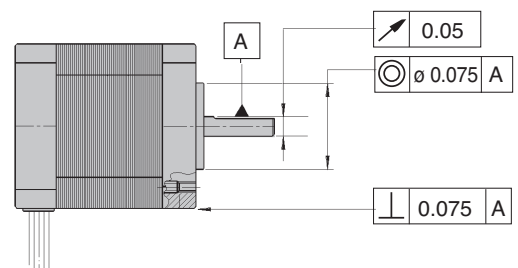
Number of Leads	Weight of Motor	Size Length	Rotor Inertia
4	0.45 kg	61 mm	$114 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$



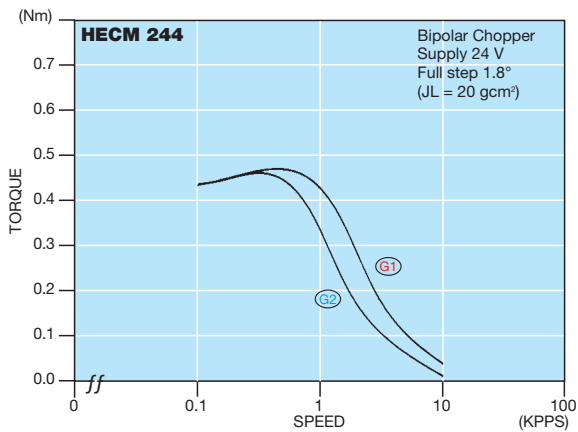
GENERAL SPECIFICATIONS

Items	Specifications
Shaft Runout	0.05 mm Max. T.I.R.
Shaft Radial Play	0.02 mm Max. (0.5 kgf)
Shaft Axial Play	0.075 mm Max. (1 kgf)
Insulation Resistance	100 M Ω (DC 500 V)
Dielectric Strength	500 V AC (1 Minute)
Insulation Class	CLASS B
Temperature Rise	80° C MAX. (2 PHASE ON)
Working Temperature	-20° C ~ + 50° C



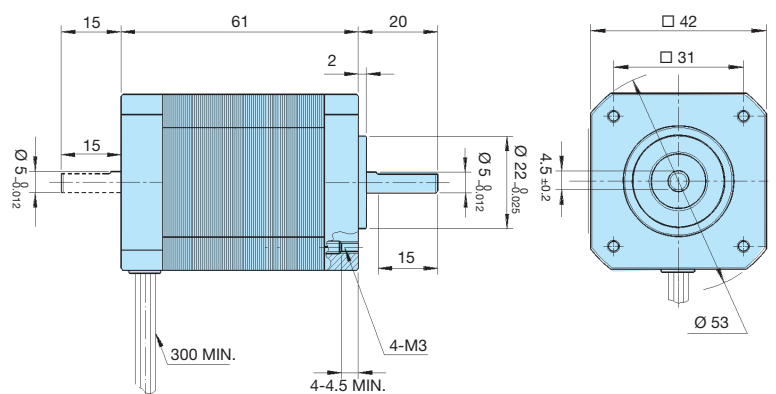
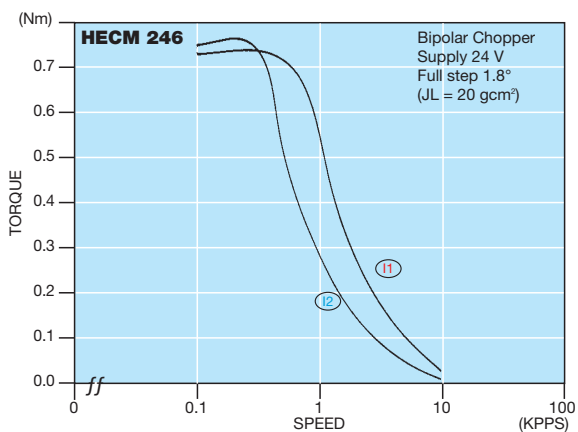
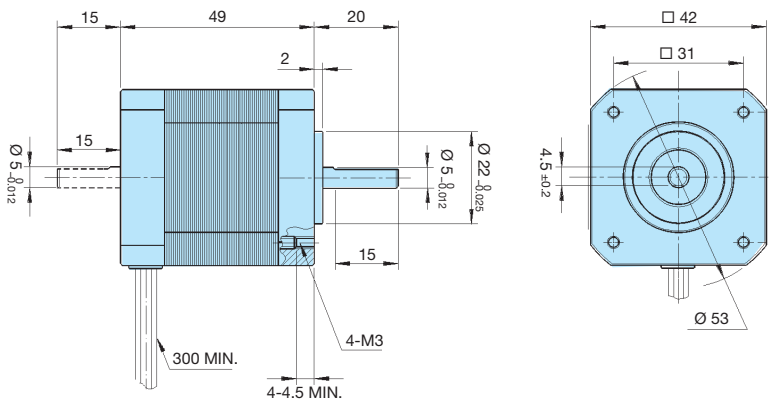
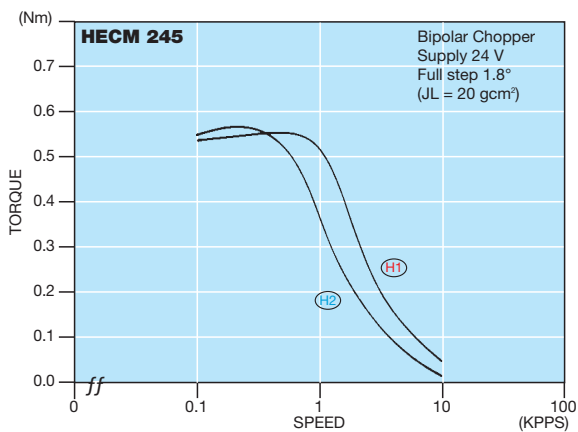
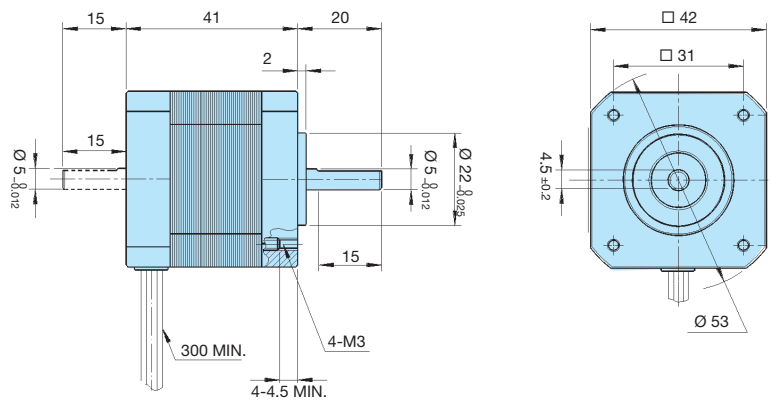
TORQUE VS. SPEED CHARACTERISTIC

Nm/KPPS (1000 PULSE/SECOND)

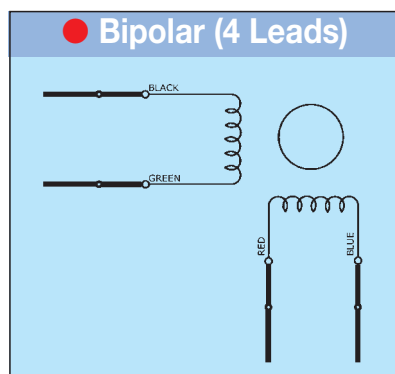


DIMENSIONS

UNIT = mm



COLOR OF LEAD WIRES



The HECM-Series are a new generation of high performance Stepping Motor up to 1 Nm holding torque in size $\square 42$ mm, full step angle 1.8° , half step angle 0.9° . This excellent torque characteristic is made up of new magnet technologies and precise manufacturing. Small in size, but big in performance.

Die Schrittmotoren der HECM-Serie sind eine neue Generation von leistungsstarken High-Torque-Schrittmotoren mit $1,8^\circ$ Vollschrittwinkel und bis zu 1 Nm Haltemoment. Erreicht wurde dies durch den konsequenten Einsatz neuester Magnet- und Produktionstechnologien. Zum Einsatz kommen diese Schrittmotoren überall dort, wo bei einer stetigen Verkleinerung der Anwendungen immer leistungsstärkere Schrittmotoren benötigt werden.

STEPPING MOTORS

□ 42 mm SECM-SPECIFICATIONS

1.8° HIGH-TORQUE 2 PHASE STEPPING MOTOR

Model A = Single Shaft B = Double Shaft	● Bipolar (Series)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
SECM243-S1.0 (A/B)	0.21	0.67	8.4	11.2	0.16	0.95	4.2	2.8	(D1)
SECM243-S0.4 (A/B)	0.21	0.28	48.0	60.0	0.16	0.40	24.0	15.0	(D2)
SECM243-S0.3 (A/B)	0.21	0.22	80.0	88.0	0.16	0.30	40.0	22.0	(D3)
SECM243-F1.3 (A/B) ●	0.24	1.30	2.2	3.3	-	-	-	-	(D4)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
S = 6 F = 4	0.2 kg	33 mm	$35 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$. ● Bipolar (4 Leads)

Model A = Single Shaft B = Double Shaft	● Bipolar (Series)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
SECM244-S1.2 (A/B)	0.33	0.85	6.6	14.4	0.26	1.20	3.3	3.6	(E1)
SECM244-S0.8 (A/B)	0.33	0.57	16.0	30.4	0.26	0.80	8.0	7.6	(E2)
SECM244-S0.4 (A/B)	0.33	0.28	60.0	120.0	0.26	0.40	30.0	30.0	(E3)
SECM244-S0.2 (A/B)	0.33	0.14	240.0	424.0	0.26	0.20	120.0	106.0	(E4)
SECM244-F1.1 (A/B) ●	0.37	1.13	3.7	7.8	-	-	-	-	(E5)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
S = 6 F = 4	0.25 kg	39 mm	$54 \times 10^{-7} \text{ kgm}^2$

Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$. ● Bipolar (4 Leads)

Model A = Single Shaft B = Double Shaft	● Bipolar (Series)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
SECM245-S1.2 (A/B)	0.41	0.85	6.6	12.0	0.32	1.20	3.3	3.0	(F1)
SECM245-S0.8 (A/B)	0.41	0.57	18.0	38.0	0.32	0.80	9.0	9.5	(F2)
SECM245-S0.4 (A/B)	0.41	0.28	60.0	116.0	0.32	0.40	30.0	29.0	(F3)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
6	0.3 kg	47 mm	$68 \times 10^{-7} \text{ kgm}^2$

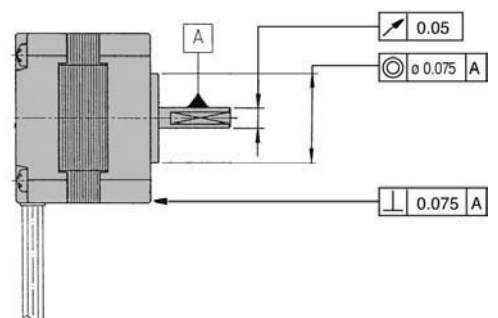
Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

SECM-Series



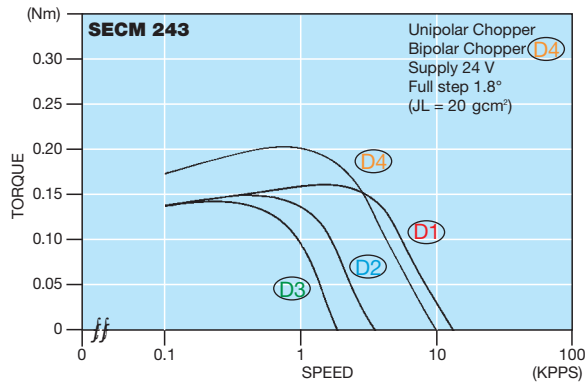
GENERAL SPECIFICATIONS

Items	Specifications
Shaft Runout	0.05 mm Max. T.I.R.
Shaft Radial Play	0.025 mm Max. (0.5 kgf)
Shaft Axial Play	0.075 mm Max. (1 kgf)
Insulation Resistance	100 M Ω (DC 500 V)
Dielectric Strength	500 V AC (1 Minute)
Insulation Class	CLASS B
Temperature Rise	80° C MAX. (2 PHASE ON)
Working Temperature	-20° C ~ +50° C



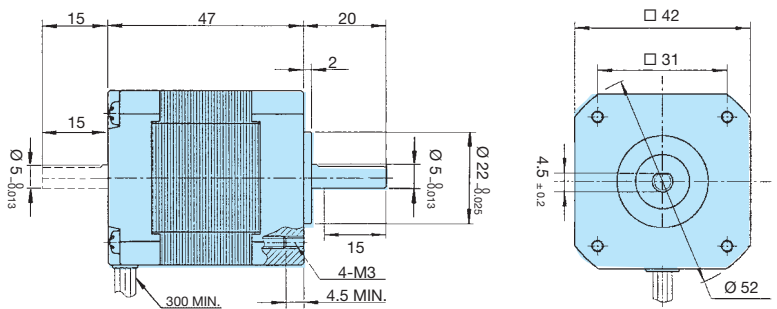
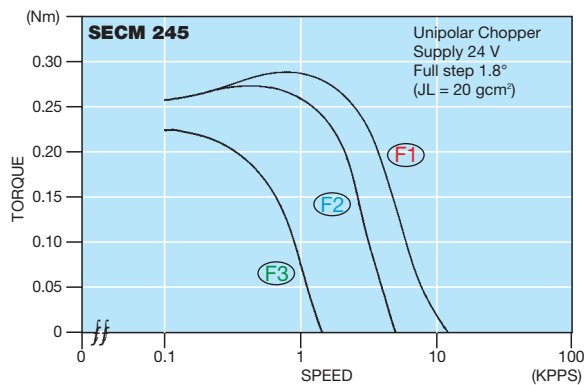
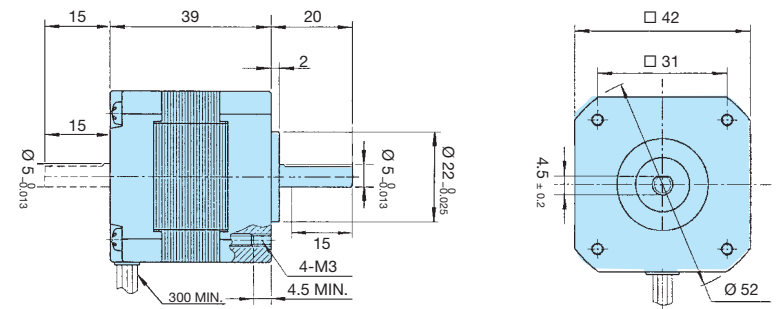
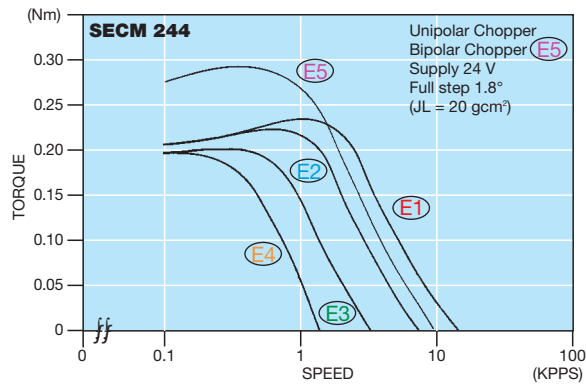
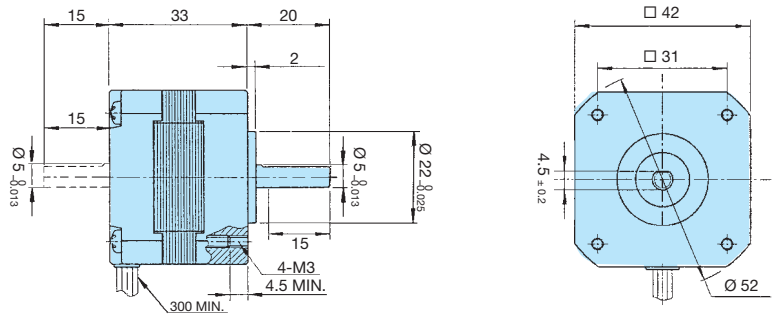
TORQUE VS. SPEED CHARACTERISTIC

Nm/KPPS (1000 PULSE/SECOND)

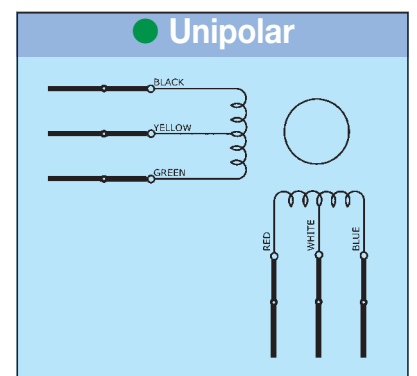
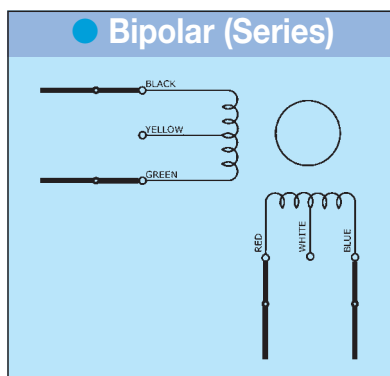
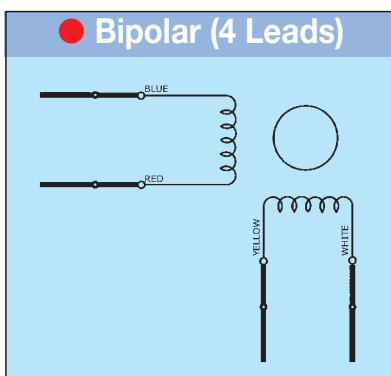


DIMENSIONS

UNIT = mm



COLOR OF LEAD WIRES



STEPPING MOTORS

□ 42 and 39 mm ECM-SPECIFICATIONS

0.9° and 0.45° 2 PHASE STEPPING MOTOR

Model A = Single Shaft B = Double Shaft	● Bipolar (Series)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
ECM243M-S0.9 (A/B)	0.10	0.64	8.8	10.0	0.08	0.90	4.4	2.5	(J1)
ECM243M-S0.3 (A/B)	0.10	0.21	80.0	84.0	0.08	0.30	40.0	21.0	(J2)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
6	0.2 kg	33 mm	$19 \times 10^{-7} \text{ kgm}^2$

Full Step Angle = 0.9°, Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

General Specifications see page 8

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
ECM232M-F0.3 (A/B)	0.050	0.32	38.0	19.0	-	-	-	-	(K1)

Number of Leads	Weight of Motor	Size Length	Rotor Inertia
4	0.12 kg	22 mm	$10 \times 10^{-7} \text{ kgm}^2$

Full Step Angle = 0.9°, Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$

Model A = Single Shaft B = Double Shaft	● Bipolar (4 Leads)				● Unipolar				Speed-Torque
	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	Holding Torque [Nm]	Current/Phase [A]	Resistance/Phase [Ohm]	Inductance/Phase [mH]	
ECM232N-F0.3 (A/B)	0.046	0.30	40.0	25.0	-	-	-	-	(L1)

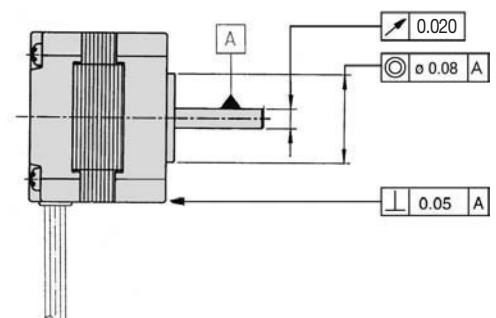
Number of Leads	Weight of Motor	Size Length	Rotor Inertia
4	0.12 kg	22 mm	$10 \times 10^{-7} \text{ kgm}^2$

Full Step Angle = 0.45°, Resistance / Phase (Ω) = $\pm 10\%$, Inductance / Phase (mH) = $\pm 20\%$



GENERAL SPECIFICATIONS

Items	Specifications
Shaft Runout	0.020 mm Max. T.I.R.
Shaft Radial Play	0.020 mm Max. (0.5 kgf)
Shaft Axial Play	0.020 mm Max. (1 kgf)
Insulation Resistance	100 M Ω (DC 500 V)
Dielectric Strength	500 V AC (1 Minute)
Insulation Class	CLASS B
Temperature Rise	80° C MAX. (2 PHASE ON)
Working Temperature	-20° C ~ + 50° C

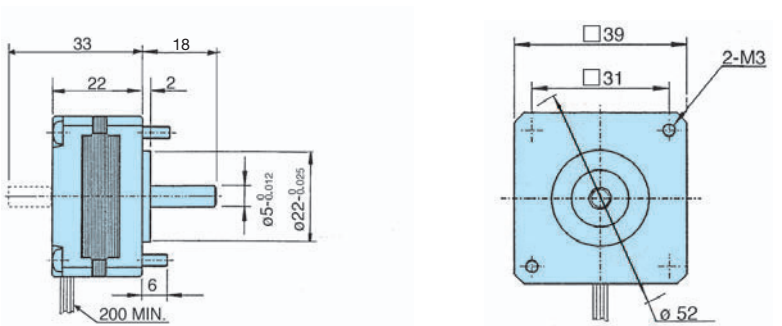
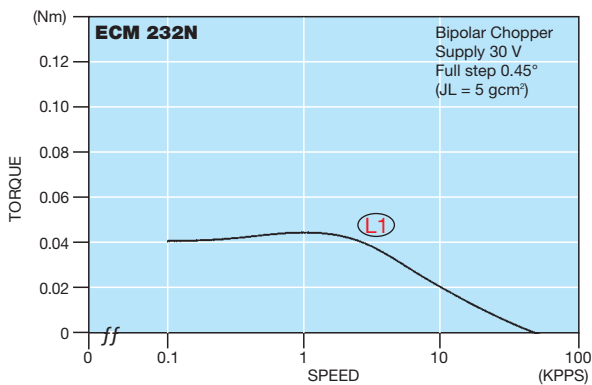
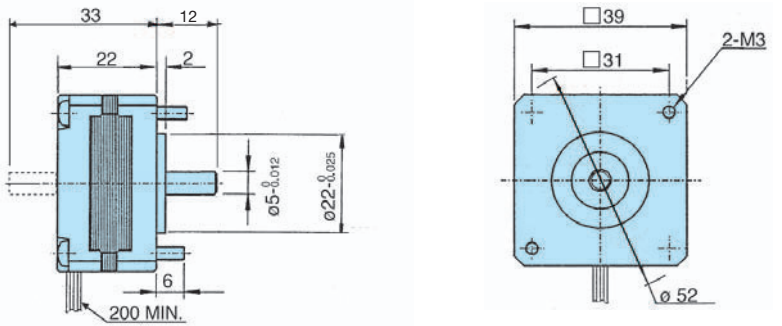
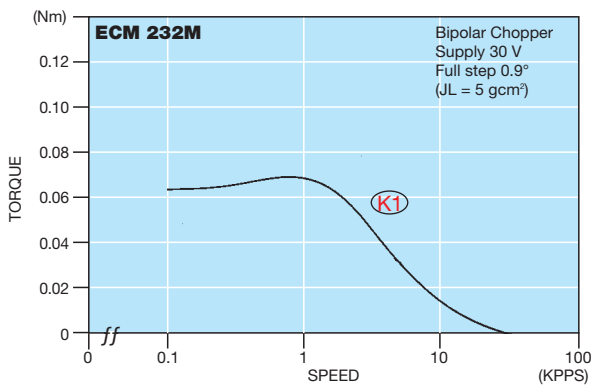
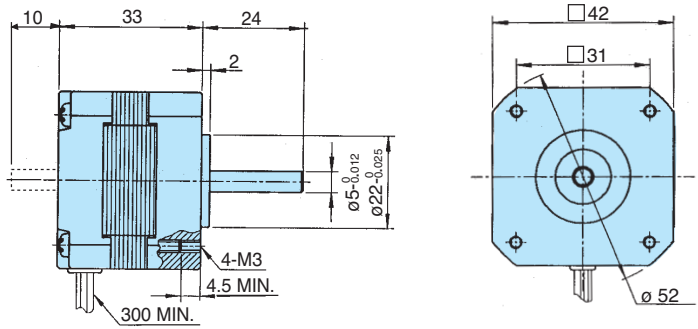
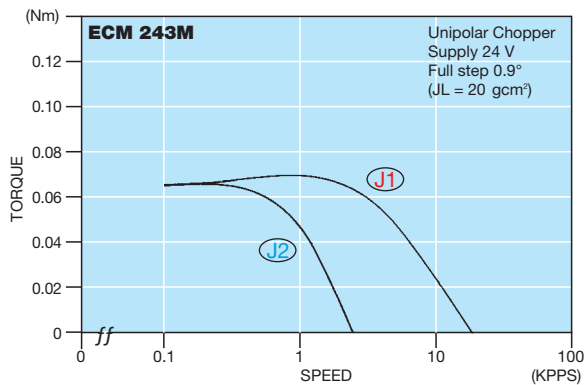


TORQUE VS. SPEED CHARACTERISTIC

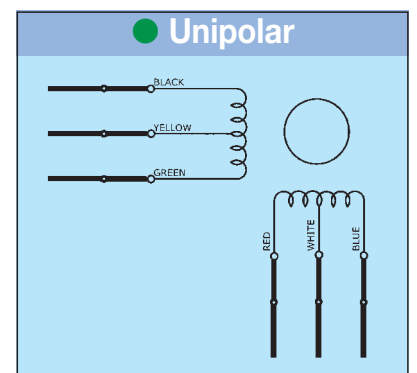
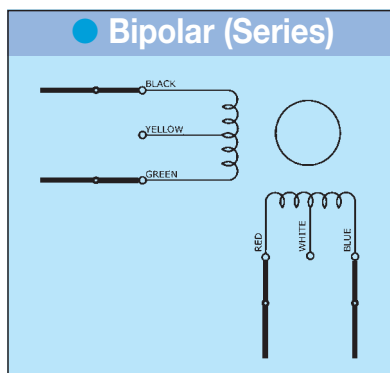
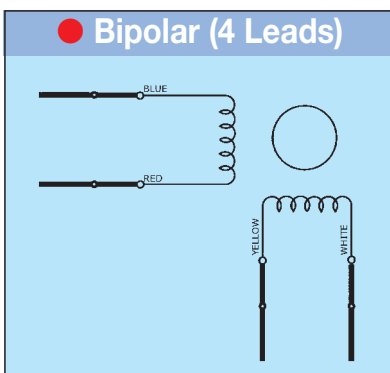
Nm/KPPS (1000 PULSE/SECOND)

DIMENSIONS

UNIT = mm



COLOR OF LEAD WIRES



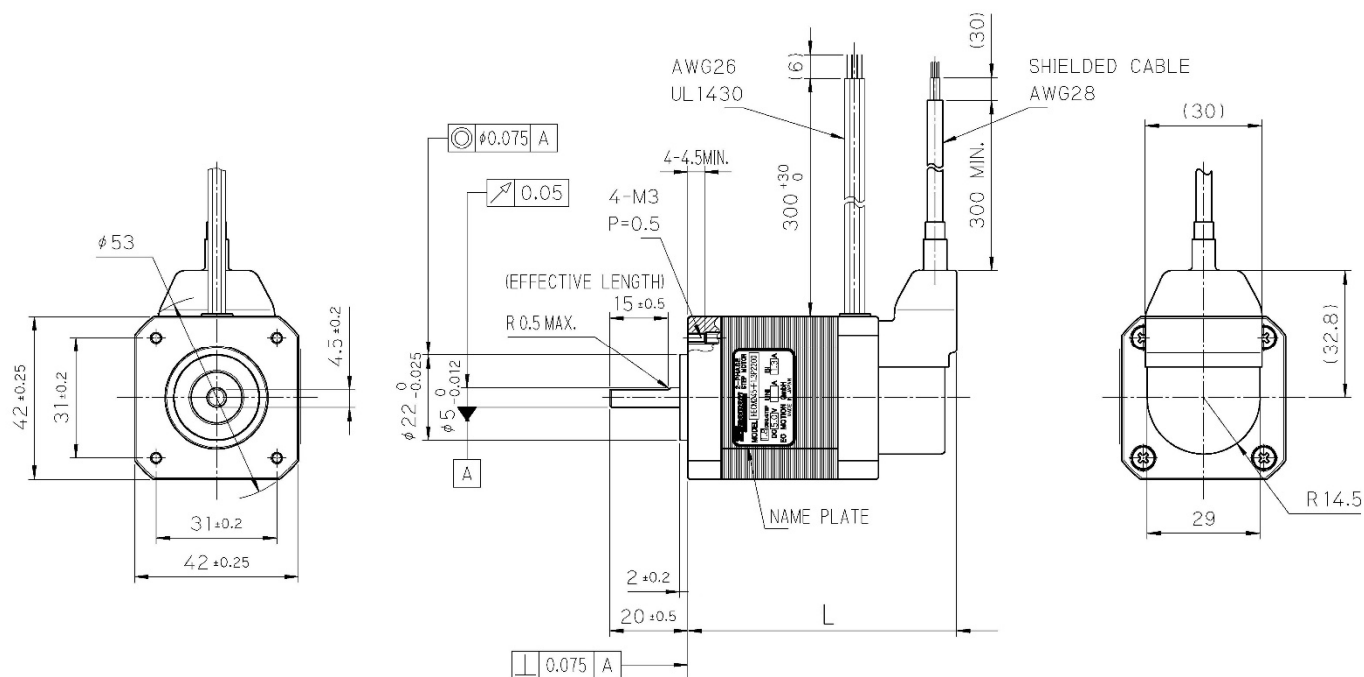


HECM24... Baureihe

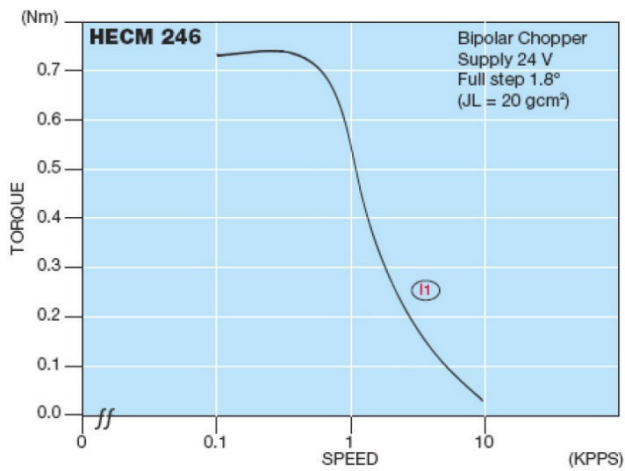
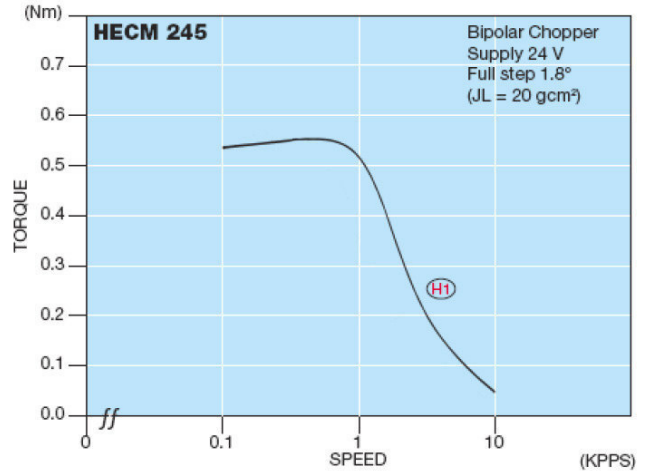
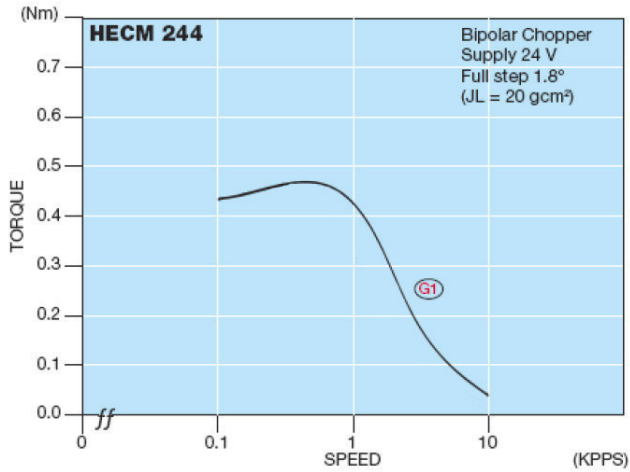
2-Phasen-Schrittmotor mit Encoder
[1,8° High-Torque-Version]

Model	● Bipolar (4 Leads)				● Unipolar				Speed Torque
	Holding Torque [Nm]	Current / Phase [A]	Resistance / Phase [Ohm]	Inductance / Phase [mH]	Holding Torque [Nm]	Current / Phase [A]	Resistance / Phase [Ohm]	Inductance / Phase [mH]	
HECM244-F1.3P2200	0.50	1.3	3.6	6.0	—	—	—	—	G1
HECM245-F1.3P2200	0.62	1.3	3.8	6.0	—	—	—	—	H1
HECM246-F1.3P2200	0.93	1.3	5.2	10.0	—	—	—	—	I1

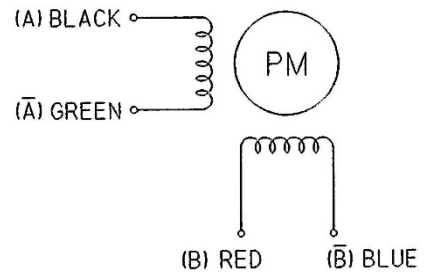
Model	Number of Leads	Weight of Motor & Encoder	Size Length	Rotor Inertia
HECM244	4	0.30 kg	61 mm	$57 \times 10^{-7} \text{ kgm}^2$
HECM245	4	0.40 kg	69 mm	$76 \times 10^{-7} \text{ kgm}^2$
HECM246	4	0.50 kg	81 mm	$114 \times 10^{-7} \text{ kgm}^2$



Optional sind für unsere Schrittmotoren auch Planetengetriebe erhältlich.



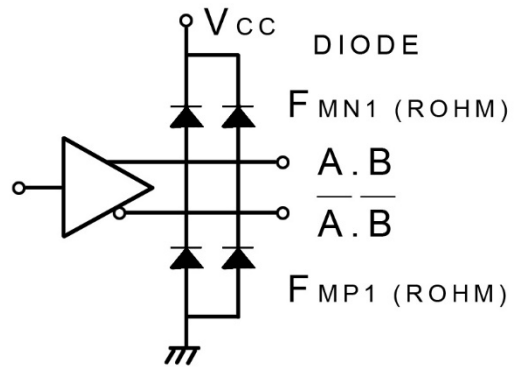
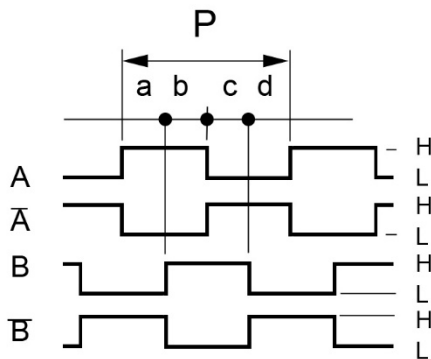
Schrittmotoranschluss



Encoder Performance

Operating Temp.range : 0°C – 85°C
 Supply : DC 5V ± 5% , 100mA max
 Resolution : 200 Counts / Turn
 Frequency Response : 100K Hz max.
 A phase difference : 1/4 P ± 1/8 P
 Code : Incremental A.B (2Ch.)

Output Signal : when output is high : DC 2.4V min
 Output Signal : when output is low : DC 0.4V max
 Sinking & Output Current : typical ± 20mA max
 Rise & Fall Times : 1 µsec max
 Moment of inertia : 5 g-cm² max Encoder only
 Output Circuit : Line Driver AM26C3IIDB



CW Rotation viewed from mounting end. Encoder signal A and B position is "H" at Motor 2Phase on.

Color of Leadwires and Funktion :

DC 5V = red	A phase = brown	\bar{A} phase = orange
GND = blue	B phase = yellow	\bar{B} phase = gray

(Old-Version)

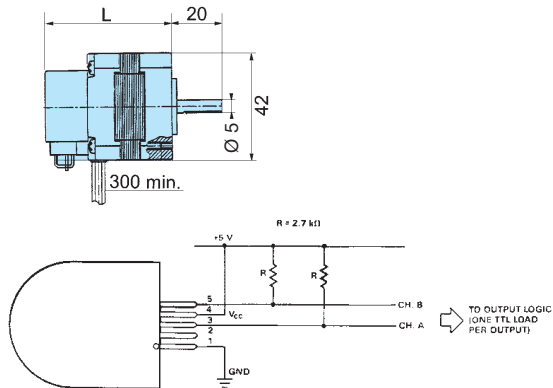
A phase = brown	\bar{A} phase = orange
B phase = yellow	\bar{B} phase = white
DC 5V = red	GND = black

STEPPING MOTORS

□ 42 mm ENCODER-SPECIFICATIONS

1.8° 2 PHASE STEPPING MOTOR

H-Type: 2-Phase-Step Motor with Encoder TTL Output 200 CPR



Article Name	Motor Length	Output
SECM243-S1.0H2200	L = 50 mm	TTL Output 200 CPR
SECM244-S1.2H2200	L = 56 mm	TTL Output 200 CPR
SECM245-S1.2H2200	L = 64 mm	TTL Output 200 CPR

Motor Specification and Torque-Curve see Pages:

SECM243-S1.0H2200 → SECM243-S1.0A → Page 8 and Page 9

SECM244-S1.2H2200 → SECM244-S1.2A → Page 8 and Page 9

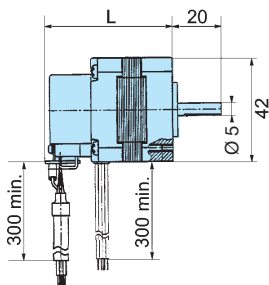
SECM245-S1.2H2200 → SECM245-S1.2A → Page 8 and Page 9

Required Connector for Encoder:

Hewlett Packard: HEDS-8902, Molex: 2695 series with 2759 series term.

AMP: 103686-4, 640442-5, Dupont/Berg: 65039-032 with 4825X-000 term.

P-Type: 2-Phase-Step Motor with Encoder Line Driver Output 200 CPR



Article Name	Motor Length	Output
SECM243-S1.0P2200	L = 53 mm	Line Driver Output 200 CPR
SECM244-S1.2P2200	L = 59 mm	Line Driver Output 200 CPR
SECM245-S1.2P2200	L = 67 mm	Line Driver Output 200 CPR

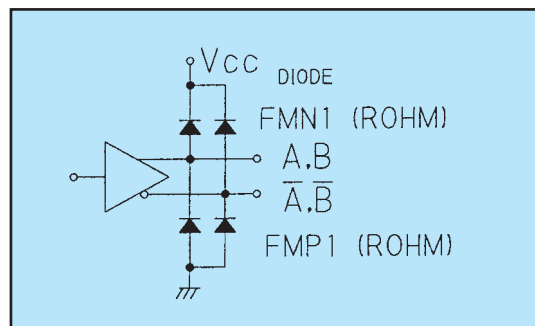
Motor Specification and Torque-Curve see Pages:

SECM243-S1.0P2200 → SECM243-S1.0A → Page 8 and Page 9

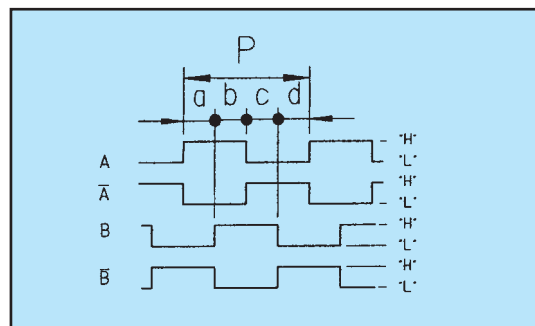
SECM244-S1.2P2200 → SECM244-S1.2A → Page 8 and Page 9

SECM245-S1.2P2200 → SECM245-S1.2A → Page 8 and Page 9

Line Driver Specification



Encoder Performance (Line Driver Output):	
Operating Temperature Range:	0°C up to 85°C
Supply:	DC 5V ± 5%, 100mA max.
Resolution:	200 Counts / Turn [CPR]
Frequency Response:	100KHz max.
A phase difference:	1/4 P ± 1/8 P
Code:	Incremental A. B. (2 CH.)
Output Signal when output is high:	DC 2.4V min.
Output Signal when output is low:	DC 0.4V max.
Sinking & Output Current:	Typical ± 20 mA max.
Rise & Fall Times:	1 µsec max.
Moment of Inertia:	5 g-cm ² max. Encoder only
Output Circuit:	Line Driver AM26C3IIB



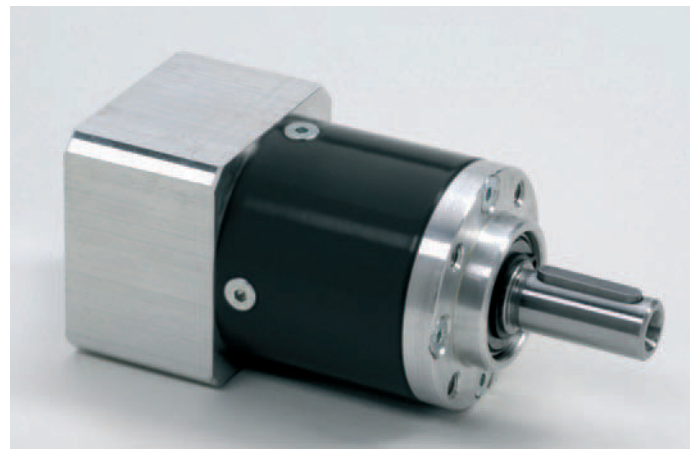
Encoder Connection Type A		Encoder Connection Type B	
Function	Color	Function	Color
DC 5 V	Red	DC 5 V	Red
GND	Blue	GND	Black
A Phase	Brown	A Phase	Brown
A-bar Phase	Orange	A-bar Phase	Orange
B Phase	Yellow	B Phase	Yellow
B-bar Phase	Gray	B-bar Phase	White

PLANETARY GEAR PRODUCT

OVERVIEW:

Model	Stages	i		max. Torque	for Step Motor	Size Page
		from	to			
● PLI40	1-stage / 1-stufig	3	7	3 Nm	SECM243...245 HECM244...246	15
	2-stage / 2-stufig	14	46	7.5 Nm		
	3-stage / 3-stufig	51	308	15 Nm		

Model	Stages	i		max. Torque	for Step Motor	Size Page
		from	to			
● PLD40	1-stage / 1-stufig	4	9	8 Nm	SECM243...245 HECM244...246	15
	2-stage / 2-stufig	16	49	15 Nm		
	3-stage / 3-stufig	64	1000	15 Nm		



PLANETARY GEAR PRODUCT CODE:

PLI 40 3 24

Gear Flange:
Getriebeflansch:

= for SECM243-245 and HECM244-246
= for SECM243-245 und HECM244-246

Number of Gear Ratio:
Untersetzung:

= from $i = 3$ up to $i = 1000$
= von $i = 3$ bis $i = 1000$

Gear-Size:
Getriebedurchmesser:

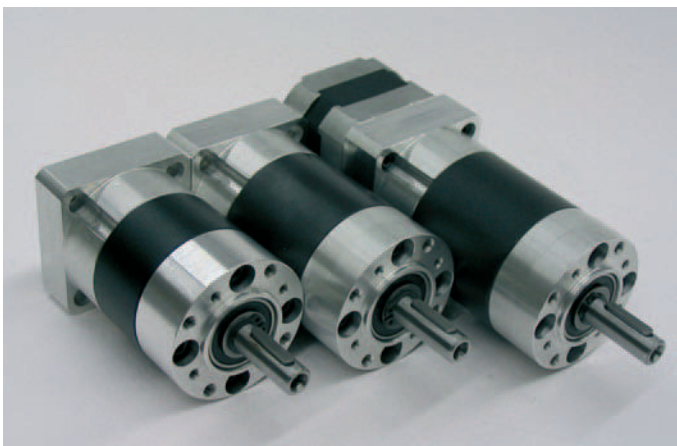
= PLI40 approx. Ø 4cm
= PLI40 ca. Ø 4cm

PLD40 approx. Ø 4cm
PLD40 ca. Ø 4cm

Planetary Gear Type:
Planetengetriebetyp:

= PLI = non integer Gear Ratio
= PLI = kein ganzzahliges
Untersetzungsverhältnis

PLD = integer Gear Ratio
PLD = ganzzahliges
Untersetzungsverhältnis



PLANETARY GEARS

SPECIFICATIONS

Size / Baugröße		● PLI40	i	i ⁽¹⁾	z ⁽²⁾	Size Page
<p>Nominal Output Torque T2N</p> <p>Abtriebs-Drehmoment T2N</p> <p>initial speed/ Eingangsdrehzahl = 3000 min⁻¹</p>	[Nm]	3.0	(3.70)	3	1	15
		3.0	(4.28)	4		
		3.0	(5.18)	5		
		3.0	(6.75)	7		
		7.5	(13.73)	14	2	
		7.5	(15.88)	16		
		7.5	(18.36)	18		
		7.5	(19.20)	19		
		7.5	(22.20)	22		
		7.5	(25.01)	25		
		7.5	(26.85)	27		
		7.5	(28.93)	29		
		7.5	(34.97)	35		
		7.5	(45.56)	46		
		15	(50.89)	51	3	
		15	(58.85)	59		
		15	(68.06)	68		
		15	(71.16)	71		
		15	(78.71)	79		
		15	(92.70)	93		
		15	(95.17)	95		
		15	(99.50)	100		
		15	(107.20)	107		
		15	(115.07)	115		
		15	(123.97)	124		
		15	(129.62)	130		
		15	(139.13)	139		
		15	(149.90)	150		
		15	(168.84)	169		
		15	(181.24)	181		
		15	(195.26)	195		
		15	(236.09)	236		
		15	(307.54)	308		

Size / Baugröße		● PLD40	i		z ⁽²⁾	Size Page
<p>Nominal Output Torque T2N</p> <p>Abtriebs-Drehmoment T2N</p> <p>initial speed/ Eingangsdrehzahl = 300 min⁻¹</p>	[Nm]	8	4	<p>Reduction ratios printed in bold → Standard Series Fett gedruckte Übersetzungen → Vorzugsreihe</p>	1	15
		8	5			
		8	7			
		8	9			
		15	16		2	
		15	20			
		15	25			
		15	28			
		15	35			
		15	49			
		15	64			
		15	80			
		15	100			
		15	140			
		15	175		3	
		15	245			
		15	343			
		15	729			
		15	1000			

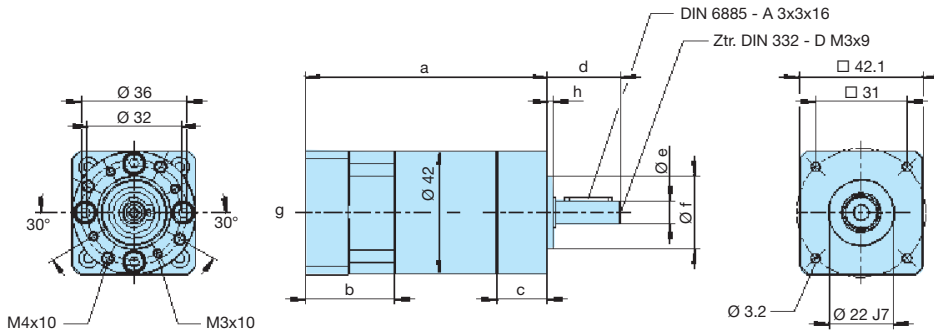
(1) = Ratios Rounded (1) = Übersetzungen gerundet

(2) = Number of Stages (2) = Anzahl der Getriebestufen

DIMENSIONS

UNIT = mm

● PLI 40



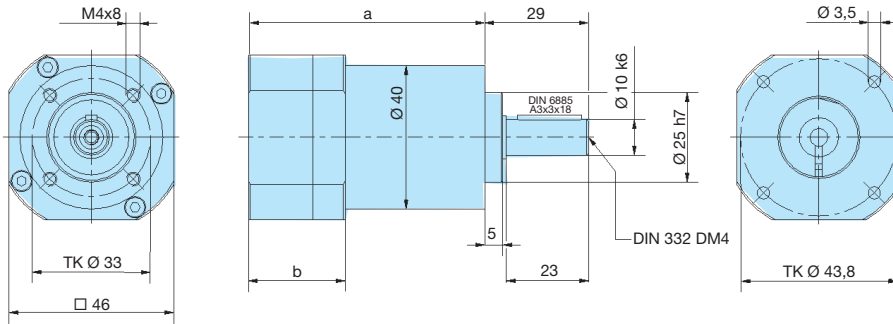
for SECM24... Stepping Motor

a = 69.5 mm (1 stage / 1 stufig)
 a = 82.5 mm (2 stage / 2 stufig)
 a = 95.5 mm (3 stage / 3 stufig)
 b = 30.5 mm e = 8 h 7
 c = 17.1 mm f = 25 h 9
 d = 25.0 mm h = 2 mm

for HECM24... Stepping Motor

a = 69.5 mm (1 stage / 1 stufig)
 a = 82.5 mm (2 stage / 2 stufig)
 a = 95.5 mm (3 stage / 3 stufig)
 b = 30.5 mm e = 8 h 7
 c = 17.1 mm f = 25 h 9
 d = 25.0 mm h = 2 mm

● PLD 40



for SECM24... Stepping Motor

a = 95 mm (1 stage / 1 stufig)
 a = 111 mm (2 stage / 2 stufig)
 a = 124 mm (3 stage / 3 stufig)
 b = 27 mm (1+2 stage / 1+2 stufig)
 b = 24 mm (3 stage / 3 stufig)

for HECM24... Stepping Motor

a = 95 mm (1 stage / 1 stufig)
 a = 111 mm (2 stage / 2 stufig)
 a = 124 mm (3 stage / 3 stufig)
 b = 27 mm (1+2 stage / 1+2 stufig)
 b = 24 mm (3 stage / 3 stufig)

Size / Baugröße		● PLI40	● PLD40	
efficiency / Wirkungsgrad		0.80	0.96	1-stage / 1-stufig
		0.75	0.94	2-stage / 2-stufig
		0.70	0.90	3-stage / 3-stufig
weight / Gewicht	[kg]	0.4	0.3	1-stage / 1-stufig
		0.5	0.4	2-stage / 2-stufig
		0.6	0.5	3-stage / 3-stufig
max. radial load / max. Radialkraft	[N]	160	220	1-stage / 1-stufig
max. axial load / max. Axialkraft	[N]	50	330	
max. radial load / max. Radialkraft	[N]	230	220	2-stage / 2-stufig
max. axial load / max. Axialkraft	[N]	80	330	
max. radial load / max. Radialkraft	[N]	300	220	3-stage / 3-stufig
max. axial load / max. Axialkraft	[N]	110	330	
backlash / Verdrehspiel	[deg]	0.80°	0.33°	1-stage / 1-stufig
		0.85°	0.42°	2-stage / 2-stufig
		0.90°	0.5°	3-stage / 3-stufig
initial speed / Eingangsdrehzahl		3000 min ⁻¹	300 min ⁻¹	
operating temp. / Betriebstemp.	[°C]	PLI40 = -30 up to +140 / -30 bis +140		
		PLD40 = -25 up to +90 shortly + 120 / -25 bis +90 kurzfristig + 120		
lubrication / Schmierung		Life time grease lubrication / Lebensdauer-Fettschmierung		

ECMD241... 0.5 - 1.25 A | 24 - 40 VDC



Steps/Revolution / Schritte/Umdrehung	1/1 - 1/2 - 1/4 - 1/16 Step
Supply Voltage / Eingangsspannung	from 24 VDC up to 40 VDC
Phase Current / Phasenstrom	from 0.5 A / Phase up to 1.25 A / Phase
Input Signal / Eingangssignal	from 3.5 VDC up to 24 VDC
Inputs / Eingänge	Puls, Direction, Gate, Reset
Dimensions / Abmessungen	L: / W: / H: 72mm / 72mm / 10mm
Features e.g. / Eigenschaften z.B.	automatic current down function
for following Stepmotor-Series / für folgende Schrittmotorserien	HECM21... HECM22... HECM24... SECM24...

ECMD242... 1.0 - 2.5 A | 24 - 40 VDC



Steps/Revolution / Schritte/Umdrehung	1/1 - 1/2 - 1/4 - 1/16 Step
Supply Voltage / Eingangsspannung	from 24 VDC up to 40 VDC
Phase Current / Phasenstrom	from 1.0 A / Phase up to 2.5 A / Phase
Input Signal / Eingangssignale	from 3.5 VDC up to 24 VDC
Inputs / Eingänge	Puls, Direction, Gate, Reset
Dimensions / Abmessungen	L: / W: / H: 72mm / 72mm / 10mm
Features e.g. / Eigenschaften z.B.	automatic current down function
for following Stepmotor-Series / für folgende Schrittmotorserien	HECM21... HECM22... HECM24... SECM24...



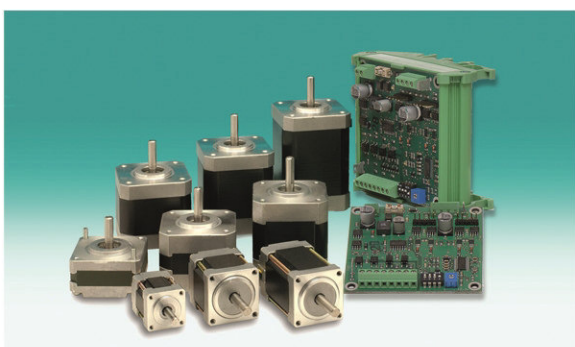
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