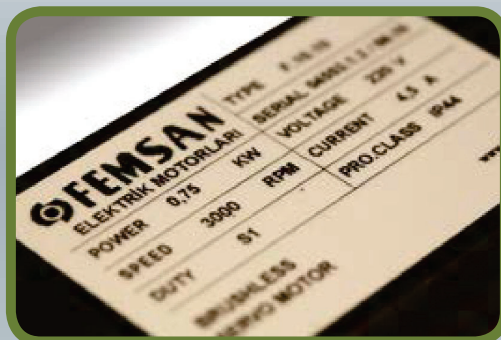




 **FEMSAN**
ELECTRIC MOTORS



FEMSAN Electric Motor Company has been founded in 1989. FEMSAN is the pioneer company in Turkish market at BLDC and DC motor industries. The company mainly focuses on design and production of PM DC Motors, Brushless DC Motors, Slotless BLDC Motors, Alternators, Electromechanical Actuators and different kind of sub-systems.

FEMSAN offers customized motor and alternator types in large scale at different voltages and speeds. Thanks to its comprised dynamic engineer staff, FEMSAN has gone far beyond being a component-based DC and Servo Motor manufacturer and has been able to carry out design and analysis activities that can meet the requirements of different applications. Especially, on account of its enhanced reflexes to compensate the sub-system needs of defence and aerospace industry, FEMSAN has been not only a supplier but also a solution partner for its customers.

FEMSAN provides significant advantages by its customized solutions, designs for long life operations and high reliability intended at comprehensive product range. FEMSAN works as a tailor when getting specific requirements from the customers on their special projects. "Designing and materialising at the speed of thought." This is what makes FEMSAN unique and how it maximizes customer satisfaction in addition to excellent product quality and on-time delivery as well as cost effectiveness.

Engineering skills and experiences of FEMSAN are a source of inspiration and creativity to overcome any adversities. Our collective purpose is to create and sell differentiated and competitive products and services, and to make it easy for our customers to do business with us.

Azimuth and Elevation Actuators for
Turret Drive, Radar and Gun Platforms



Electric Motors for Pump, Compressor,
Ventilation and Hatch operations

Electric Motors for commander
and soldier sights

Seeker Motors
and Resolver



Electric Motors for Fin and Canard Control
Complete Fin Drive Systems

Starter Motors, Alternators
and Control Units



DO254 & DO278 compatible Actuators

- Rotary and Linear
- for Low and High Altitude
- for Safety Critical Systems
- Fully Integrated
- Redundant & Intelligent
- Electromechanical

Frameless Motors
0.1 kW. - 0.35 kW.
12V. DC - 120 V. DC



Frameless Motors with
Integrated Ball Screw
0.1 kW. -0.45 kW.
12V. DC-56 V. DC



Slotless BLDC Motors
12 V. DC - 48 V. DC
20 W. - 370 W.



Brushless DC Motors
12 V. DC - 72 V. DC
0.1 kW. - 8.15 kW.



PM Brush DC Motors
12 V. DC - 72 V. DC
0.2 kW. - 11 kW.



Slotless BLDC Motors
with Ball Screw, Gearbox,
Encoder and Brake



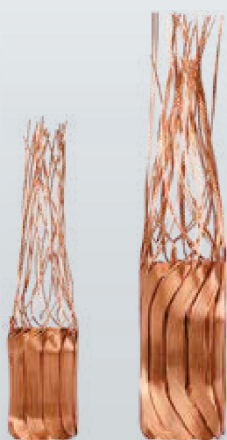
Fin and Canard
Actuation Systems



V Series Slotless BLDC Motors

Thanks to recent technological developments, Femsan completed the R&D and qualification phases of it's new V series slotless BLDC Servo Motors.

Improved material performance like NdFeB magnets combined with optimized manufacturing processes and resulted with the best performance from smallest size.



Slotless Technology

Slotless air gap winding for optimum power density.
Multipole rotor magnet with low residual balance.
Electronic commutation via hall sensors or encoder.



High Efficiency



Good Heat Dissipation



High Overload Capacity



No Detent Torque



Highly Dynamic



Long Service Life



Robust Design



Preloaded Ball Bearings



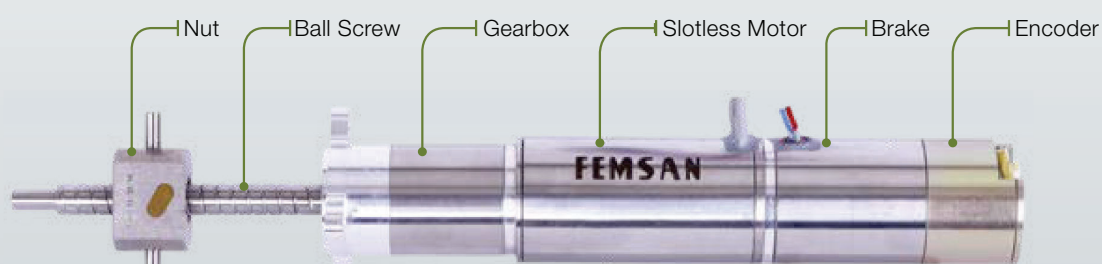
Low Inductance



Optimum Combination for Perfect Fin Actuation

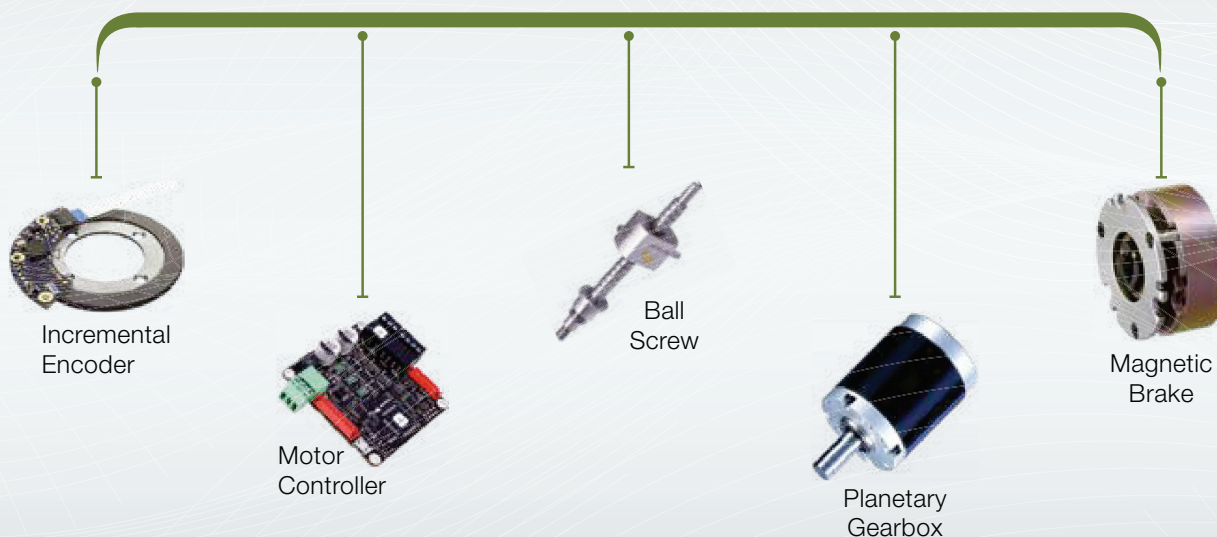
Lower rolling friction of ball screw provides very high level of efficiency. In addition, superior production precision enables a very low axial play, accompanied by a high positioning accuracy.

Optimum coupling performed between the motor and/or gearbox shaft and ball screw to obtain the best backlash-free torque transmission.



Fin and Canard actuation not only with linear systems but also with worm or helical gear sets

Modular Configurability



Applicable to Fin and
Canard Actuation



Part Number	5 V 25 28 5	5 V 25 28	5 V 30 46	5 V 30 46 8	5 V 30 46 7	
Values at Nominal Voltage						
DC Bus Voltage	24	24	24	24	36	V
No Load Speed	12800	11800	8.400	16.900	15.700	rpm
No Load Current	0,15	0,25	0,38	0,9	0,65	A
Nominal Speed	10800	10900	7500	16000	14500	rpm
Nominal Torque	20	30	120	118	120	mNm
Nominal Current	1,3	2	4,8	9,6	6,1	A
Stall Torque	0,132	0,46	3,2	2,7	2,6	Nm
Stall Current	7,5	24	114	200	120	A

Torque Constant	17,9	19,4	27,7	13,5	21,9	mNm/A
Speed Constant	533	491	345	705	435	rpm/V
Resistance	3,2	1	0,42	0,12	0,3	Ohm
Inductance	0,22	0,05	0,08	0,02	0,045	mH
Max. Efficiency	78	79	88	88	88	%
Number of Poles	2	4	4	4	4	
Mechanical Time Constant	5,8	4	2	2,5	2	ms

Dimensions

Outer Diameter	25	25	30	30	30	mm
Length including Encoder	67	67	84	84	84	mm
Shaft Diameter	3	3	4	4	4	mm
Shaft Length	10	10	16	16	16	mm

Encoder - Obligatory

Supply Voltage	5	V. DC
Counts per turn	2048	cpr
Type	incremental with line driver	

Brake - Optional

Supply Voltage	24	V. DC
Holding Torque	0,1	Nm
Holding	0,2	W

Contact with sales@femsan.com for full dimensions
Contact with sales@femsan.com for cable & connector alternatives



Applicable to Fin and Canard Actuation

Part Number	5 V 30 46 2	5 V 35 46	5 V 40 80	5 V 40 80 2	5 V 40 80 3	
Values at Nominal Voltage						
DC Bus Voltage	48	24	24	24	48	V
No Load Speed	16800	17500	4.650	15.000	9.250	rpm
No Load Current	0,38	1,8	0,4	1,2	0,4	A
Nominal Speed	16000	16000	4200	13000	8600	rpm
Nominal Torque	120	170	270	270	270	mNm
Nominal Current	4,8	15	5,8	19	5,8	A
Stall Torque	3,2	3	6	4	6	Nm
Stall Current	114	266	120	265	120	A

Torque Constant	27,7	13,1	50,2	15,2	50,2	mNm/A
Speed Constant	345	729	190	625	190	rpm/V
Resistance	0,42	0,09	0,39	0,083	0,39	Ohm
Inductance	0,08	0,013	0,1	0,023	0,1	mH
Max. Efficiency	89	83	91	89	93	%
Number of Poles	4	4	4	2	4	
Mechanical Time Constant	2	3	3	1,75	3	ms

Dimensions

Outer Diameter	30	35	40	40	40	mm
Length including Encoder	84	90	127	127	127	mm
Shaft Diameter	4	5	5	5	5	mm
Shaft Length	16	16.5	20	20	20	mm

Encoder - Obligatory

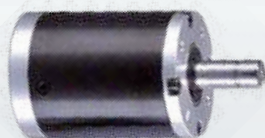
Supply Voltage	5		V. DC
Counts per turn	2048	4096	cpr
Type	incremental with line driver		

Brake - Optional

Available upon request

Supply Voltage	24		V. DC
Holding Torque	0,1		Nm
Nominal Power	0,2		W

Contact with sales@femsan.com for full dimensions
 Contact with sales@femsan.com for cable & connector alternatives



Applicable to Slotless
BLDC Motors



		5 V 25 28			5 V 30 46			5 V 30 46			5 V 30 46			
Matching Motor Code		5 V 25 28			5 V 30 46			5 V 35 46			5 V 35 46			
		5 V 30 46			5 V 35 46			5 V 40 80			5 V 40 80			
Code Number		8 RD P GN 22			8 RD P GN 26			8 RD P GN 32			8 RD P GN 42K			
Outer Diameter		22			26			32			42K			mm
Number of Stage		1	2	3	1	2	3	1	2	3	1	2	3	
Reduction Ratio	i									64				
										72			49	
										81			56	
										100		12,25	64	
									12,08	130		14	70	
									16	144		16	80	
									18	175,78		20	100	
				64			81,37		25	200		24	120	
				80			112,67		29	225		35	144	
			16	112		12,25	143,97	4	32	256	3,5	30	184	
			20	140		18,78	199,33	4,5	36	288	4	30,67	235,11	
		4	28	196	3,5	26	216	5,2	41,6	332,8	5	38,33	293,89	
		5	35	245	4,33	33,22	276	6,25	50	400	6	46	352,67	
		7	49	343	6	46	352,67	8	64	512	7,67	58,78	450,63	
Continuous Rated Torque	ST Type	0,1	0,5	1,5	0,3	1	3	0,4	2	6	0,7	4	15	Nm
	AB Type	0,1	0,5	1,5	0,3	1	3	0,4	2	6	0,7	4	15	Nm
	AH Type	0,2	1	1,5	0,6	2	3	0,8	4	6	1,4	8	15	Nm
	DB Type	-	-	-	-	-	-	0,8	4	6	1,4	8	15	Nm
Maximum Efficiency at Rated Torque		90	85	80	90	85	80	90	85	80	90	85	80	%
Intermittent Torque	ST Type	0,2	1	3	0,6	2	6	0,8	4	12	1,4	8	30	Nm
	AB Type	0,2	1	3	0,6	2	6	0,8	4	12	1,4	8	30	Nm
	AH Type	0,4	1,5	3	1,2	3	6	1,6	6	12	3	15	30	Nm
	DB Type	-	-	-	-	-	-	1,6	6	12	3	15	30	Nm
Weight		50	75	100	70	90	115	135	180	250	315	400	485	gr
Average No Load Backlash	ST Type	20	35	50	20	35	50	20	35	50	20	35	50	arcmin≤
	AB Type	10	20	30	10	20	30	12	20	30	12	20	30	arcmin≤
	AH Type	20	35	50	20	35	50	20	35	50	20	35	50	arcmin≤
	DB Type	-	-	-	-	-	-	8	12	15	8	12	15	arcmin≤
Output Shaft Diameter		4	4	4	5	5	5	6	6	6	12	12	12	mm
Output Shaft Length		12	12	12	14	14	14	16	16	16	17	17	17	mm
Length Excluding Shaft		21	28	35	25	33	41	29	38	47	38	50,5	63	mm
Temperature Range	ST Type	-30 / +90			-30 / +90			-30 / +90			-25 / +90			°C
	AB Type	-30 / +90			-30 / +90			-30 / +90			-25 / +90			°C
	AH Type	-40 / +90			-40 / +90			-40 / +90			-25 / +90			°C
	DB Type	-			-			-40 / +90			-25 / +90			

ST Type : Standard Configuration - AB Type : Reduced Backlash - AH Type : Heavy Duty - DB Type : Low Backlash

Slotless Motor
with Encoder



Slotless Motor with Encoder,
with Brake



Slotless Motor with Encoder,
with Brake, with Pl. Gearbox



Slotless Motor with Encoder,
with Brake, with Pl. Gearbox,
with Worm Gearbox

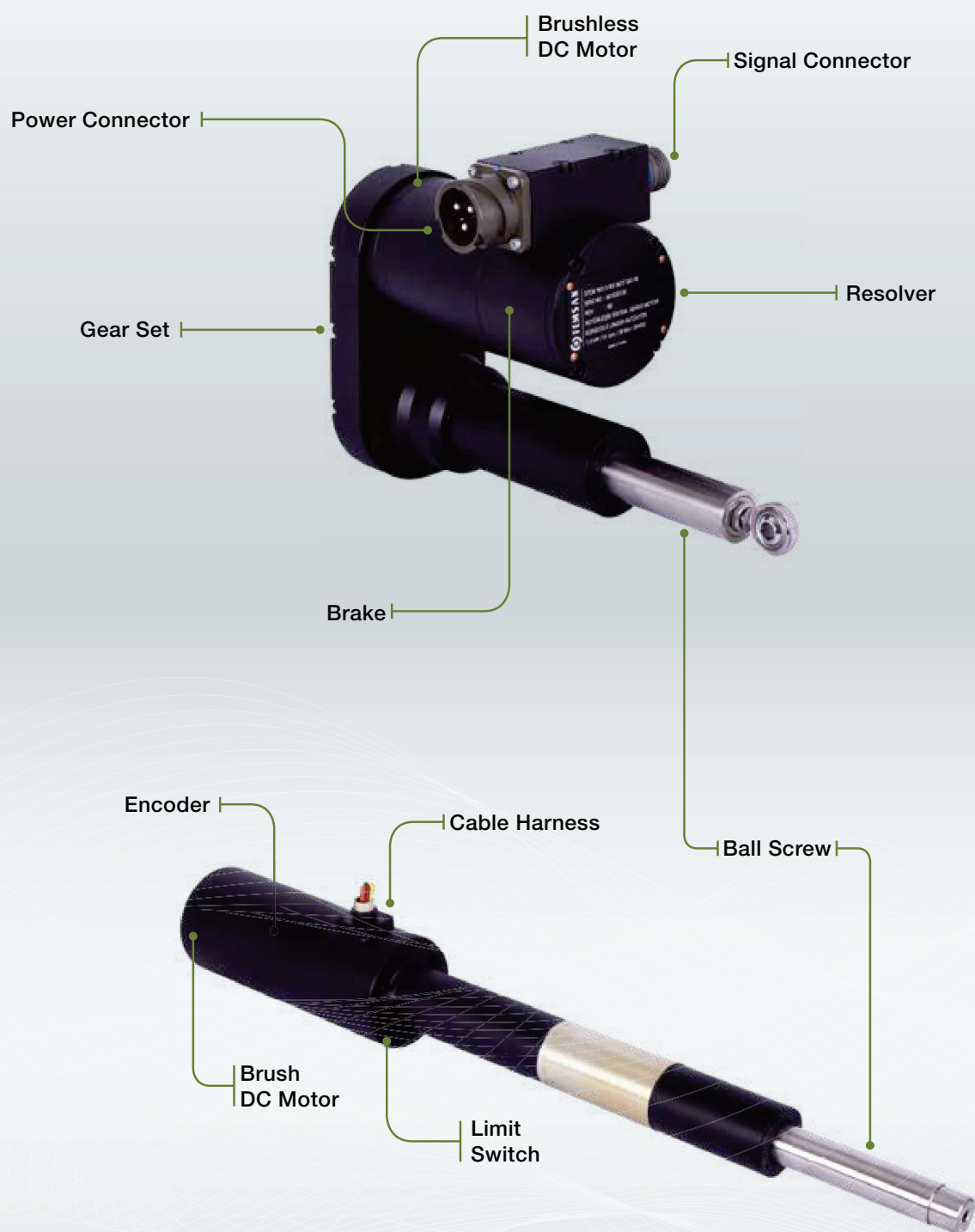


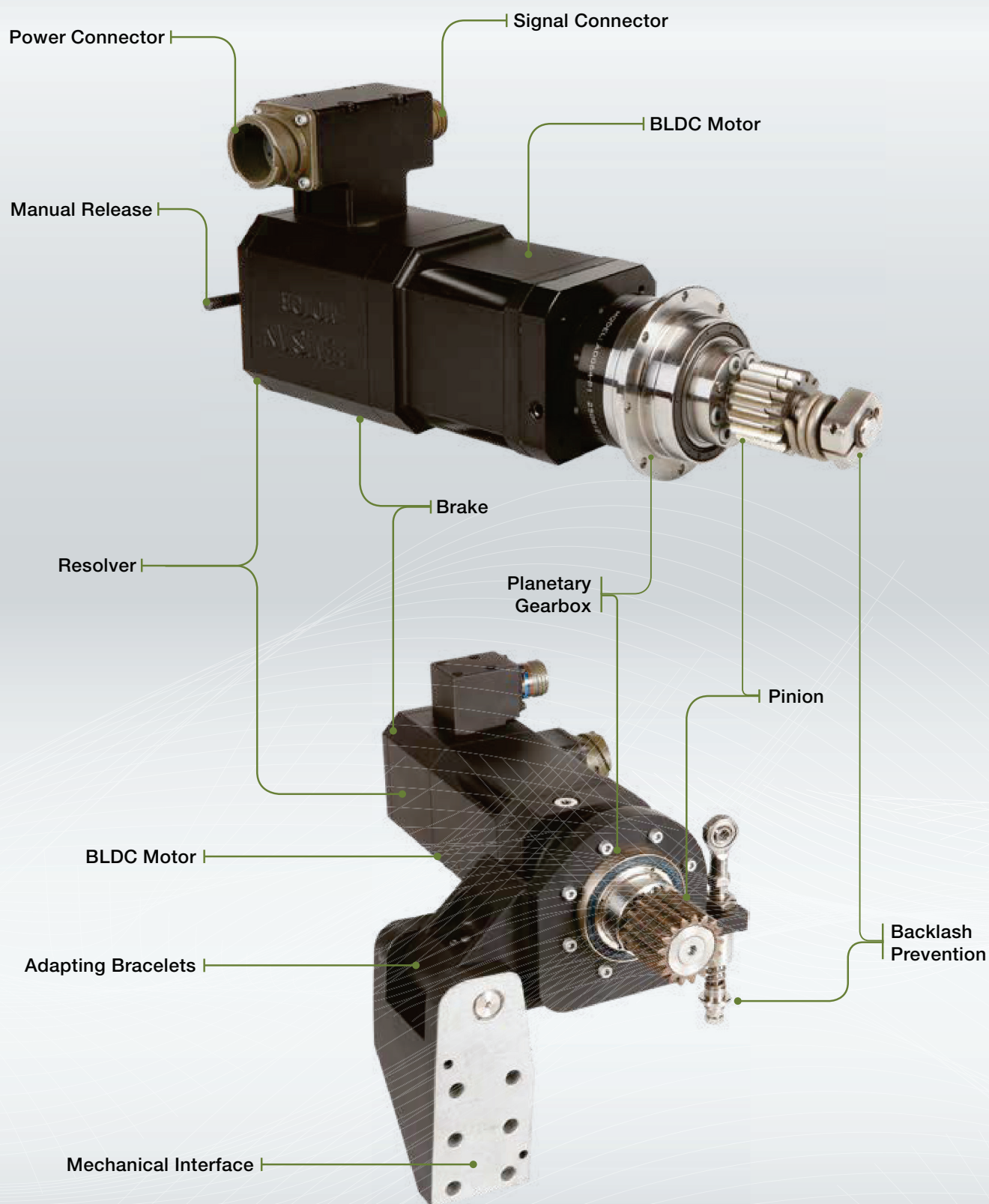
Slotless Motor
with Ball Screw



Slotless Motor with Encoder,
with Brake, with Pl. Gearbox,
with Ball Screw









**Applicable to Defense
and Aerospace**



Part Number	5 C 06 05	5 C 08 04	5 C 08 05	5 C 10 05	5 C 10 10	
Values at Nominal Voltage						
Nominal Voltage	24	24	24	24	24	V
Nominal Speed	1600	2300	1.250	3150	1.700	rpm
Nominal Torque	1,3	1,7	2,2	5,5	7,5	Nm
Nominal Current	13	19	15	105	59	A
Output Power	220	410	290	1800	1330	W
No-load Speed	2100	2700	1750	3700	1930	rpm
Stall Torque	3	3,1	6	15,5	22	Nm
Stall Current	30	35	49	175	175	A
Torque Constant	0,1	0,09	0,14	0,0524	0,127	Nm/A
Speed Constant	12,8	7,64	12,35	6,074	10,9	Vp/krpm
Resistance, terminal to terminal	430	130	205	12	14	mOhm
Inductance, terminal to terminal	0,37	0,22	0,22	0,014	0,049	mH
Number of Phase	3					
Number of Poles	12	8	8	12	12	
Operating Temperature	-40 / +55					°C
Weight	3	3,3	3,5	4,8	4,8	kg
Brake (1)	2	2,5	2,5	6	8	Nm
Feedback (2)	Resolver					
Signal Connector	D38999/20WC98PN					
Power Connector	ACA3102E20-22PB-F80			ACA3102E28-22PB-F80		
Motor Shaft	11	11	11	19		mm
Frame (housing) Size	70 x 70	80 x 80	86 x 86	105 x 105		mm
Flange Diameter	60	60	60	95		mm
Hole Axis Diameter	75	80	95	115		mm

(1) : Spring applied electromagnetic brake. Manual release is available upon request.

(2) : SinCos, Encoder (magnetic or optic) and Hall Sensor feedbacks are also available upon request.

Options

- | | |
|---|---|
| • Planetary Gearbox (in line or angle) mounting possibilities | • All kind of mechanical interfaces to mount any platform |
| • Backlash prevent mechanisms to secure robust working | • Configurable signal and power connectors |
| • Plain (w/ or w/out key way) or geared output shaft | • Absolute Encoder |



Applicable to Defense
and Aerospace



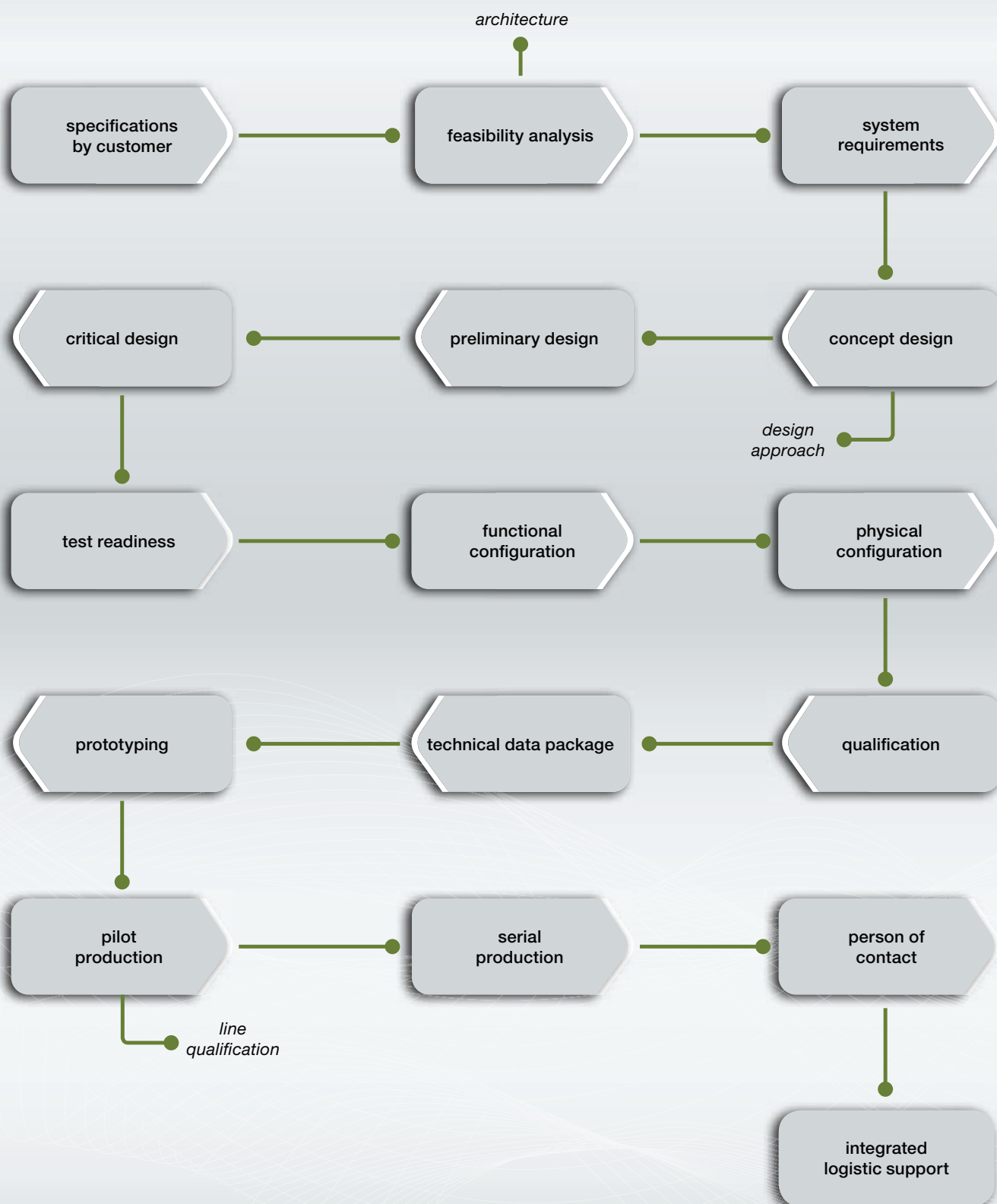
Part Number	5 C 14 08	5 C 14 17-1	5 C 14 17-2	5 C 16 15	5 C 20 15	
Values at Nominal Voltage						
Nominal Voltage	24	24	24	24	24	V
Nominal Speed	1500	1350	2.600	800	800	rpm
Nominal Torque	19	33	30	21	38	Nm
Nominal Current	138	200	350	60	100	A
Output Power	3000	4650	8150	1760	3200	W
No-load Speed	1650	1450	2700	1300	1300	rpm
Stall Torque	48	87	50	77	115	Nm
Stall Current	385	565	560	235	300	A
Torque Constant	0,14	0,165	0,085	0,35	0,38	Nm/A
Speed Constant	13,5	14,6	7,54	20,3	20,3	Vp/krpm
Resistance, terminal to terminal	13,5	4,5	2,3	9,8	3,8	mOhm
Inductance, terminal to terminal	7	0,027	0,0176	0,05	0,028	mH
Number of Phase	3					
Number of Poles	12	12	12	12	12	
Operating Temperature	-40 / +55					°C
Weight	15	29	31	28	42	
Brake (1)	25	64	64	N.A	N.A	
Feedback (2)	Resolver					
Signal Connector	D38999/20WC35PN					
Power Connector	CA3102E36-3P-B-01					
Motor Shaft	22	24	24	22	24	mm
Frame (housing) Size	140 x 140	140 x 140	140 x 140	160 x 160	200 x 200	mm
Flange Diameter	130	130	130	130	130	mm
Hole Axis Diameter	165	165	165	165	165	mm

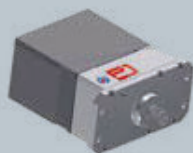
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- | | |
|---|---|
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| • Backlash prevent mechanisms to secure robust working | • Configurable signal and power connectors |
| • Plain (w/ or w/out key way) or geared output shaft | • Absolute Encoder |





Fully integrated, redundant & intelligent, DO254 compatible

- for low and high altitude
- for safety critical systems



Improved performance for challenging environmental conditions and EMI & EMC



Applicable to flight control surfaces of tactical class UAVs

Part Number		5 H 12 16	5 H 21 10	5 H 09 56		Part Number
Actuator Type		Rotary	Rotary	Linear		Actuator Type
Supply Voltage	V	28	28	28	V	Supply Voltage
Nominal Torque	Nm	16	190	8.250	N	Nominal Force
Nominal Current	A	1,5	10	11	A	Nominal Current
Peak Torque	Nm	26	250	11.250	N	Peak Force
Peak Current	A	3	16	18	A	Peak Current
No-load Speed	deg/sec	160	50	4,8	mm/sec	No-load Speed
Nominal Speed	deg/sec	100	50	4,8	mm/sec	Nominal Speed
Displacement	degree	+/- 50	+/- 180	100	mm	Stroke
Backlash	degree	< 0,5	< 0,5	< 0,1	mm	Backlash
Waiting Mode		Floating	Floating	Self Locking		Waiting Mode
MTBF	hour	2.500	5.000	5.000	hour	MTBF
Case Dimensions	mm	122 x 61 x 163	212 x 164 x 106	93 x 95 x 561	mm	Case Dimensions
Weight	kg	1,5	6,5	6,5	kg	Weight
Operating Altitude	ft	30.000	40.000	40.000	ft	Operating Altitude

Common Features

Control Electronic		Digital	
Communication		RS422 & RS485 & MIL-STD-1553B & CAN BUS	
Signal Bandwidth		100	Hz
Development Guideline		DO 254	
Operating Temperature		-54 / +70	°C
Storage Temperature		-55 / +85	°C
Position Feedback		High Precision Potentiometer displacement sensor	
Signal Connector		D38999/20WD35PN	

MOPA

Marketing of Industrial Products

Mopa represents and distributes the products of many brands in Turkey.

Dedicated and technically strong team provides the deep penetration of various industrial products into Turkish market.

FAULHABER

dunkermotoren
advanced motion solutions

LITEON

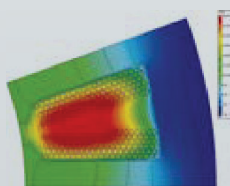
KENDRION

Elmo
Motion Control

TRANSTECNO
THE MODULAR GEARMOTOR

MOTEK

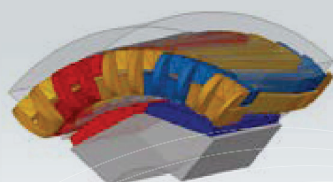
Research & Development for Electromechanics



Engineering service not only for electric motors but also actuation and propulsion systems and sub-systems



Research and Development activities at the fields of electric, electronic, software, mechanic, mechatronic and aviation



Thermal and structural analysis including static and dynamic for designed and developed systems



Gearbox, Brake, Encoder, Resolver, Lead Screw and Ball Screw mounted Electric Motors

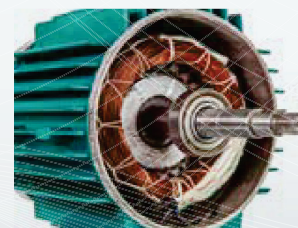
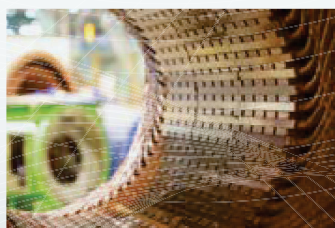
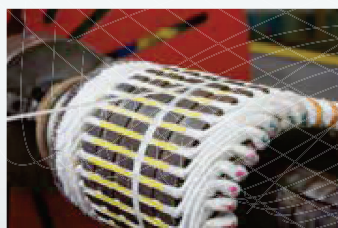
MOGESER

Maintenance and Overhaul of Motors, Generators

Specialized in maintenance and repair services for electric motors, alternators and servo motors.

Highly skilled technical team provides favorable turnaround time for our customers.

When you need the maintenance of your motors be the first to think MOGESER.





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