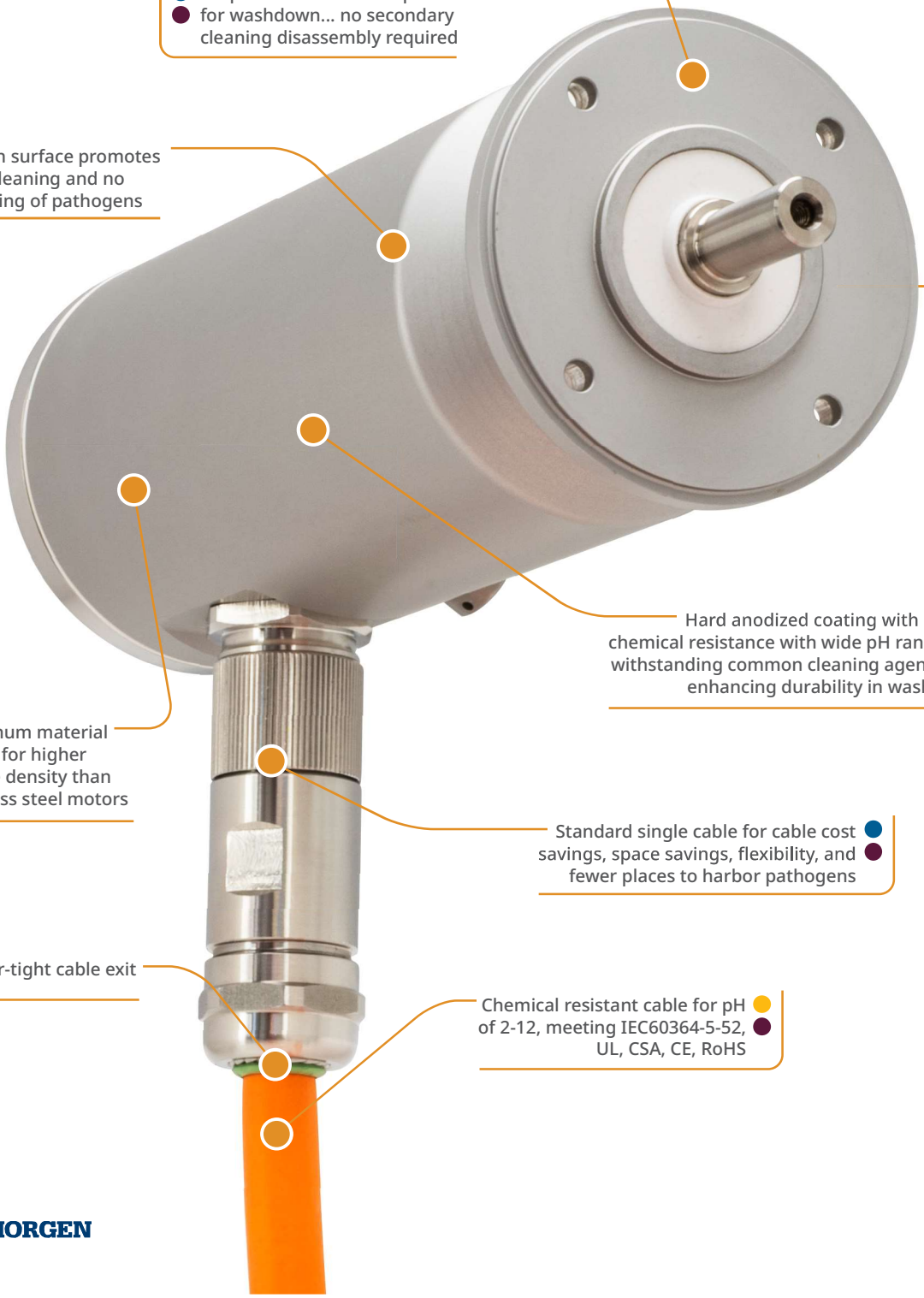
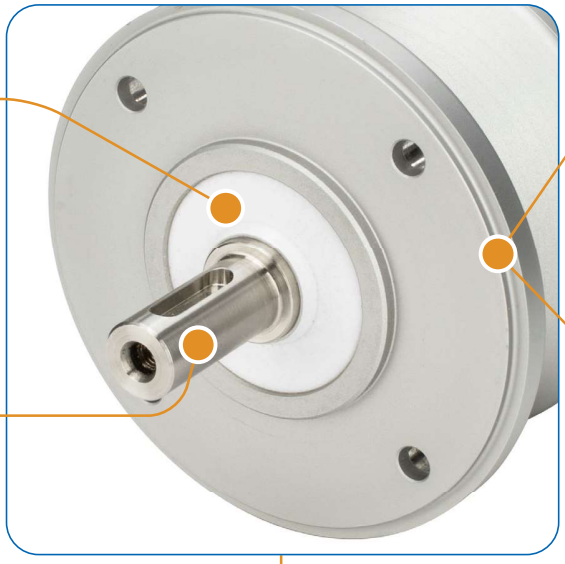
AKMA™ Design Features

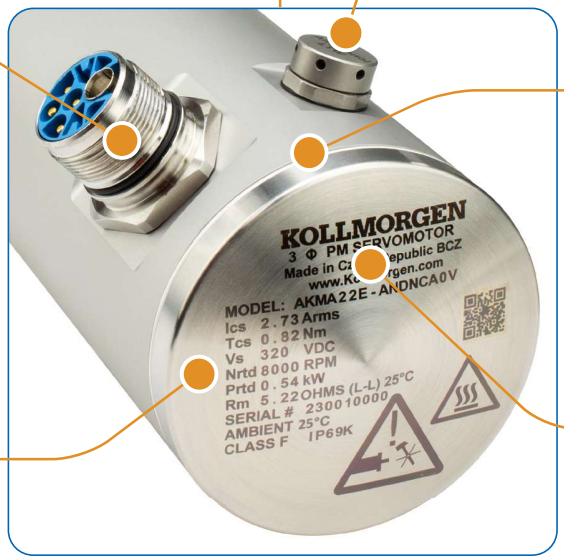
The key benefits of AKMA hygienic design features:

- Reduces risk of food recall
- Increases reliability in wash-down applications
- Reduces cleaning time: higher OEE





- Hygienic, IP69K shaft seal, special shaft treatment for long life
- Flange Mount for easy mounting
- Flange compatible with common gearboxes
- Stainless steel shaft with high durability & capability to meet functional safety requirement



- Unique vented connector design equalizes pressure in and outside the motor to prevent condensation inside the housing during changes of temperature
- Standard connector for easy mounting & maintenance
- Viton or EPDM O-ring and gasket sealing with FDA approved materials
- Hygienic marking method eliminates harboring of pathogens
- Conical end cover to eliminate water puddling, even in vertical mounting

AKMA™ Performance Overiew

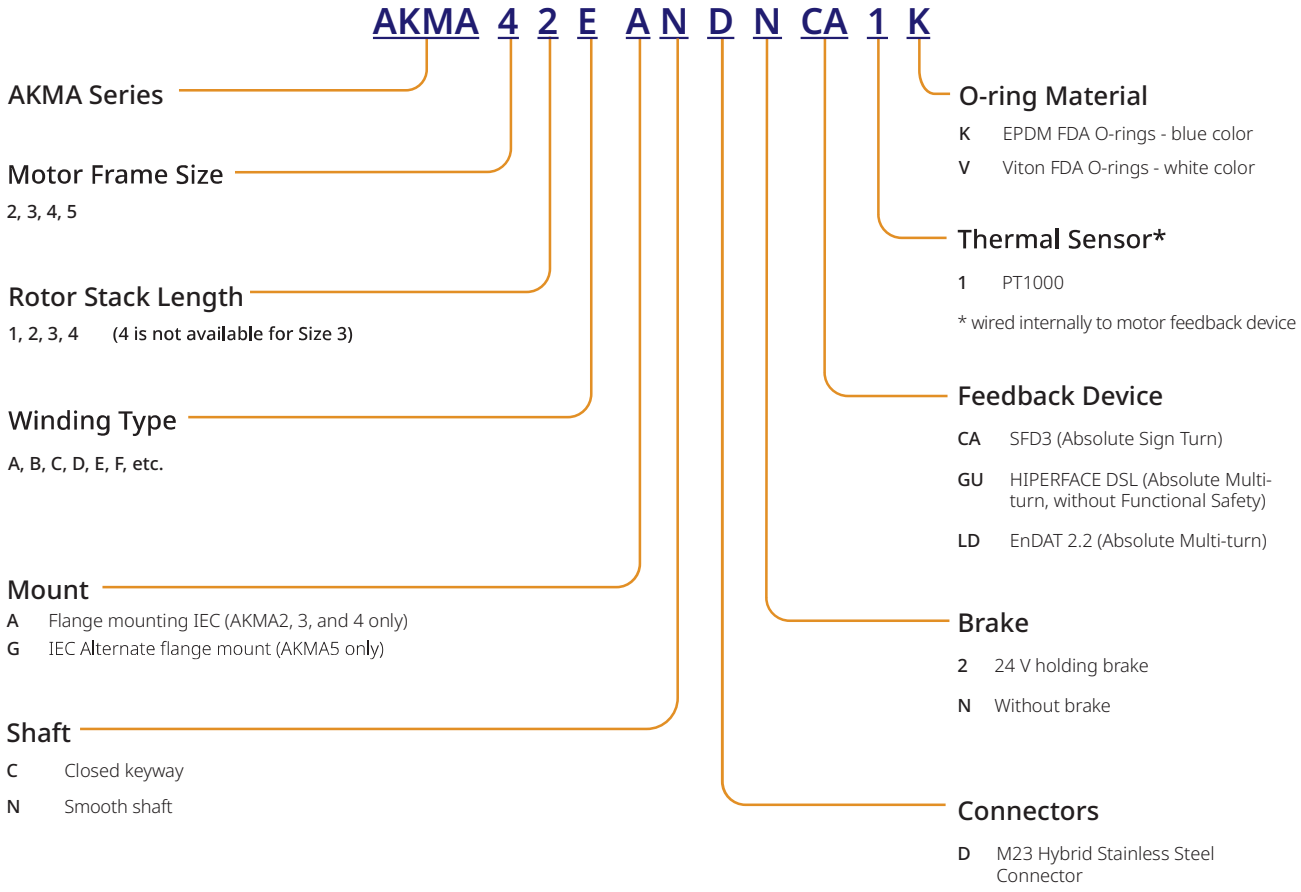
			AKMA2x				AKMA3x		
Parameters	Sym	Units	1	2	3	4	1	2	3
Continuous Torque	T_c	Nm	0.45	0.82	1.13	1.36	1.18	2.05	2.84
Rated Speed	N_{rtd}	rpm	8000	8000	8000	8000	6000	6000	5500
Rotor Inertia	J_r	kg·cm^2	0.11	0.16	0.22	0.27	0.33	0.59	0.85

			AKMA4x				AKMA5x			
Parameters	Sym	Units	1	2	3	4	1	2	3	4
Continuous Torque	T_c	Nm	1.89	3.39	4.63	5.63	4.62	8.20	10.9	13.4
Rated Speed	N_{rtd}	rpm	6000	6000	6000	6000	6000	6000	6000	6000
Rotor Inertia	J_r	kg·cm^2	0.81	1.5	2.1	2.7	3.4	6.2	9.1	12.0

Values shown are representative of each model. For exact information refer to the selection guide, installation manual, Motioneering and design tools.

AKMA Servo Motor Nomenclature

AKMA Brushless Servo Motor



AKMA2x Performance Data

AKMA2x Performance Data – Up to 640 Vdc

					AKMA21			AKMA22			AKMA23				AKMA24			
	Parameters	Tol	Symbol	Units	C	E	G	C	E	G	C	D	E	F	C	D	E	F
	Max Rated Voltage	Max	Vbus	V_{AC}	240	120	120	480	240	120	480	480	240	240	480	480	240	240
				V_{DC}	320	160	160	640	320	160	640	640	320	320	640	640	320	320
	Continuous Torque (Stall) for ΔT winding = 100°C ①②④⑦	Nom	T_{cs}	Nm	0.43	0.44	0.45	0.79	0.81	0.82	1.08	1.10	1.11	1.13	1.32	1.35	1.35	1.36
				lb-in	3.8	3.9	4.0	7.0	7.2	7.3	9.6	9.7	9.9	10.0	11.7	11.9	12.0	12.0
	Continuous Current (Stall) for ΔT winding = 100°C ①②④⑦	Nom	I_{cs}	A_{rms}	1.58	3.11	4.87	1.39	2.73	4.82	1.41	2.19	2.78	4.31	1.42	2.21	2.79	3.89
	Continuous Torque (Stall) for ΔT winding = 60°C ②④⑦	Nom	T_{cs}	Nm	0.33	0.34	0.35	0.61	0.63	0.64	0.84	0.85	0.86	0.87	1.03	1.04	1.05	1.05
				lb-in	2.9	3.0	3.1	5.4	5.6	5.6	7.4	7.5	7.6	7.7	9.1	9.2	9.3	9.3
	Max Mechanical Speed ⑤	Nom	N_{max}	rpm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
	Peak Torque ①②	Nom	T_p	Nm	1.47	1.49	1.51	2.73	2.76	2.79	3.77	3.84	3.86	3.88	4.73	4.76	4.79	4.82
				lb-in	13.0	13.2	13.4	24.2	24.4	24.7	33.4	34.0	34.2	34.3	41.9	42.1	42.4	42.7
	Peak Current	Nom	I_p	A_{rms}	6.3	12.4	19.5	5.6	10.9	19.3	5.6	8.8	11.1	17.2	5.7	8.8	11.2	15.6
Maximum Rated Bus Voltage	120 V_{AC} / 160 V_{DC}																	
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	0.41	0.37	0.36	0.78	0.76	0.69	1.06	1.07	1.05	1.02	-	1.31	1.29	1.28
				lb-in	3.6	3.2	3.2	6.9	6.7	6.1	9.4	9.5	9.3	9.1	-	11.6	11.4	11.4
	Rated Speed		N_{rtd}	rpm	2500	7000	8000	1000	3500	7000	1000	1500	2500	4500	-	1500	2000	3000
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.11	0.27	0.30	0.08	0.28	0.50	0.11	0.17	0.28	0.48	-	0.21	0.27	0.40
				Hp	0.14	0.36	0.40	0.11	0.37	0.67	0.15	0.23	0.37	0.65	-	0.28	0.36	0.54
	240 V_{AC} / 320 V_{DC}																	
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	0.34	-	-	0.73	0.65	-	1.03	0.98	0.93	0.89	1.27	1.24	1.19	1.07
				lb-in	3.0	-	-	6.5	5.7	-	9.1	8.7	8.3	7.9	11.3	11.0	10.6	9.5
	Rated Speed		N_{rtd}	rpm	8000	-	-	3500	8000	-	2500	5000	6500	8000	2000	4000	5500	8000
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.28	-	-	0.27	0.54	-	0.27	0.51	0.64	0.75	0.27	0.52	0.69	0.90
				Hp	0.38	-	-	0.36	0.73	-	0.36	0.69	0.85	1.00	0.36	0.70	0.92	1.21
	400 V_{AC} / 560 V_{DC}																	
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	-	-	-	0.63	-	-	0.94	0.87	-	-	1.20	1.06	-	-
				lb-in	-	-	-	5.6	-	-	8.3	7.7	-	-	10.6	9.4	-	-
	Rated Speed		N_{rtd}	rpm	-	-	-	8000	-	-	5500	8000	-	-	4500	8000	-	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	-	-	-	0.53	-	-	0.54	0.73	-	-	0.57	0.89	-	-
				Hp	-	-	-	0.71	-	-	0.73	0.98	-	-	0.76	1.19	-	-
	480 V_{AC} / 640 V_{DC}																	
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	-	-	-	0.63	-	-	0.90	0.87	-	-	1.17	1.06	-	-
				lb-in	-	-	-	5.6	-	-	8.0	7.7	-	-	10.4	9.4	-	-
	Rated Speed		N_{rtd}	rpm	-	-	-	8000	-	-	7000	8000	-	-	5500	8000	-	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	-	-	-	0.53	-	-	0.66	0.73	-	-	0.68	0.89	-	-
				Hp	-	-	-	0.71	-	-	0.89	0.98	-	-	0.91	1.19	-	-

See following page for notes.

AKMA2x Performance Data – Up to 640 Vdc (Continued)

				AKMA21			AKMA22			AKMA23				AKMA24			
Parameters	**Tol**	**Symbol**	**Units**	**C**	**E**	**G**	**C**	**E**	**G**	**C**	**D**	**E**	**F**	**C**	**D**	**E**	**F**
Torque Constant ①②	±10%	K_t	Nm/A_{rms}	0.30	0.16	0.10	0.61	0.32	0.18	0.80	0.52	0.42	0.27	0.97	0.63	0.50	0.36
			$lb\text{-}in/A_{rms}$	2.7	1.4	0.9	5.4	2.8	1.6	7.1	4.6	3.7	2.4	8.6	5.6	4.5	3.2
Back EMF Constant ⑥	±10%	K_e	$V_{rms}/krpm$	19.5	10.2	6.6	39.0	20.4	11.7	51.8	33.8	27.0	17.6	62.4	40.8	32.5	23.4
Motor Constant ①	Nom	K_m	$N\text{-}m/\sqrt{W}$	0.07	0.07	0.07	0.11	0.11	0.11	0.14	0.14	0.15	0.14	0.18	0.17	0.17	0.17
			$lb\text{-}in/\sqrt{W}$	0.61	0.62	0.61	0.98	1.00	0.98	1.26	1.28	1.28	1.28	1.55	1.53	1.55	1.52
Resistance (line-line) ⑥	±10%	R_m	ohm	13.00	3.42	1.44	19.98	5.22	1.77	21.23	8.77	5.44	2.34	20.40	9.02	5.44	2.94
Inductance (line-line)		L	mH	19.0	5.2	2.2	35.5	9.7	3.2	40.7	17.3	11.1	4.7	43.8	18.7	11.8	6.2
Inertia (includes feedback) ③	±10%	J_m	$kg\text{-}cm^2$	0.11			0.16			0.22				0.27			
			$lb\text{-}in\text{-}s^2$	9.7E-05			1.4E-04			1.9E-04				2.4E-04			
Optional Brake Inertia (additional)	±10%	J_m	$kg\text{-}cm^2$	0.013			0.013			0.013				0.013			
			$lb\text{-}in\text{-}s^2$	1.2E-05			1.2E-05			1.2E-05				1.2E-05			
Weight ⑧		W	kg	1.7			2.0			2.3				2.7			
			lb	3.7			4.4			5.1				6.0			
Static Friction ①		T_f	Nm	0.049			0.051			0.054				0.057			
			lb-in	0.43			0.44			0.48				0.50			
Viscous Damping ①		K_{dv}	Nm/krpm	0.005			0.006			0.007				0.007			
			lb-in/krpm	0.04			0.05			0.06				0.07			
Thermal Time Constant		TCT	minutes	8			9			10				11			
Thermal Resistance		$R_{thw\text{-}a}$	°C/W	1.43			1.19			1.10				1.07			
Pole Pairs				3			3			3				3			
Heat Sink Size				10"x10"x0.25" Aluminum Plate			10"x10"x0.25" Aluminum Plate			10"x10"x0.25" Aluminum Plate				10"x10"x0.25" Aluminum Plate			

Notes:
① Motor winding temperature rise, ΔT=100°C, at 40 °C ambient.
② All data referenced to sinusoidal commutation.
③ Add holding brake if applicable for total inertia.
④ Motor with 125 °C rated feedback and standard heat sink.
⑤ May be limited at some values of Vbus.
⑥ Measured at 25°C.
⑦ Brake option reduces continuous torque rating by:
AKMA21 = 0.00 Nm AKMA22 = 0.02 Nm AKMA23 = 0.05 Nm AKMA24 = 0.12 Nm
⑧ Brake option increases weight by 0.5 kg (1.1 lb)

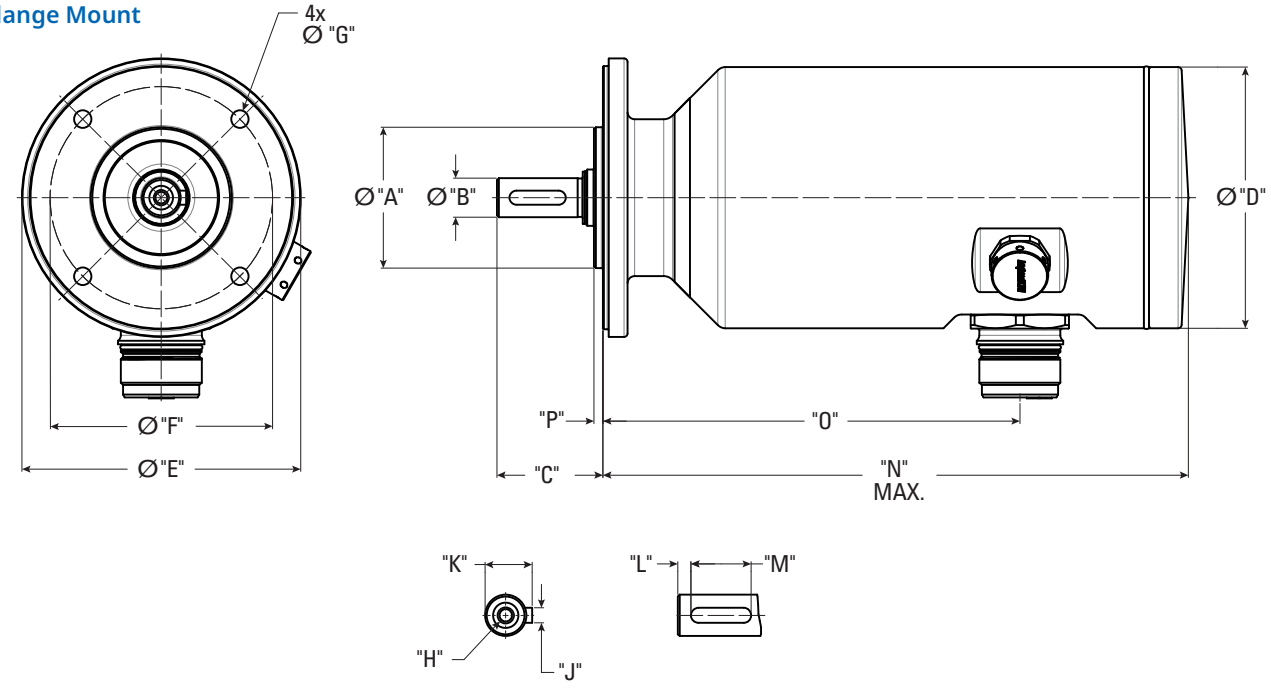
*Complete AKMA series model nomenclature can be found on page 9.

AKMA2x Dimensional Data

AKMA 2 2 C – AN D N CA 1 K*
Motor Series | Frame Size | Stack Length | Winding | Mount/Shaft | Connection | Brake | Feedback | Thermal Sensor | Seal

AKMA2x Frame

Flange Mount



AKMA2x Dimension Data

Code	Shaft	Pilot Dia. "A"	Shaft Dia. "B"	Shaft Length "C"	Motor Body Dia. "D"	Flange Dia. "E"	Bolt Circle Dia. "F"	Bolt Hole Dia. "G"
AC	Keyway	Ø40j6	Ø11k6	30	74	79	63	4.8 +0.30/-0.0
AN	Smooth	Ø40j6	Ø11k6	30	74	79	63	4.8 +0.30/-0.0

Code	"H"	Key Height "J"	Key Width "K"	"L"	Key Length "M"	Pilot Height "P"
AC	M4 DIN332	x	x	x	x	2.5
AN	M4 DIN332	12.5 +0/-0.13	4N9	3.5	16 +0/-0.20	2.5

	Connector Position "O"		Motor Length "N"	
MODEL	W/O Brake	W/ Brake	W/O Brake	W/ Brake
AKMA21	118.2	164.8	166.2	212.8
AKMA22	137.2	183.8	185.2	231.8
AKMA23	156.2	202.8	204.2	250.8
AKMA24	175.2	221.8	223.2	269.8

Dimensions are in mm.

*Complete AKMA series model nomenclature can be found on page 9.

AKMA3x Performance Data

AKMA3x Performance Data – Up to 640 Vdc

					AKMA31			AKMA32				AKMA33		
	Parameters	Tol	Symbol	Units	C	E	H	C	D	E	H	C	E	H
	Max Rated Voltage	Max	Vbus	V_{AC}	480	240	120	480	480	480	240	480	480	240
				V_{DC}	640	320	160	640	640	640	320	640	640	320
	Continuous Torque (Stall) for ΔT winding = 100°C ①②④⑦	Nom	T_{cs}	Nm	1.10	1.15	1.18	1.95	1.98	1.99	2.05	2.66	2.75	2.84
				lb-in	9.8	10.2	10.5	17.2	17.5	17.6	18.2	23.6	24.3	25.1
	Continuous Current (Stall) for ΔT winding = 100°C ①②④⑦	Nom	I_{cs}	A_{rms}	1.37	2.99	5.85	1.44	2.23	2.82	5.50	1.47	2.58	5.62
	Continuous Torque (Stall) for ΔT winding = 60°C ②④⑦	Nom	T_{cs}	Nm	0.85	0.89	0.92	1.51	1.53	1.54	1.59	2.06	2.13	2.20
				lb-in	7.6	7.9	8.1	13.4	13.6	13.7	14.1	18.3	18.9	19.4
	Max Mechanical Speed ⑤	Nom	N_{max}	rpm	8000	8000	8000	8000	8000	8000	8000	8000	8000	8000
	Peak Torque ①②	Nom	T_p	Nm	3.88	4.00	4.06	7.01	7.06	7.12	7.26	9.76	9.96	10.21
				lb-in	34.3	35.4	35.9	62.0	62.5	63.0	64.3	86.4	88.1	90.4
	Peak Current	Nom	I_p	A_{rms}	5.5	12.0	23.4	5.8	8.9	11.3	22.0	5.9	10.3	22.5
Maximum Rated Bus Voltage	120 V_{AC} / 160 V_{DC} Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	-	1.12	0.92	-	1.95	1.96	1.91	-	-	2.61
				lb-in	-	9.9	8.2	-	17.3	17.4	16.9	-	-	23.1
	Rated Speed		N_{rtd}	rpm	-	2500	6000	-	1000	1000	3000	-	-	2500
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	-	0.29	0.58	-	0.20	0.21	0.60	-	-	0.68
				Hp	-	0.39	0.78	-	0.27	0.28	0.81	-	-	0.92
	240 V_{AC} / 320 V_{DC} Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	1.07	0.90	-	1.90	1.88	1.86	1.40	2.59	2.57	2.22
				lb-in	9.5	8.0	-	16.8	16.7	16.5	12.4	22.9	22.8	19.7
	Rated Speed		N_{rtd}	rpm	2500	6000	-	1500	2500	3000	7000	1000	2000	5500
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.28	0.57	-	0.30	0.49	0.59	1.03	0.27	0.54	1.28
				Hp	0.38	0.76	-	0.40	0.66	0.78	1.38	0.36	0.72	1.72
	400 V_{AC} / 560 V_{DC} Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	0.95	-	-	1.81	1.60	1.45	-	2.49	2.29	-
				lb-in	8.4	-	-	16.0	14.2	12.9	-	22.1	20.3	-
	Rated Speed		N_{rtd}	rpm	5000	-	-	3000	5500	6500	-	2000	4500	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.50	-	-	0.57	0.92	0.99	-	0.52	1.08	-
				Hp	0.67	-	-	0.76	1.24	1.33	-	0.70	1.45	-
	480 V_{AC} / 640 V_{DC} Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	0.86	-	-	1.78	1.53	1.17	-	2.45	2.22	-
				lb-in	7.6	-	-	15.8	13.6	10.4	-	21.7	19.7	-
	Rated Speed		N_{rtd}	rpm	6000	-	-	3500	6000	8000	-	2500	5000	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.54	-	-	0.65	0.96	0.98	-	0.64	1.16	-
				Hp	0.73	-	-	0.88	1.29	1.32	-	0.86	1.56	-

See following page for notes.

AKMA3x Performance Data – Up to 640 Vdc (Continued)

				AKMA31			AKMA32				AKMA33		
Parameters	**Tol**	**Symbol**	**Units**	**C**	**E**	**H**	**C**	**D**	**E**	**H**	**C**	**E**	**H**
Torque Constant ①②	±10%	K_t	Nm/A_{rms}	0.85	0.41	0.21	1.40	0.92	0.73	0.39	1.86	1.10	0.52
			$lb\text{-}in/A_{rms}$	7.5	3.6	1.9	12.3	8.1	6.5	3.4	16.5	9.7	4.6
Back EMF Constant ⑥	±10%	K_e	$V_{rms}/krpm$	54.5	26.1	13.7	89.8	59.0	47.1	24.8	120.0	70.6	33.4
Motor Constant ①	Nom	K_m	$N\text{-}m/\sqrt{W}$	0.149	0.152	0.151	0.234	0.233	0.235	0.239	0.295	0.298	0.299
			$lb\text{-}in/\sqrt{W}$	1.32	1.35	1.34	2.07	2.06	2.08	2.12	2.61	2.64	2.64
Resistance (line-line) ⑥	±10%	R_m	ohm	21.40	4.74	1.29	23.76	10.30	6.32	1.69	26.59	9.01	1.96
Inductance (line-line)		L	mH	37.5	8.6	2.4	46.5	20.1	12.8	3.5	53.6	18.5	4.1
Inertia (includes feedback) ③	±10%	J_m	$kg\text{-}cm^2$	0.33			0.59				0.85		
			$lb\text{-}in\text{-}s^2$	2.9E-04			5.2E-04				7.5E-04		
Optional Brake Inertia (additional)	±10%	J_m	$kg\text{-}cm^2$	0.014			0.014				0.014		
			$lb\text{-}in\text{-}s^2$	1.2E-05			1.2E-05				1.2E-05		
Weight ⑧		W	kg	2.3			3.1				3.8		
			lb	5.1			6.8				8.4		
Static Friction ①		T_f	Nm	0.061			0.067				0.073		
			lb-in	0.54			0.59				0.65		
Viscous Damping ①		K_{dv}	Nm/krpm	0.002			0.003				0.004		
			lb-in/krpm	0.02			0.03				0.04		
Thermal Time Constant		TCT	minutes	14			17				20		
Thermal Resistance		$R_{thw\text{-}a}$	°C/W	1.11			0.92				0.78		
Pole Pairs				4			4				4		
Heat Sink Size				10"x10"x0.25" Aluminum Plate			10"x10"x0.25" Aluminum Plate				10"x10"x0.25" Aluminum Plate		

Notes:
① Motor winding temperature rise, ΔT=100°C, at 40 °C ambient.
② All data referenced to sinusoidal commutation.
③ Add holding brake if applicable for total inertia.
④ Motor with 125 °C rated feedback and standard heat sink.
⑤ May be limited at some values of Vbus.
⑥ Measured at 25°C.
⑦ Brake option reduces continuous torque rating by:
AKMA31 = 0.00 Nm AKMA32 = 0.1 Nm AKMA33 = 0.2 Nm
⑧ Brake option increases weight by 0.6 kg (1.3 lb)

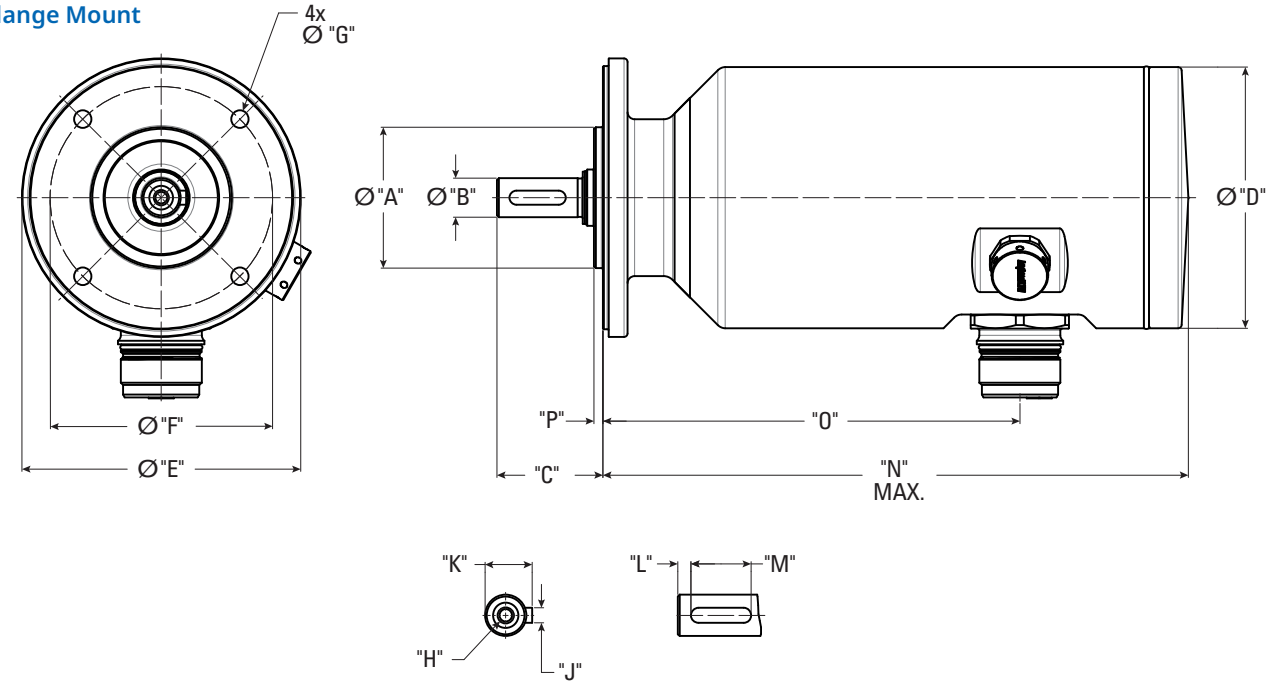
*Complete AKMA series model nomenclature can be found on page 9.

AKMA3x Dimensional Data

AKMA 3 2 C – AN D N CA 1 K*
Motor Series | Frame Size | Stack Length | Winding | Mount/Shaft | Connection | Brake | Feedback | Thermal Sensor | Seal

AKMA3x Frame

Flange Mount



AKMA2x Dimension Data

Code	Shaft	Pilot Dia. "A"	Shaft Dia. "B"	Shaft Length "C"	Motor Body Dia. "D"	Flange Dia. "E"	Bolt Circle Dia. "F"	Bolt Hole Dia. "G"
AC	Keyway	Ø60j6	Ø14k6	30	85	89	75	5.8 +0.30/-0.0
AN	Smooth	Ø60j6	Ø14k6	30	85	89	75	5.8 +0.30/-0.0

Code	"H"	Key Height "J"	Key Width "K"	"L"	Key Length "M"	Pilot Height "P"
AC	M5 DIN332	x	x	x	x	2.5
AN	M5 DIN332	16+0/-0.13	5N9	3.5	16 +0/-0.20	2.5

	Connector Position "O"		Motor Length "N"	
MODEL	W/O Brake	W/ Brake	W/O Brake	W/ Brake
AKMA31	118.3	156.3	166.4	204.3
AKMA32	149.3	187.3	197.4	235.3
AKMA33	180.3	218.3	228.4	266.34

Dimensions are in mm.

*Complete AKMA series model nomenclature can be found on page 9.

AKMA4x Performance Data

AKMA4x Performance Data – Up to 640 Vdc

					AKMA41			AKMA42				
Parameters	Tol	Symbol	Units		C	E	H	C	E	G	H	J
Max Rated Voltage	Max	Vbus	V_{AC}		480	480	240	480	480	480	240	240
			V_{DC}		640	640	320	640	640	640	320	320
Continuous Torque (Stall) for ΔT winding = 100°C ①②④⑦	Nom	T_{cs}	Nm		1.78	1.85	1.89	3.18	3.25	3.36	3.37	3.39
			lb-in		15.7	16.4	16.7	28.1	28.8	29.7	29.8	30.0
Continuous Current (Stall) for ΔT winding = 100°C ①②④⑦	Nom	I_{cs}	A_{rms}		1.39	2.73	5.36	1.37	2.66	4.68	5.83	8.16
Continuous Torque (Stall) for ΔT winding = 60°C ②④⑦	Nom	T_{cs}	Nm		1.38	1.43	1.46	2.46	2.52	2.60	2.61	2.63
			lb-in		12.2	12.7	12.9	21.8	22.3	23.0	23.1	23.2
Max Mechanical Speed ⑤	Nom	N_{max}	rpm		6000	6000	6000	6000	6000	6000	6000	6000
Peak Torque ①②	Nom	T_p	Nm		6.12	6.28	6.36	11.10	11.30	11.50	11.60	11.60
			lb-in		54.2	55.6	56.3	98.2	100.0	101.8	102.7	102.7
Peak Current	Nom	I_p	A_{rms}		5.8	11.4	22.4	5.6	11.0	19.2	24.0	33.7
Maximum Rated Bus Voltage: 120 V_{AC} / 160 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm		-	1.77	1.69	-	-	-	3.03	2.86
			lb-in		-	15.7	14.9	-	-	-	26.8	25.3
Rated Speed		N_{rtd}	rpm		-	1200	3000	-	-	-	2000	3000
Rated Power (speed) ①②④⑦		P_{rtd}	kW		-	0.22	0.53	-	-	-	0.63	0.90
			Hp		-	0.30	0.71	-	-	-	0.85	1.20
240 V_{AC} / 320 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm		1.71	1.65	1.45	-	2.95	2.73	2.55	2.21
			lb-in		15.1	14.6	12.8	-	26.1	24.2	22.6	19.5
Rated Speed		N_{rtd}	rpm		1200	3000	6000	-	1800	3500	4500	6000
Rated Power (speed) ①②④⑦		P_{rtd}	kW		0.21	0.52	0.91	-	0.56	1.00	1.20	1.39
			Hp		0.29	0.69	1.22	-	0.75	1.34	1.61	1.86
400 V_{AC} / 560 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm		1.60	1.41	-	2.93	2.64	2.18	-	-
			lb-in		14.2	12.5	-	25.9	23.4	19.3	-	-
Rated Speed		N_{rtd}	rpm		3000	6000	-	1500	3500	6000	-	-
Rated Power (speed) ①②④⑦		P_{rtd}	kW		0.50	0.89	-	0.46	0.97	1.37	-	-
			Hp		0.67	1.19	-	0.62	1.30	1.84	-	-
480 V_{AC} / 640 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm		1.57	1.41	-	2.85	2.55	2.18	-	-
			lb-in		13.9	12.5	-	25.2	22.6	19.3	-	-
Rated Speed		N_{rtd}	rpm		3500	6000	-	2000	4000	6000	-	-
Rated Power (speed) ①②④⑦		P_{rtd}	kW		0.58	0.89	-	0.60	1.07	1.37	-	-
			Hp		0.77	1.19	-	0.80	1.43	1.84	-	-

See following page for notes.

AKMA4x Performance Data – Up to 640 Vdc (Continued)

				AKMA41			AKMA42				
Parameters	**Tol**	**Symbol**	**Units**	**C**	**E**	**G**	**C**	**E**	**G**	**H**	**J**
Torque Constant ①②	±10%	K_t	Nm/A_{rms}	1.34	0.71	0.37	2.40	1.26	0.74	0.59	0.43
			$lb\text{-}in/A_{rms}$	11.9	6.3	3.3	21.2	11.1	6.5	5.3	3.8
Back EMF Constant ⑥	±10%	K_e	$V_{rms}/krpm$	86.3	45.6	23.7	154.3	80.9	47.5	38.3	27.5
Motor Constant ①	Nom	K_m	$N\text{-}m/\sqrt{W}$	0.24	0.24	0.24	0.37	0.37	0.38	0.37	0.39
			$lb\text{-}in/\sqrt{W}$	2.10	2.09	2.11	3.30	3.25	3.33	3.31	3.41
Resistance (line-line) ⑥	±10%	R_m	ohm	21.30	6.02	1.56	27.50	7.78	2.51	1.65	0.80
Inductance (line-line)		L	mH	66.1	18.4	5.0	97.4	26.8	9.2	6.0	3.1
Inertia (includes feedback) ③	±10%	J_m	$kg\text{-}cm^2$	0.81			1.50				
			$lb\text{-}in\text{-}s^2$	7.2E-04			1.3E-03				
Optional Brake Inertia (additional)	±10%	J_m	$kg\text{-}cm^2$	0.058			0.058				
			$lb\text{-}in\text{-}s^2$	5.1E-05			5.1E-05				
Weight ⑧		W	kg	3.7			4.9				
			lb	8.2			10.8				
Static Friction ①		T_f	Nm	0.085			0.097				
			lb-in	0.75			0.86				
Viscous Damping ①		K_{dv}	Nm/krpm	0.0090			0.0130				
			lb-in/krpm	0.08			0.12				
Thermal Time Constant		TCT	minutes	13			17				
Thermal Resistance		$R_{thw\text{-}a}$	°C/W	0.97			0.80				
Pole Pairs				5			5				
Heat Sink Size				10"x10"x0.25" Aluminum Plate			10"x10"x0.25" Aluminum Plate				

Notes:
① Motor winding temperature rise, ΔT=100°C, at 40 °C ambient.
② All data referenced to sinusoidal commutation.
③ Add holding brake if applicable for total inertia.
④ Motor with 125 °C rated feedback and standard heat sink.
⑤ May be limited at some values of Vbus.
⑥ Measured at 25°C.
⑦ Brake option reduces continuous torque rating by:
AKMA41 = 0.12 Nm AKMA42 = 0.26 Nm AKMA43 = 0.35 Nm AKMA44 = 0.46 Nm
⑧ Brake option increases weight by 1.3 kg (2.9 lb)

*Complete AKMA series model nomenclature can be found on page 9.

AKMA4x Performance Data

AKMA4x Performance Data – Up to 640 Vdc (Continued)

					AKMA43					AKMA44				
Parameters	Tol	Symbol	Units	E	G	H	K	L	E	G	H	K	L
Max Rated Voltage	Max	Vbus	V_{AC}	480	480	480	240	240	480	480	480	480	240
			V_{DC}	640	640	640	320	320	640	640	640	640	320
Continuous Torque (Stall) for ΔT winding = 100°C ①②④⑦	Nom	T_{cs}	Nm	4.43	4.53	4.55	4.63	4.46	5.39	5.51	5.52	5.63	5.51
			lb-in	39.2	40.1	40.3	41.0	39.5	47.7	48.8	48.8	49.8	48.8
Continuous Current (Stall) for ΔT winding = 100°C ①②④⑦	Nom	I_{cs}	A_{rms}	2.64	4.67	5.23	9.19	10.70	2.70	4.73	5.34	8.38	9.59
Continuous Torque (Stall) for ΔT winding = 60°C ②④⑦	Nom	T_{cs}	Nm	3.43	3.51	3.52	3.59	3.45	4.17	4.27	4.27	4.36	4.27
			lb-in	30.4	31.0	31.2	31.7	30.6	36.9	37.8	37.8	38.6	37.8
Max Mechanical Speed ⑤	Nom	N_{max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Peak Torque ①②	Nom	T_p	Nm	15.90	16.10	16.10	16.40	16.00	20.20	20.30	20.20	20.50	20.20
			lb-in	140.7	142.5	142.5	145.1	141.6	178.8	179.7	178.8	181.4	178.8
Peak Current	Nom	I_p	A_{rms}	11.0	19.5	21.6	38.4	44.6	11.6	20.0	22.4	35.2	40.4
Maximum Rated Bus Voltage: 120 V_{AC} / 160 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	-	-	4.19	3.81	3.51	-	-	5.07	-	4.53
			lb-in	-	-	37.1	33.7	31.1	-	-	44.9	-	40.1
Rated Speed		N_{rtd}	rpm	-	-	1200	2500	3000	-	-	1000	-	2000
Rated Power (speed) ①②④⑦		P_{rtd}	kW	-	-	0.53	1.00	1.10	-	-	0.53	-	0.95
			Hp	-	-	0.71	1.34	1.48	-	-	0.71	-	1.27
240 V_{AC} / 320 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	3.97	3.73	3.59	2.35	2.26	4.85	4.53	4.29	3.47	2.81
			lb-in	35.1	33.0	31.8	20.8	20.0	42.9	40.1	38.0	30.7	24.9
Rated Speed		N_{rtd}	rpm	1500	2500	3000	6000	6000	1200	2000	2500	4000	5000
Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.62	0.98	1.13	1.48	1.42	0.61	0.95	1.12	1.45	1.47
			Hp	0.84	1.31	1.51	1.98	1.90	0.82	1.27	1.51	1.95	1.97
400 V_{AC} / 560 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	3.65	2.74	2.54	-	-	4.43	2.81	3.11	2.38	-
			lb-in	32.3	24.2	22.5	-	-	39.2	24.9	27.5	21.1	-
Rated Speed		N_{rtd}	rpm	2500	5000	5500	-	-	2000	5000	4500	6000	-
Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.96	1.43	1.46	-	-	0.93	1.47	1.46	1.49	-
			Hp	1.28	1.92	1.96	-	-	1.24	1.97	1.96	2.00	-
480 V_{AC} / 640 V_{DC} — Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	3.49	2.30	2.31	-	-	4.19	2.57	2.56	2.38	-
			lb-in	30.9	20.3	20.4	-	-	37.1	22.7	22.6	21.1	-
Rated Speed		N_{rtd}	rpm	3000	6000	6000	-	-	2500	5500	5500	6000	-
Rated Power (speed) ①②④⑦		P_{rtd}	kW	1.10	1.44	1.45	-	-	1.10	1.48	1.47	1.49	-
			Hp	1.47	1.94	1.95	-	-	1.47	1.98	1.98	2.00	-

See following page for notes.

AKMA4x Performance Data – Up to 640 Vdc (Continued)

				AKMA43					AKMA44				
Parameters	**Tol**	**Symbol**	**Units**	**E**	**G**	**H**	**K**	**L**	**E**	**G**	**H**	**K**	**L**
Torque Constant ①②	±10%	K_t	Nm/A_{rms}	1.72	0.99	0.89	0.52	0.43	2.04	1.19	1.06	0.69	0.59
			$lb\text{-}in/A_{rms}$	15.2	8.8	7.9	4.6	3.8	18.1	10.5	9.3	6.1	5.2
Back EMF Constant ⑥	±10%	K_e	$V_{rms}/krpm$	110.8	63.9	57.4	33.2	27.5	131.6	76.6	68.0	44.2	37.8
Motor Constant ①	Nom	K_m	$N\text{-}m/\sqrt{W}$	0.48	0.48	0.49	0.48	0.46	0.57	0.58	0.57	0.57	0.57
			$lb\text{-}in/\sqrt{W}$	4.24	4.28	4.29	4.28	4.04	5.02	5.14	5.05	5.06	5.01
Resistance (line-line) ⑥	±10%	R_m	ohm	8.61	2.81	2.20	0.74	0.57	8.64	2.80	2.23	0.94	0.70
Inductance (line-line)		L	mH	32.6	10.8	8.7	2.9	2.0	33.9	11.5	9.1	3.8	0.7
Inertia (includes feedback) ③	±10%	J_m	$kg\text{-}cm^2$	2.10					2.70				
			$lb\text{-}in\text{-}s^2$	1.9E-03					2.4E-03				
Optional Brake Inertia (additional)	±10%	J_m	$kg\text{-}cm^2$	0.058					0.058				
			$lb\text{-}in\text{-}s^2$	5.1E-05					5.1E-05				
Weight ⑧		W	kg	6.1					7.3				
			lb	13.4					16.1				
Static Friction ①		T_f	Nm	0.11					0.12				
			lb-in	0.96					1.07				
Viscous Damping ①		K_{dv}	Nm/krpm	0.017					0.021				
			lb-in/krpm	0.15					0.19				
Thermal Time Constant		TCT	minutes	20					24				
Thermal Resistance		$R_{thw\text{-}a}$	°C/W	0.70					0.65				
Pole Pairs				5					5				
Heat Sink Size				10"x10"x0.25" Aluminum Plate					10"x10"x0.25" Aluminum Plate				

Notes:
① Motor winding temperature rise, ΔT=100°C, at 40 °C ambient.
② All data referenced to sinusoidal commutation.
③ Add holding brake if applicable for total inertia.
④ Motor with 125 °C rated feedback and standard heat sink.
⑤ May be limited at some values of Vbus.
⑥ Measured at 25°C.
⑦ Brake option reduces continuous torque rating by:
AKMA41 = 0.12 Nm AKMA42 = 0.26 Nm AKMA43 = 0.35 Nm AKMA44 = 0.46 Nm
⑧ Brake option increases weight by 1.3 kg (2.9 lb)

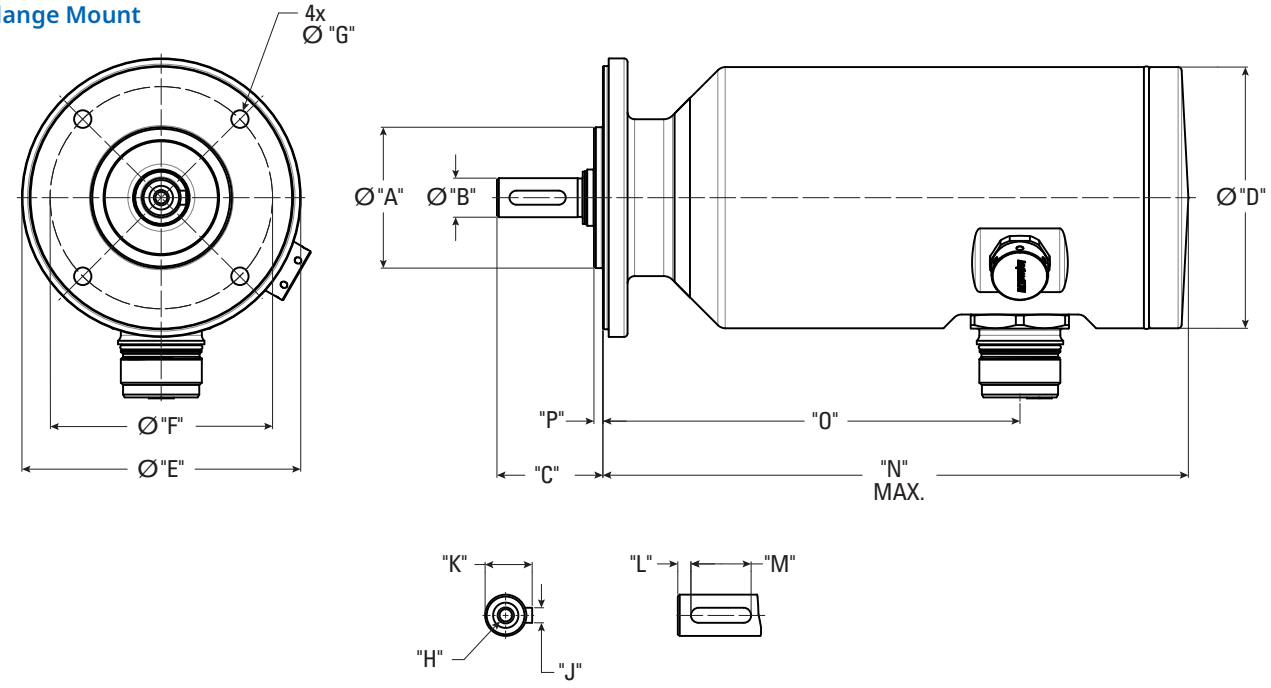
*Complete AKMA series model nomenclature can be found on page 9.

AKMA4x Dimensional Data

AKMA 4 2 C – AN D N CA 1 K*
Motor Series | Frame Size | Stack Length | Winding | Mount/Shaft | Connection | Brake | Feedback | Thermal Sensor | Seal

AKMA2x Frame

Flange Mount



AKMA4x Dimension Data

Code	Shaft	Pilot Dia. "A"	Shaft Dia. "B"	Shaft Length "C"	Motor Body Dia. "D"	Flange Dia. "E"	Bolt Circle Dia. "F"	Bolt Hole Dia. "G"
AC	Keyway	Ø80j6	Ø19k6	40	113	117	100	7 +0.3/-0.0
AN	Smooth	Ø80j6	Ø19k6	40	113	117	100	7 +0.3/-0.0

Code	"H"	Key Height "J"	Key Width "K"	"L"	Key Length "M"	Pilot Height "P"
AC	M6 DIN332	x	x	x	x	3.0
AN	M6 DIN332	21.5 +0/-0.13	6N9	4	25+0/-0.3	3.0

	Connector Position "O"		Motor Length "N"	
MODEL	W/O Brake	W/ Brake	W/O Brake	W/ Brake
AKMA41	122.7	165.9	171.4	214.5
AKMA42	151.7	194.9	200.4	243.5
AKMA43	180.7	223.9	229.4	272.5
AKMA44	209.7	252.9	258.4	301.5

Dimensions are in mm.

*Complete AKMA series model nomenclature can be found on page 9.

AKMA5x Performance Data

AKMA5x Performance Data – Up to 640 Vdc

					AKMA51					AKMA52				
	Parameters	Tol	Symbol	Units	E	G	H	K	L	E	G	H	L	M
	Max Rated Voltage	Max	Vbus	V_{AC}	480	480	480	240	240	480	480	480	480	240
				V_{DC}	640	640	640	320	320	640	640	640	640	320
	Continuous Torque (Stall) for ΔT winding = 100°C ①②④⑦	Nom	T_{cs}	Nm	4.42	4.47	4.51	4.62	4.61	7.87	7.96	8.01	8.20	8.13
				lb-in	39.1	39.6	39.9	40.9	40.8	69.6	70.4	70.9	72.6	72.0
	Continuous Current (Stall) for ΔT winding = 100°C ①②④⑦	Nom	I_{cs}	A_{rms}	2.67	4.68	5.85	9.17	11.53	2.89	4.54	5.68	11.16	12.60
	Continuous Torque (Stall) for ΔT winding = 60°C ②④⑦	Nom	T_{cs}	Nm	3.42	3.46	3.49	3.58	3.57	6.10	6.17	6.20	6.35	6.30
				lb-in	30.3	30.6	30.9	31.7	31.6	54.0	54.6	54.9	56.2	55.7
	Max Mechanical Speed ⑤	Nom	N_{max}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
	Peak Torque ①②	Nom	T_p	Nm	11.60	11.70	11.70	11.90	12.00	21.30	21.50	21.60	22.00	21.90
				lb-in	102.7	103.5	103.5	105.3	106.2	188.5	190.3	191.2	194.7	193.8
	Peak Current	Nom	I_p	A_{rms}	8.2	14.5	18.0	28.2	35.7	9.0	14.2	17.7	34.8	39.4
Maximum Rated Bus Voltage	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	-	-	4.18	3.87	3.67	-	-	-	7.42	-
				lb-in	-	-	37.0	34.2	32.5	-	-	-	65.7	-
	Rated Speed		N_{rtd}	rpm	-	-	1200	2500	3000	-	-	-	2500	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	-	-	0.53	1.01	1.15	-	-	-	1.94	-
				Hp	-	-	0.70	1.36	1.55	-	-	-	2.60	-
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	4.13	3.74	3.59	2.07	1.72	-	7.22	7.06	5.93	4.73
				lb-in	36.6	33.1	31.8	18.3	15.2	-	63.9	62.5	52.5	41.9
	Rated Speed		N_{rtd}	rpm	1200	2500	3000	5500	6000	-	1500	1800	3500	4500
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.52	0.98	1.13	1.19	1.08	-	1.13	1.33	2.17	2.23
				Hp	0.70	1.31	1.51	1.60	1.45	-	1.52	1.78	2.91	2.99
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	3.70	2.34	1.69	-	-	7.14	6.59	5.79	2.80	-
				lb-in	32.7	20.7	15.0	-	-	63.2	58.3	51.2	24.8	-
	Rated Speed		N_{rtd}	rpm	2500	5000	6000	-	-	1500	2500	3500	6000	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	0.97	1.23	1.06	-	-	1.12	1.73	2.12	1.76	-
				Hp	1.30	1.64	1.42	-	-	1.50	2.31	2.85	2.36	-
	Rated Torque (speed) ①②④⑦		T_{rtd}	Nm	3.52	1.66	1.69	-	-	6.81	6.19	5.30	2.80	-
				lb-in	31.2	14.7	15.0	-	-	60.3	54.8	46.9	24.8	-
	Rated Speed		N_{rtd}	rpm	3000	6000	6000	-	-	2000	3000	4000	6000	-
	Rated Power (speed) ①②④⑦		P_{rtd}	kW	1.11	1.04	1.06	-	-	1.43	1.94	2.22	1.76	-
				Hp	1.48	1.40	1.42	-	-	1.91	2.61	2.98	2.36	-

Maximum Rated Bus Voltage: 120 V_{AC} / 160 V_{DC}; 240 V_{AC} / 320 V_{DC}; 400 V_{AC} / 560 V_{DC}; 480 V_{AC} / 640 V_{DC}

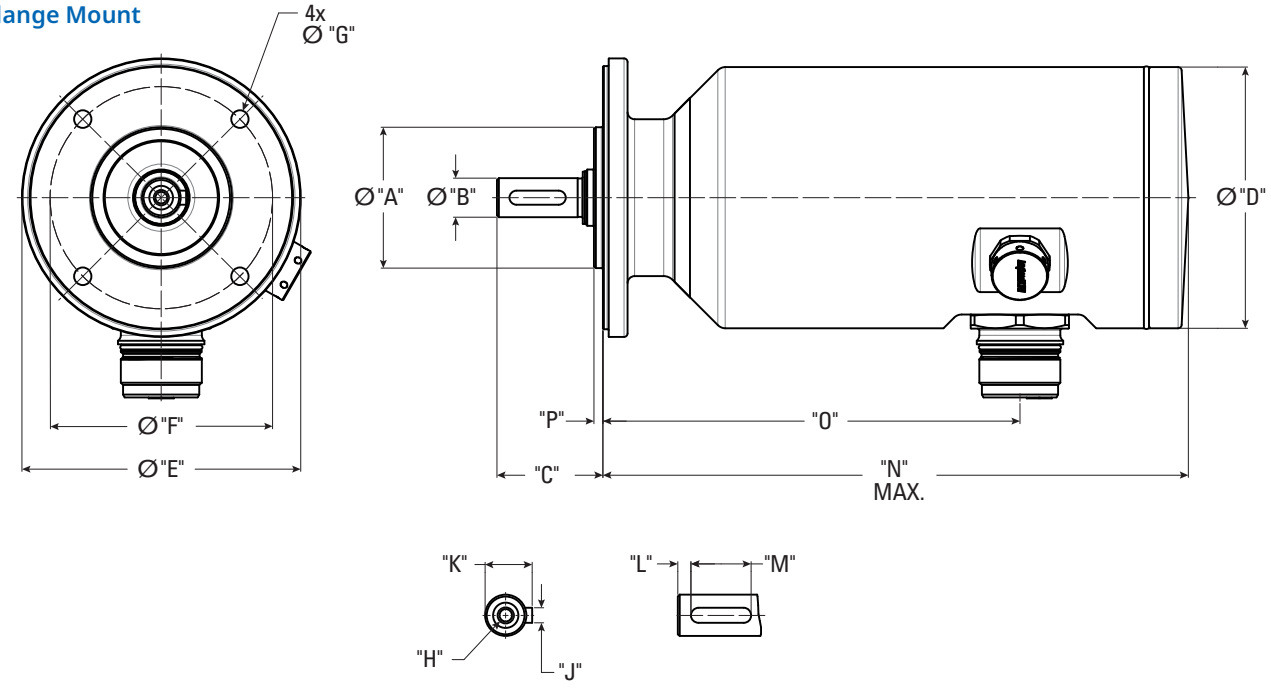
See following page for notes.

AKMA5x Dimensional Data

AKMA 5 2 C – AN D N CA 1 K*
Motor Series | Frame Size | Stack Length | Winding | Mount/Shaft | Connection | Brake | Feedback | Thermal Sensor | Seal

AKMA2x Frame

Flange Mount



AKMA5x Dimension Data

Code	Shaft	Pilot Dia. "A"	Shaft Dia. "B"	Shaft Length "C"	Motor Body Dia. "D"	Flange Dia. "E"	Bolt Circle Dia. "F"	Bolt Hole Dia. "G"
AC	Keyway	Ø95j6	Ø24k6	50	132	137	115	9+0.36/-0.0
AN	Smooth	Ø95j6	Ø24k6	50	132	137	115	9+0.36/-0.0

Code	"H"	Key Height "J"	Key Width "K"	"L"	Key Length "M"	Pilot Height "P"
AC	M8 DIN332	x	x	x	x	3.0
AN	M8 DIN332	27 +0/-0.13	8N9	4	36 +0/-0.30	3.0

	Connector Position "O"		Motor Length "N"	
MODEL	W/O Brake	W/ Brake	W/O Brake	W/ Brake
AKMA51	138.1	188.3	186.3	236.9
AKMA52	169.1	219.3	217.3	267.9
AKMA53	200.1	250.3	248.3	298.9
AKMA54	231.1	281.3	279.3	329.9

Dimensions are in mm.

*Complete AKMA series model nomenclature can be found on page 9.

Brake & Feedback Options

Holding Brake

The holding brake is designed to provide motor shaft static holding torque with the brake coil de-energized. The brake must first be released (coil energized) prior to commanding motion as determined by its drop-out time. The optional brake is intended for stationary motor holding, or "parking," and is NOT intended for dynamic braking (i.e. There should be absolutely no intended rotor motion when power is removed from the brake coil to physically engage brake.)

AKMA Motor Brake Specifications

Motor	Minimum Static Torque @120°C		Power Consumption @24V, 20°C	Current @24V, 20°C	Inertia		Closing Time (engage)	Opening Time (release)	Backlash	
									Maximum	Typical
	Nm	lb-in	Watts ±7%	ADC	kg-cm²	lb-in-sec²	msec	msec	deg.	deg.
AKMA2	1.42	12.6	8.4	0.35	0.0128	1.81E-04	36	35	1.01	0.46
AKMA3	2.5	22.1	10.1	0.42	0.0135	1.91E-04	20	50	1.01	0.46
AKMA4	5.3	46.9	12.8	0.53	0.0579	8.20E-04	30	75	0.81	0.37
AKMA5	14.5	128	19.5	0.82	0.1658	2.35E-03	30	115	0.71	0.31

Note 1: Operating Voltage: 24 Vdc ± 10%.
Note 2: Maximum backlash is calculated using worst-case tolerancing, and typical backlash is calculated using statistical tolerancing.

Feedback Options

The AKMA motor is available with one of the three following feedback options and utilizes hybrid (power+brake+feedback) single-cable drive connectivity. A thermal sensor is connected to the encoder and temperature information is transferred over the communication protocol.

AKMA Feedback Option Specifications

Feedback	Description	Feedback Model	Technology	Single-turn resolution	Multi-turn resolution	Accuracy ±arc-min
CA	Smart Feedback Device	SFD3	Resolver	24 bits	---	8
GU	Hiperface DSL encoder	EEM37	Capacitive	17 bits	12 bits (4096)	4
LD	EnDat 2.2 inductive encoder	EQI1131 (AKMA2-5)	Inductive	19 bits	12 bits (4096)	2

AKMA Motor Connector Pinouts

AKMAxx D- Connector Pinout

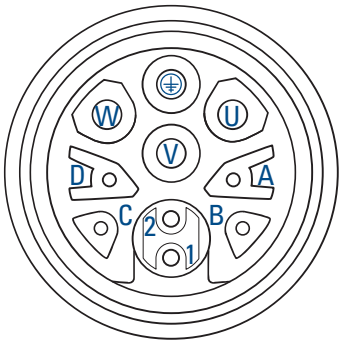
D- with SFD3 (CA)

AKMA x x x – xx D 2 CA x x

D: Connection, 2: Brake, CA: Feedback

Power ± Brake + SFD3/DSL

Function	AKMA M23
Phase U	U
Phase V	V
Phase W	W
PE	⏚
Brake +	A
N/C	B
N/C	C
Brake –	D
SFD3/DSL+	1
SFD3/DSL–	2



D- with HIPERFACE DSL (GU)

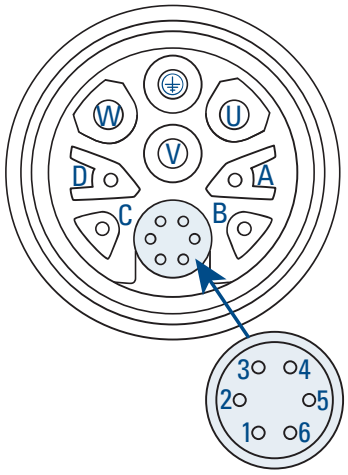
AKMA x x x – xx D 2 GU x x

D- with EnDAT 2.2 (LD)

AKMA x x x – xx D 2 LD x x

Power ± Brake + EnDAT 2.2

Function	AKMA M23
Phase U	U
Phase V	V
Phase W	W
PE	⏚
Brake +	A
N/C	B
N/C	C
Brake –	D
S+ Up	1
S– 0 V	2
Data+	3
Data–	4
Clock+	5
Clock–	6



AKMA Motor Cables

H2 – 21 – 015 – W1 – 00 – XXXX00
Cable Version – Drive Connector – Wire X-section – Motor Mating Connector – Customization – Length

AKMA Cable Properties

Test voltage	3kVAC
Operating voltage	1000 VAC
Temperature range	-40°C/+90°C static/dynamic/storage
Minimum bending radius - static	5xDia
Minimum bending radius - dynamic	8xDia
Max. speed	300m/min
Max. acceleration	50m/s^2
Max. torsion	30°/m
Max. number of cycles	5,000,000
Flame resistance	EN50265-1-2/IEC60332-1-2/UL VW-1/ CSA FT1
Halogen free	EN50267-2-1/IEC60754-1
Hydrocarbons and oil resistance	UL1581/VDE0472 part 803 A/B

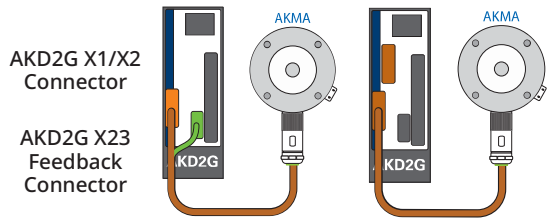
AKMA to AKD2G SFD3/HIPERFACE DSL Cable


AKMA to AKD1G EnDAT 2.2 Cable

H2 – 21 – 015 – W1 – 00 – XXXX00

Cable Version | Drive Connector | Wire X-section | Motor Mating Connector | Customization | Length

AKMAxx Motor to AKD®2G Servo Drive Cables



Voltage (V_{AC})	Drive	Motor Feedback	Motor Connector	Current Rating* (A)	Hybrid Cable
120-240	AKD2G-SPx-6V03x	SFD3 (CA) HIPERFACE DSL (GU)	Single straight IP69K	Rms < 11	H2-21-010-W1-00-XXXX00
	AKD2G-SPx-6V06x				
	AKD2G-SPx-6V12x			Rms < 15	H2-21-015-W1-00-XXXX00
240-480	AKD2G-SPx-7V03x				
	AKD2G-SPx-7V06x				
	AKD2G-SPx-7V12x				
	AKD2G-SPx-7V24x			Rms < 20	H2-21-025-W1-00-XXXX00
				Rms < 27	Contact Kollmorgen Support
120-240	AKD2G-SPx-6V03x	EnDat 2.2 (LD)	Single straight IP69K	Rms < 15	H2-21-015-W6-00-XXXX00
	AKD2G-SPx-6V06x				
	AKD2G-SPx-6V12x				
240-480	AKD2G-SPx-7V03x				
	AKD2G-SPx-7V06x				
	AKD2G-SPx-7V12x				
	AKD2G-SPx-7V24x			Rms < 20	H2-21-025-W6-00-XXXX00
				Rms < 27	Contact Kollmorgen Support

* Current ratings used on a IEC 60364-5-52 standard

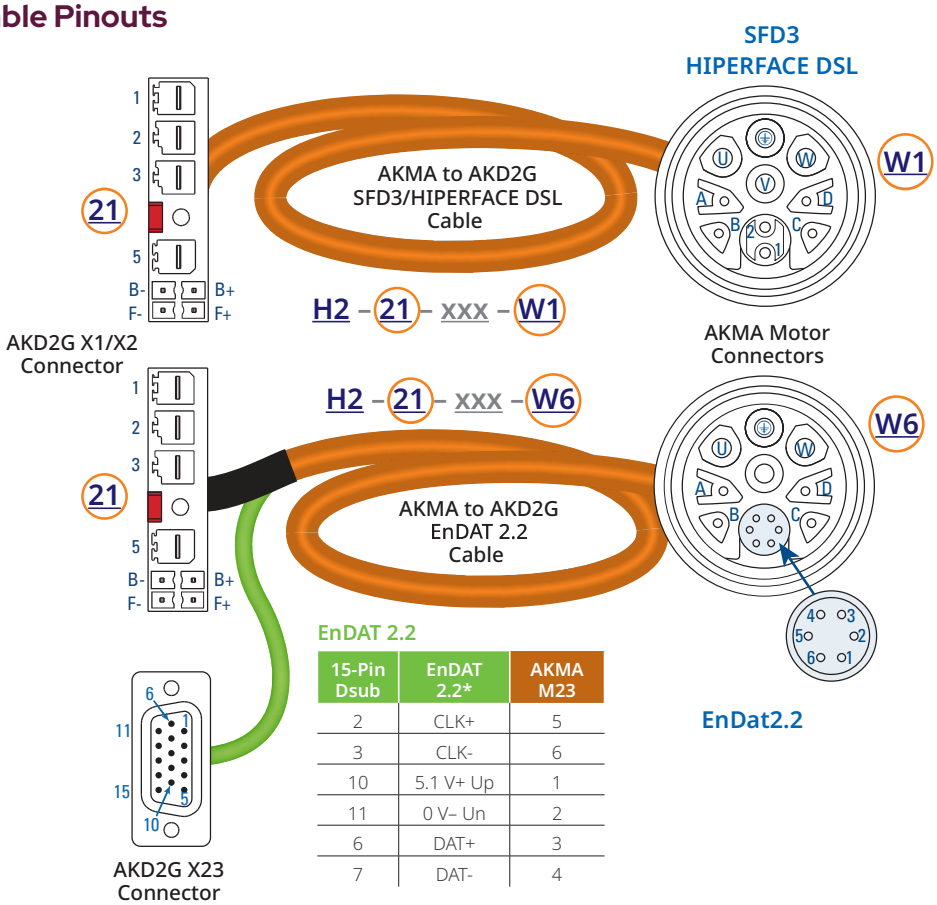
AKD®2G Servo Drive Cable Pinouts

Power ± Brake + SFD3/DSL

AKD2G X1/X2	Function	AKMA M23
1	Phase U	U
2	Phase V	V
3	Phase W	W
Retention Latch, Shield Screw		
5	PE	⏚
B+	Brake +	A
B–	Brake –	D
F+	SFD3/DSL+	1
F–	SFD3/DSL–	2

Power ± Brake

AKD2G X1/X2	Function	AKMA M23
1	Phase U	U
2	Phase V	V
3	Phase W	W
Retention Latch, Shield Screw		
5	PE	⏚
B+	Brake +	A
B–	Brake –	D
F+	–	–
F–	–	–

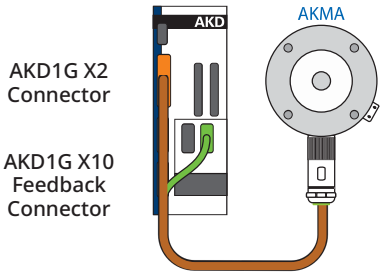


15-Pin Dsub	EnDAT 2.2*	AKMA M23
2	CLK+	5
3	CLK-	6
10	5.1 V+ Up	1
11	0 V– Un	2
6	DAT+	3
7	DAT-	4

AKMA Motor Cables

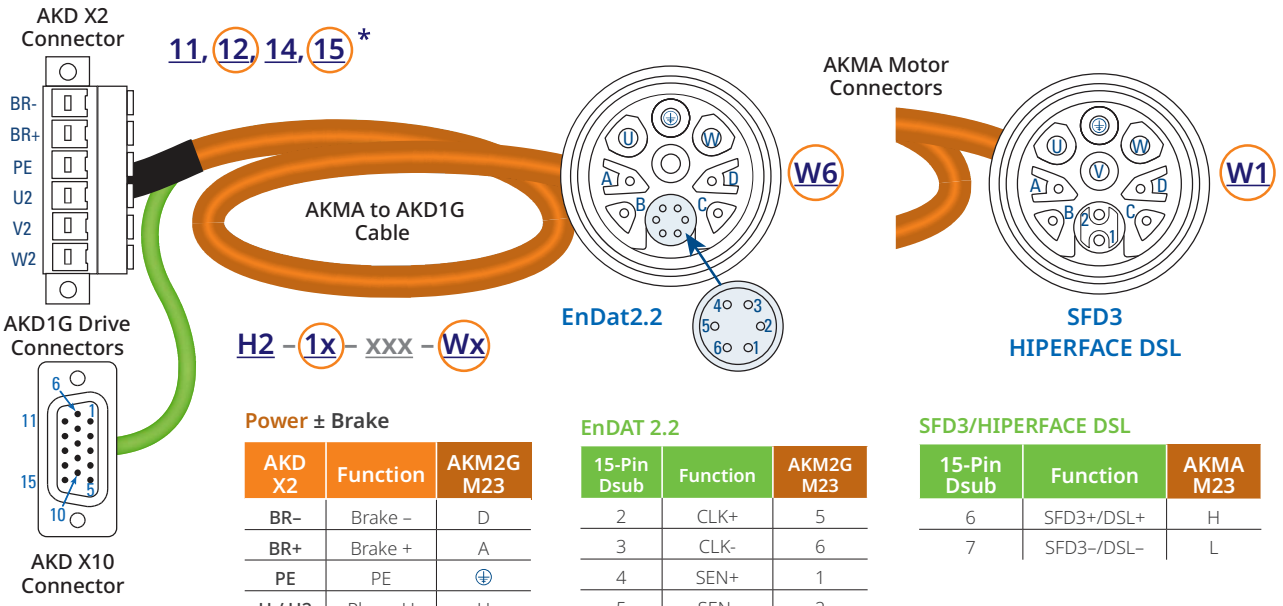
H2 – 21 – 015 – W1 – 00 – XXXX00
Cable Version | Drive Connector | Wire X-section | Motor Mating Connector | Customization | Length

AKMAxx Motor to AKD® Servo Drive Cables



Voltage (VAC)	Drive	Motor Feedback	Motor Connector	Current Rating[1] (A)	Hybrid Cable
120-240	AKD-x00306 AKD-x00606	SFD3 (CA) HIPERFACE DSL (GU)	Single straight IP69K	Rms < 11	H2-11-010-W1-00-XXXX00
				Rms < 15	H2-11-015-W1-00-XXXX00
	AKD-x01206 AKD-x02406			Rms < 15	H2-12-015-W1-00-XXXX00
				Rms < 20	H2-12-025-W1-00-XXXX00
				Rms < 27	H2-12-040-W1-00-XXXX00
240-480	AKD-x00307 AKD-x01207 AKD-x02407			Rms < 15	H2-12-015-W1-00-XXXX00
				Rms < 20	H2-12-025-W1-00-XXXX00
				Rms < 27	H2-12-040-W1-00-XXXX00
120-240	AKD-x00306 AKD-x00606	EnDAT 2.2 (LD)	Single straight IP69K	Rms < 15	H2-14-015-W6-00-XXXX00
	AKD-x01206 AKD-x02406			Rms < 15	H2-15-015-W6-00-XXXX00
				Rms < 20	H2-15-025-W6-00-XXXX00
				Rms < 27	H2-15-040-W6-00-XXXX00
240-480	AKD-x00307 AKD-x01207 AKD-x02407			Rms < 15	H2-15-015-W6-00-XXXX00
				Rms < 20	H2-15-025-W6-00-XXXX00
				Rms < 27	H2-15-040-W6-00-XXXX00

AKD® Servo Drive Cable Pinouts



Power ± Brake

AKD X2	Function	AKM2G M23
BR–	Brake –	D
BR+	Brake +	A
PE	PE	⏚
U / U2	Phase U	U
V / V2	Phase V	V
W / W2	Phase W	W

EnDAT 2.2

15-Pin Dsub	Function	AKM2G M23
2	CLK+	5
3	CLK-	6
4	SEN+	1
5	SEN-	2
6	DAT+	3
7	DAT-	4

SFD3/HIPERFACE DSL

15-Pin Dsub	Function	AKMA M23
6	SFD3+/DSL+	H
7	SFD3–/DSL–	L

* Connector designation depends on the drive model. Please refer to the cable nomenclature on the following page for more information.

Kollmorgen 2G Cable Nomenclature

H2 – 12 – 015 – A1 – 00 – XXXX00

Cable Version

Cable Jacket Material – PUR

- F1 Mid-flex Feedback Cable PUR
- H2 Mid-flex Hybrid PUR with brake
- P1 Power Cable PUR
- P2 Power Cable PUR with brake

Cable Jacket Material – PVC

- F5 MId-flex Feedback Cable PVC
- H6 Mid-flex Hybrid PVC with brake
- P5 Mid-flex Power Cable PVC
- P6 Mid-flex Power Cable PVC with brake

Length (no less than 100 mm increments)

- xxxx00 Length in mm
  - Standard lengths: 1 - 25 m
  - Example:
    6 m cable = 006000
    25 m cable = 025000

Options

- 00 Standard Option Set
- VL Value Line
- XX Specials (excluding standard option set)

Connector Type

If Feedback, connector type [connector type and pinout]

- 10 AKD, AKD2G, 15 Pin D-Sub, 45° angle, Resolver
- 12 AKD, AKD2G, 15 Pin D-Sub, 45 degree angle, EnDat® 2.1, BiSS B
- 14 AKD, AKD2G, 15 Pin D-sub, 45 degree angle, HIPERFACE®
- 18 AKD, AKD2G, 15 Pin D-sub, 45 degree angle, SFDG2
- 20 AKD, AKD2G, 15 Pin D-sub, 45 degree angle, Comcoder, Sine Enc. w/ Halls
- 41 S300/S700 Resolver 9 pin D-sub
- 42 S300/S700 Encoder 15 pin D-sub (EnDat® 2.2, Biss C)
- 43 S300/S700 Encoder 15 pin D-sub (Sine Encoder w Halls)
- 91 Flying leads, Resolver
- 92 Flying leads, EnDat, Biss
- 93 Flying leads, HIPERFACE
- 94 Flying leads, SFD2G
- 95 Flying leads, Comcoder

If Power or Hybrid drive connector type

- 11 AKD-x00306, -x00606 (Power and Hybrids with HDSL, SFD3)
- 12 AKD-x01206, -x02406 (Power and Hybrids with HDSL, SFD3)
  AKD-x00307, -x00607, -x01207, -x02407 (Power and Hybrids with HDSL, SFD3)
- 13 AKD-x04807 (Power and Hybrids with HDSL, SFD3)
- 14 AKD-x00306, -x00606 (Hybrids with EnDat 2.2)
- 15 AKD-x01206, -x02406 (Hybrids with EnDat 2.2)
  AKD-x00307, -x00607, -x01207, -x02407 (Hybrids with EnDat 2.2)
- 21 AKD2G-x00306, -x00606, -x01206
  AKD2G-x00307, -x00607, -x01207, -x02406, -x02407
- 33 AKD-N DB (Hybrid cable)
- 34 AKD-N DF/DS (Power cable)
- 41 S300 MV (Power or Hybrid w/ SFDG3, DSL)
- 42 S300 HV (Power or Hybrid w/ SFDG3, DSL)
- 43 S300 MV (Hybrid with EnDat 2.2-22)
- 44 S300 HV (Hybrid with EnDat 2.2-22)
- 46 S701-S724 connector (Power or Hybrid w/ SFDG3, HDSL)
- 47 S701-S724 connector (Hybrid with EnDat 2.2-22)
- 48 S748/S772 flying leads
- 01 Unterminated flying leads
- SP Special

Motor Mating Connector Type

Hybrid / Power Connectors (#Pins)

- A1 AKM2G, M23 SpeedTec® (9)
- A4 AKM2G, M40 SpeedTec (9)
- A5 AKM1G, M23 SpeedTec (8)
- A6 AKM1G, M23 Screw-type (8)
- A7 AKM1G, M40 SpeedTec (6)
- B1 AKM2G, M23 htec (9) (standard keying, DSL)
- B2 AKM2G, M23 htec (13) (rotated keying, EnDat 2.2)
- B3 AKM2G, M40 htec (11) (standard keying, DSL)
- C1 AKM/AKM2G, M15 ytec® (9)
- C4 AKM, M15 itec (9) (SFD3)
- UB Unterminated (Blunt Cut)
- UF Unterminated (Flying leads)
- W1 AKMA, M23 SS Screw-type Washdown (8) (SFD3/DSL)
- W5 AKM, M23 Hummel Washdown (8)
- W6 AKMA, M23 SS Screw-type Washdown (12) (EnDAT 2.2)

Feedback Connectors

- A2 AKM/AKM2G, M23 SpeedTec (12)
- A3 AKM/AKM2G, M23 SpeedTec (17)
- C2 AKM/AKM2G, M15 ytec (12)
- C3 AKM/AKM2G, M15 ytec (15)
- UB Unterminated (Blunt cut)
- UF Unterminated (flying leads)
- W2 AKM, M23 Hummel Washdown (12)

Cable Type

If Feedback, type [cable construction, not pinout]

- FB1 4 Conductor
- FB2 8 Conductor
- FB3 6 Conductor
- FB4 16 Conductor
- FB5 14 Conductor
- FB6 10 Conductor
- FB7 12 Conductor

If Power or Hybrid drive connector type

- 010 1.0 mm^2
- 015 1.5 mm^2
- 025 2.5 mm^2
- 040 4.0 mm^2
- 060 6.0 mm^2
- 100 10.0 mm^2

AKMA™ Technical Guide

I. General Technical Data

Ambient Temperature: 0...+25° C for site altitude up to 1000 m amsl (at rated values). It is vital to consult our applications department for ambient temperatures above 40° C and/or any enclosed environment.

Power De-rating:
(currents and torques)

1% / °C in range 40° C...50° C up to 1000 m amsl for site altitude above 1000 m amsl and 40° C

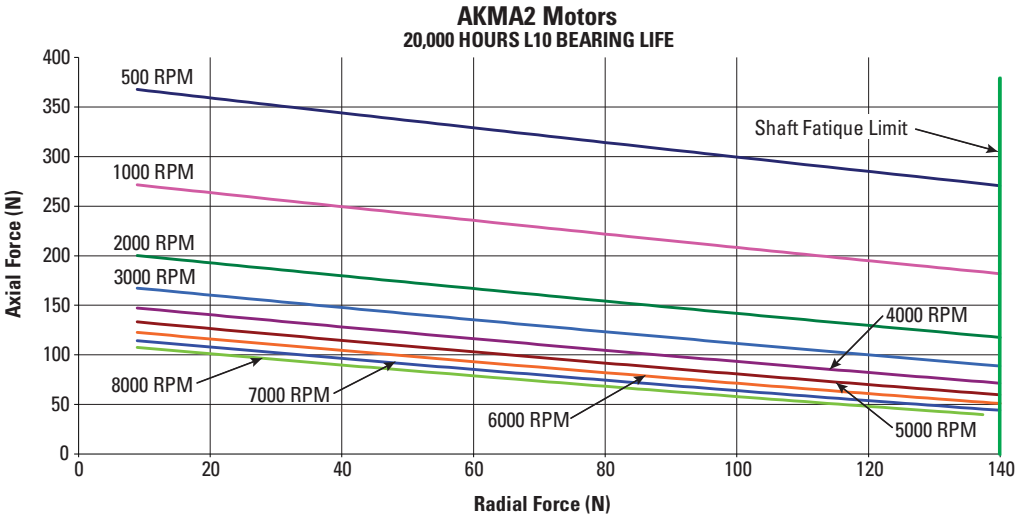
- 6% up to 2000 m amsl
- 17% up to 3000 m amsl
- 30% up to 4000 m amsl
- 55% up to 5000 m amsl

For site altitudes above 1000 m amsl, no de-rating with temperature reduction of 10° C / 1000 m

Temperature De-rating: If the application requires de-rating due to lower motor surface temperature, please contact our applications department.

Ball-bearing Life: ≥ 20,000 operating hours

II. L10 Bearing Fatigue



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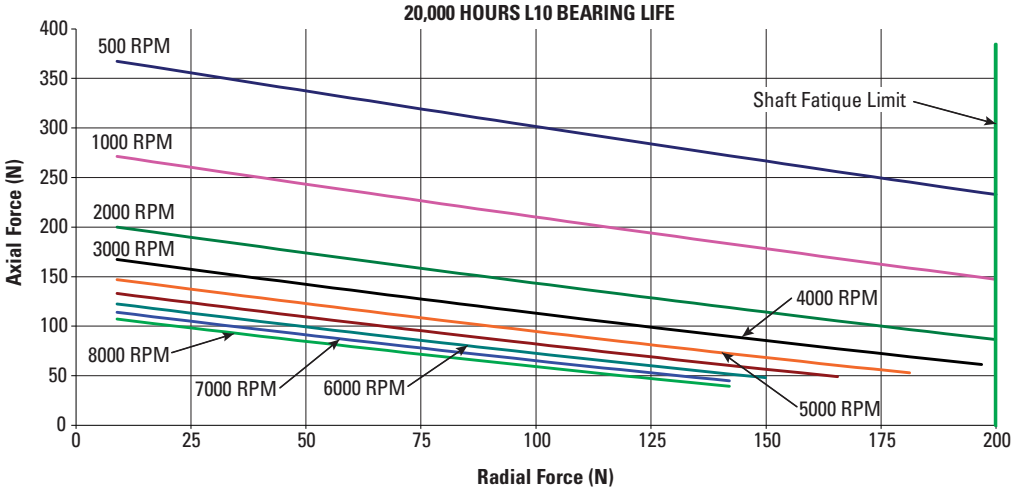
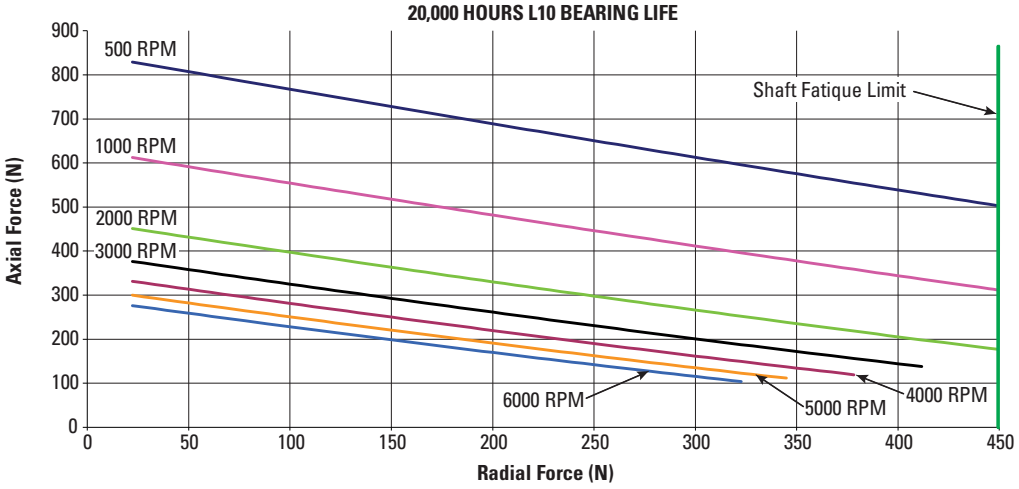
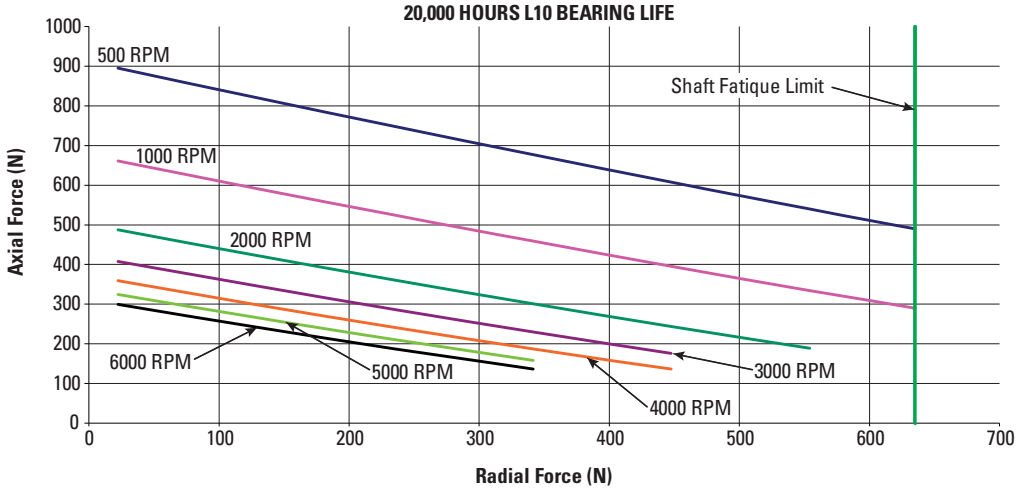
AKMA3 Motors
20,000 HOURS L10 BEARING LIFE



AKMA4 Motors
20,000 HOURS L10 BEARING LIFE



AKMA5 Motors
20,000 HOURS L10 BEARING LIFE



AKMA™ Technical Guide

III. Shaft Loading

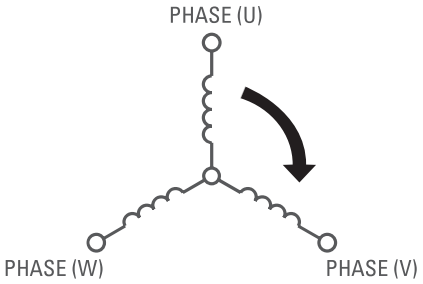
Motor	Max. Radial Force (N)	Max. Axial Force (N)
AKMA2xy-A / C	140	600
AKMA2xy-B / D	120	
AKMA3xy-A / C	200	600
AKMA4xy-A / C	450	1400
AKMA4xy-B / D	195	
AKMA5xy-A / C / G / H	635	1740
AKMA5xy-B / D	245	

The maximum radial load ratings reflect the following assumptions:

1. Motors are operated with peak torque of the longest stack length of the frame size.
2. Constant radial load on the end of the shaft for the smallest OD and longest standard shaft extension.
3. Infinite life with 99% reliability.
4. Safety factor = 2.

IV. Phasing Diagram – All Motors

- When the motor is rotated C.W. (viewed from drive shaft end), the following BEMF voltage waveforms result:
- Voltage phase-U, leads Voltage phase-V, by 120-degrees
- Voltage phase-V, leads Voltage phase-W, by 120-degrees
- Voltage phase-W, leads Voltage phase-U, by 120-degrees



Motor Winding Configuration

V. Protection Class

Shaft Seal	Flange Sealing	Protection Class
EPDM (K) or Viton (V)	O-Ring	IP69K

Protection class IP69K has been created for high pressure and high temperature cleaning according to DIN 40050-9. Code "6" (Dust tight. No ingress of dust.) defines the protection against solids. Code "9K" (Protected against close-range high pressure, high temperature spray downs.) defines the protection against liquids.

IP69K protection class is for static use only. This rating does not account for water present while the shaft is rotating. For applications that require sealing during rotation, please contact Kollmorgen Customer Support.

VI. Insulation Material

AKMA motors are insulation class F according to IEC 60085 (UL1446 class F).

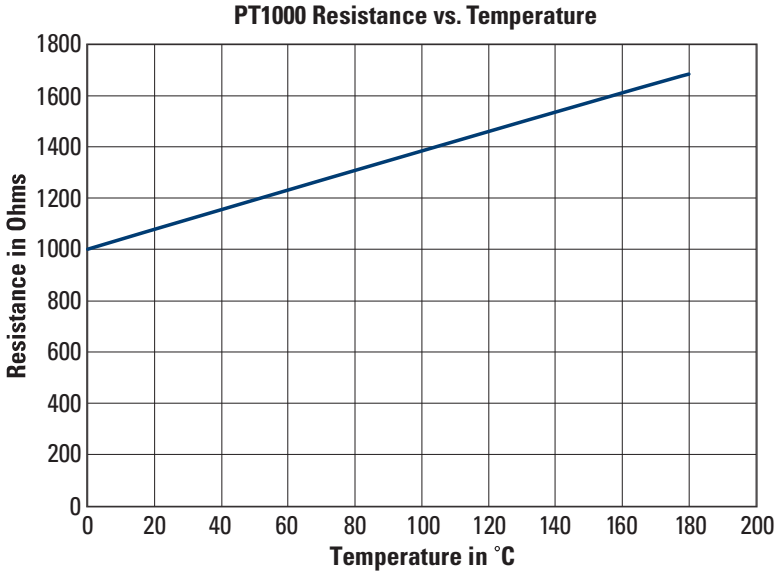
VII. Surface

The AKMA motor housing is made from anodized 6082 aluminum.

IIX. Protective Device

AKMA motors are fitted with an electrically isolated temperature sensor (rated temperature 155°C ± 5%) and integrate into the motor temperature monitoring system (e.g. Kollmorgen's AKD). The standard motor option is equipped with a PT1000 thermal sensor, with a threshold limit setting of 1592 Ohms.

The standard sensor option is defined by following diagram:



Please note, these protection devices are for monitoring and protecting the motor during normal operation and when attempting to maximize operation—they should not be expected to provide protection against a short or other overload event.

IX. Vibration Class

Velocity [rpm]	Max. Rel. Vibration Displacement [µm]	Max. Run-out [µm]
<= 1800	90	23
> 1800	65	16

AKMA motors are designed and manufactured to meet vibration class A (EN 60034-14). Hence, a defined speed range of 600 to 3600 rpm, with a frame size between 56 and 132 mm, means the permitted vibration is 1.6 mm/s.

AKMA™ Hygienic Design Guide

I. Hygienic Design

The Food and Drug Administration (FDA) is an agency of the United States Department of Health and Human Services. The FDA is responsible for protecting and promoting public health through the regulation and supervision of food safety, vaccines, biopharmaceuticals, blood transfusions, medical devices and other products.

The "European Hygienic Engineering and Design Group" (EHEDG) is a European-based non-government organization devoted to the advancement of hygienic design and food engineering. European legislation requires that handling, preparation, processing, packaging, etc. of food is done hygienically, with hygienic machinery in hygienic premises (the food hygiene directive, the machine directive and the food contact materials directive).

Certifications:	UL, CE, RoHs, EAC
Surface:	6082 Aluminum Anodized; satin gray
Immunity:	Against tested industrial cleaning agent, corrosion-proof
Degree of Protection:	IP69K
Mounting Screw*:	Stainless steel 316L/1.4404, sealant FDA 21 CFR 175.300
O-Ring:	EPDM or Viton, FDA 21 CFR 177.2600
Shaft:	Stainless steel 316L/1.4404
Rotary Shaft Seal:	Mineral filled PTFE, single lip, mineral: FDA 21 CFR 175.300, PTFE: FDA 21 CFR 177.1500
Shaft Center Screw*:	Stainless steel 1.4404, sealant FDA 21 CFR 175.300
Bearing Grease:	Food-grade as per FDA 21 CFR 178.3570
Connector with Viton Seal:	Stainless steel 1.4404, Silicone seal FDA 21 CFR 177.2600
Name Plate:	Laser marked in housing
Size:	AKMA2 to AKMA5

*Optional, included in the mounting kit