



**CYCLONE**

*Professional Direct Drive System Supplier*

***Torque Motor***



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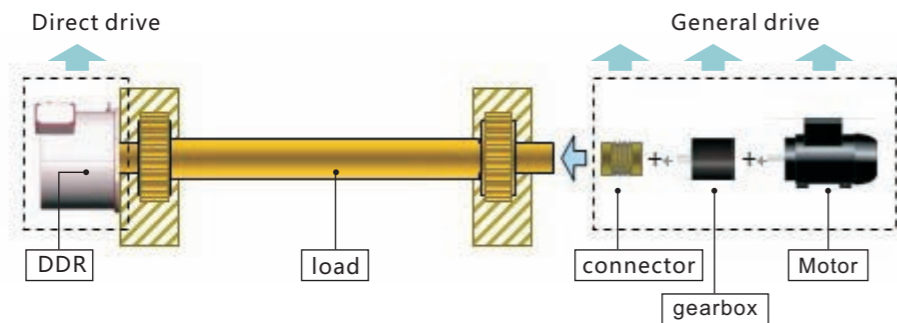
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# Cyclone DDR Motors



Relying on advanced motor technology and ripe crafts, Cyclone Motor has successfully undertaken a key project on Hi-End Numerical Control Machines and Fundamental Manufacturing Equipment in 2009. That is "Large Torque DDR Motor and the Driving Device".

Rich in theoretical research and comprehensive design ability, E-Motion has successfully designed and produced a series of DDR products with continuous torque from 2Nm to 3300Nm. Later on it issued enterprise standard for them, acting as the 1st enterprise in China issuing standards for DDR motors.



**By adopting direct drive technology, DDR motor gets rid of retarding mechanism and has the following advantages.**

- High dynamic performance and high reliability.
- Direct extension of the force - no mechanical transmission
- Maintenance-free drive
- Simplified mechanical design
- High dynamic response and high drive control
- High positioning accuracy
- Simple installation and removal

Suggest that our customers choose our standard products firstly, because their stocks are always available for prompt delivery. Of course, we also provide the customized service for our customers, in order to meet the actual working needs.

## Contrast among DDR motor, Servo motor and stepping motor

As a new generation of creative products, DDR motor will largely take replace of traditional servo motor and stepping motor in those applications-- semiconductor, automation equipment, NC machine and etc, and grow up to the important functional parts for optimizing and upgrading the products.

Parameter	DDR Motor	Servo Motor	Stepping Motor
Accuracy	High	Medium	Low
Torque	High	Medium	Low
Dynamic property	Good	Common	Low
Speed	Low	High	Low
Reliability	High	Common	Common
Cost	High	Common	Low
Precision retaining ability	Good	Medium	Medium

## Product range, Application and performance analysis

Cyclone motor has realized the abundant supply of DDR motors from 2Nm to 3300Nm, which can satisfy customers their diversified needs.

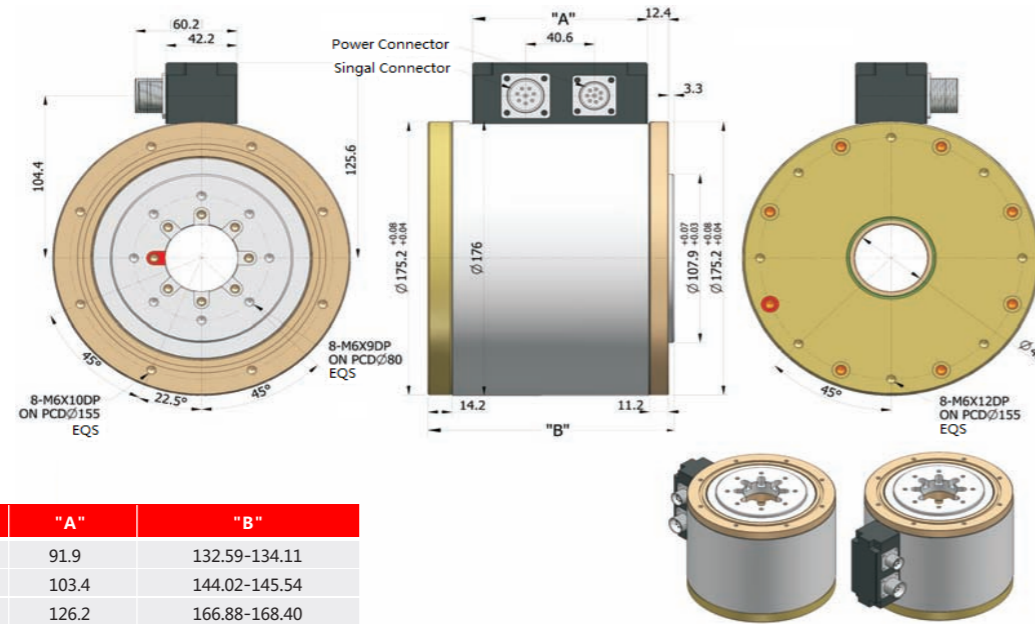
Product Series			
Parameter	Series FI	Series FE	Series BI
Product type	Frame type, inner rotor	Frame type, outer rotor	Frameless
Continuous torque	2 Nm~320 Nm	4 Nm~20 Nm	200 Nm~3300 Nm
Max. rotate speed	500 r/min	600 r/min	300 r/min
Features	Drive by inner rotor, integrated bearing/encoder	Drive by outer rotor, integrated bearing/encoder	Frameless, inner rotor

## Application and Performance analysis

Application	performance		
	Accuracy+volume+maintenance	Speed	Rigidity
Detection equipment	√	√	
Industrial robot	√		
Semiconductor	√	√	√
Transportation/Processing		√	
Precision turntable/dividing table	√	√	√
NC machine	√	√	√

# FI Series (Frame Type, Inner Rotor)

## ● FI-1 Series



Model No.	"A"	"B"
FI1-005-X-X-X	91.9	132.59-134.11
FI1-010-X-X-X	103.4	144.02-145.54
FI1-015-X-X-X	126.2	166.88-168.40

### RATED PERFORMANCE

Model No	SYMBOL	UNIT	FI1-005	FI1-010	FI1-015
Continuous Torque(At Tmax)	Tc	Nm	5	10	17.7
Peak Torque	Tp	Nm	15	30	51
Max Speed (220Vac)	Nmax	Rpm	500	500	500
Resolution	/	Position/rev	2097152	2097152	2097152
Repeat Accuracy	/	arc sec	±2	±2	±2
Positioning Accuracy	/	arc sec	±26	±26	±26

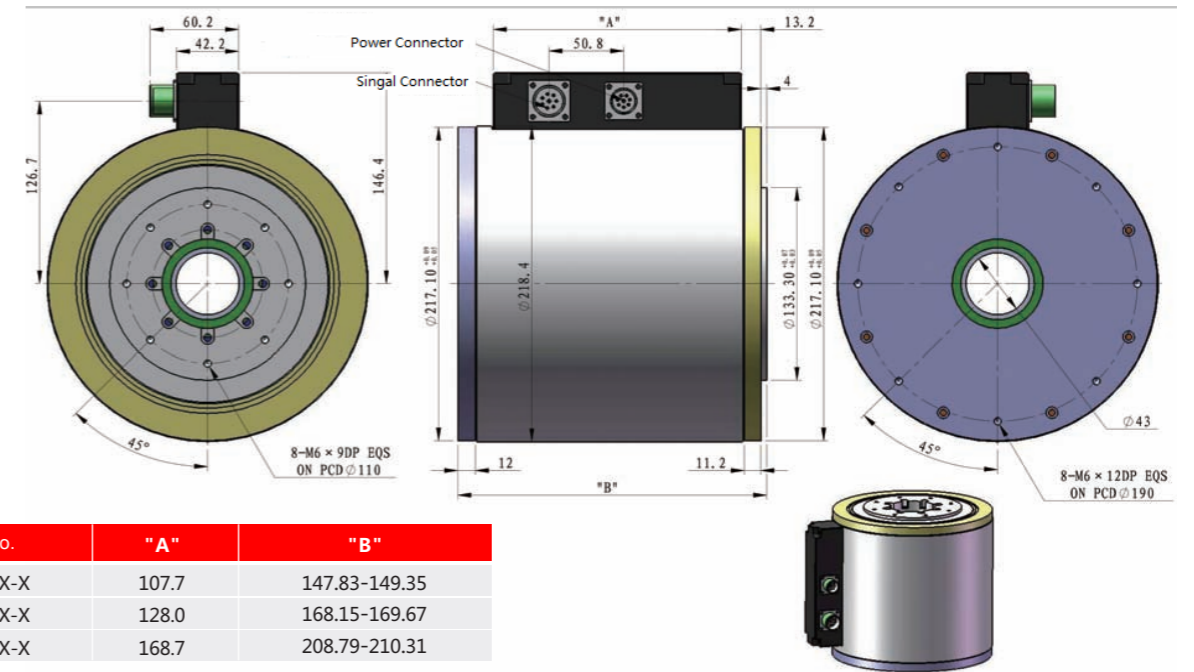
### ELECTRICAL SPECIFICATION

Continuous Current (at Tmax)	Ic	Arms	2.3	2.7	2.3
Peak Current (for 1s)	Ip	Arms	7	8.1	7
Torque Constant (25 °C±10%)	Tf	N/Arms	2.16	3.7	7.7
Back EMF Constant (25 °C±10%)	Te	Vrms/rad/s	0.72	1.23	2.6
Electrical Resistance (25 °C±10%)	R	Ω(p-p)	13	14.6	19.5
Electrical Inductance (±20%) p-p	L	mH(p-p)	23	26	35
Pole Pairs	p		8	8	8
Max Coil Temperature	Tmax		120	120	120

### MECHANICAL SPECIFICATION

Motor Weight	/	KG	13.7	15.5	19.5
Rotor Weight	Mc	KG	2.8	3.5	4.9
Rotor Inertia	Jm	Kg*m2	0.004	0.0053	0.0076
Axial Run Out	/	mm	0.04	0.04	0.04
Radial Run Out	/	mm	0.04	0.04	0.04

## ● FI-2 Series



Model No.	"A"	"B"
FI2-015-X-X-X	107.7	147.83-149.35
FI2-025-X-X-X	128.0	168.15-169.67
FI2-050-X-X-X	168.7	208.79-210.31

### RATED PERFORMANCE

Model No	SYMBOL	UNIT	FI2-015	FI2-025	FI2-050
Continuous Torque(At Tmax)	Tc	Nm	15	25	50
Peak Torque	Tp	Nm	45	75	150
Max Speed (220Vac)	Nmax	Rpm	500	300	250
Resolution	/	Position/rev	2097152	2097152	2097152
Repeat Accuracy	/	arc sec	±2	±2	±2
Positioning Accuracy	/	arc sec	±26	±26	±26

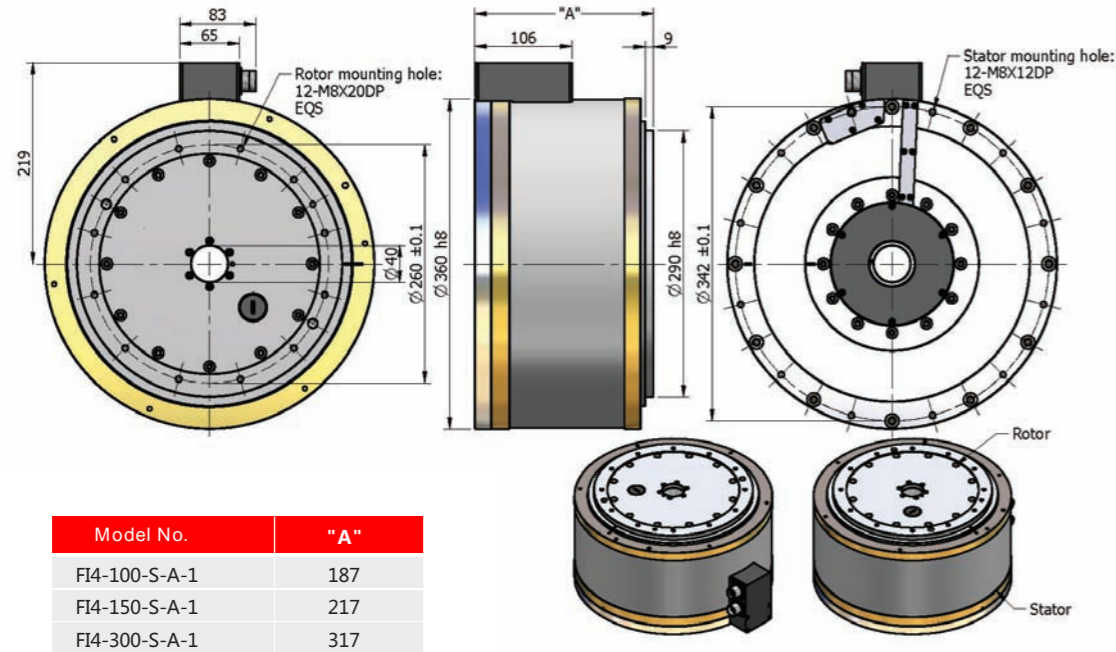
### ELECTRICAL SPECIFICATION

Continuous Current (at Tmax)	Ic	Arms	4.7	4	4
Peak Current (for 1s)	Ip	Arms	14	12	12
Torque Constant (25 °C±10%)	Tf	N/Arms	3.2	6.4	12.2
Back EMF Constant (25 °C±10%)	Te	Vrms/rad/s	1.1	2.1	4.1
Electrical Resistance (25 °C±10%)	R	Ω(p-p)	1.7	2.6	4.3
Electrical Inductance (±20%) p-p	L	mH(p-p)	4.8	7.4	12.2
Pole Pairs	p		16	16	16
Max Coil Temperature	Tmax		120	120	120

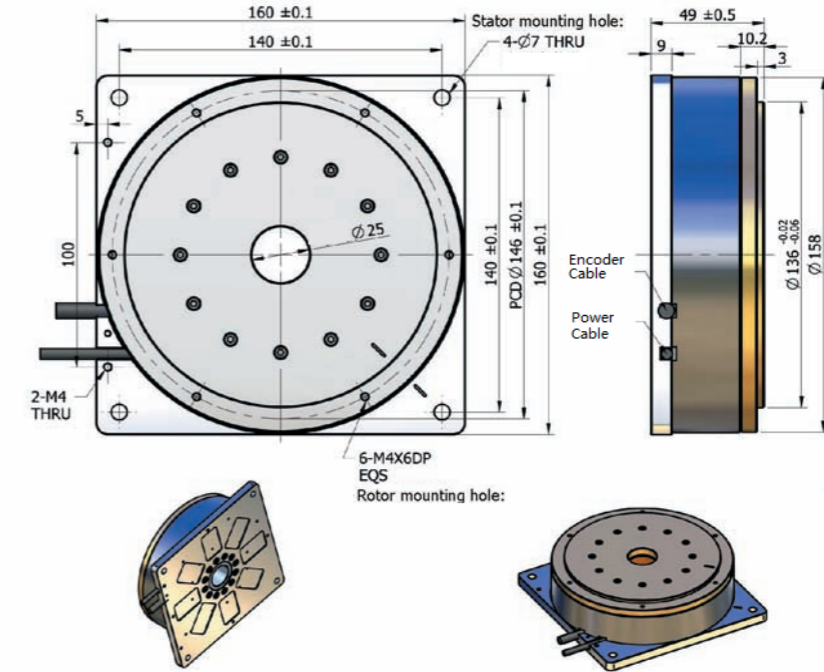
### MECHANICAL SPECIFICATION

Motor Weight		KG	26	31	41
Rotor Weight	Mc	KG	6.0	7.2	9.5
Rotor Inertia	Jm	Kg*m2	0.014	0.0186	0.0264
Axial Run Out		mm	8	0.04	0.04
Radial Run Out		mm	0.04	0.04	0.04

● FI-4 Series



● FI-5 Series



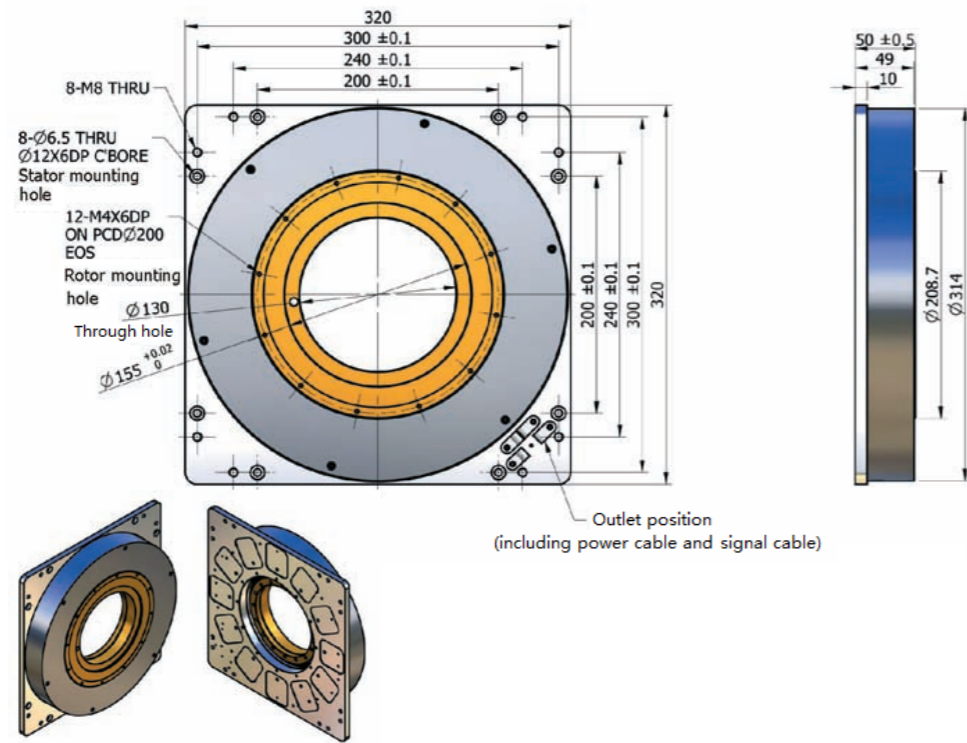
PERFORMANCE PARAMETER	SYMBOL	UNITS	FI4-100	FI4-150	FI4-300
Continuous Torque	Tc	Nm	100	160	220
Peak Torque	Tp	Nm	300	500	600
Max Axial Load	Fa	N	30000	30000	30000
Max Speed (220Vac)	Nmax	r/min	200	120	80
Resolution ( Incremental/Absolute )	-	Position/rev	2097152	2097152	209715
Repeat Accuracy	-	arc sec	±2	±2	±2
Positioning Accuracy	-	arc sec	±26	±26	±26
Weight Parameter					
Rotor Weight	Mc	kg	18	26	50
Rotor Inertia	Jm	Kg*m2	0.2	0.3	0.5

PERFORMANCE PARAMETER	SYMBOL	UNITS	FI5-001-S-A-1
Continuous Torque(At Tmax)	Tc	Nm	1
Peak Torque	Tp	Nm	3
Max Speed (220Vac)	Nmax	r/min	300
Repeat Accuracy	-	arc sec	±1
Positioning Accuracy	-	arc sec	±16
Continuous Current (at Tmax)	Ic	Arms	2.5
Peak Current (1s)	Ip	Arms	7.5
Torque Constant (25 °C±10%)	Tf	N/Arms	0.4
Back EMF Constant (25 °C±10%)	Ke	Vpp/rad/s	0.33
Back EMF Constant (25 °C±10%)	Ke	Vpp/100rpm	34.2
Electrical Resistance (25 °C±10%)	R	Ω(p-p)	2.66
Electrical inductance (25 °C±10%)	L	mH(p-p)	0.71
Pole pairs	p		8
Max Coil Temperature	Tmax	°C	120
Motor Weight	M	Kg	3.0
Rotor Inertia	Jm	Kg*m2	0.003

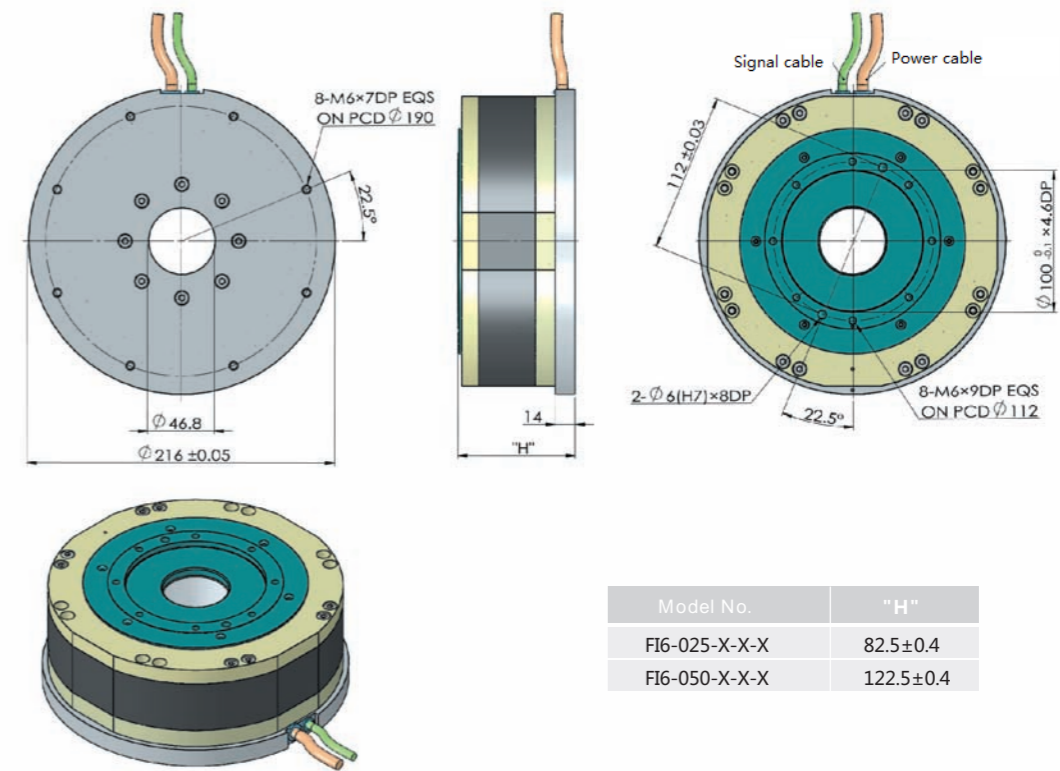
Note:

- 1.DDR motor will be generally equipped with Cyclone independently developed servo drives. However, it is also ok for customer to specify the drive.
- 2.Cyclone Motor can offer the customized service for those special applications.
- 3.Series FI4 will be configured with high precision incremental encoder.
- 4.Please ask for detailed product manual or consult our technical personnel, when adopt the servo drive of other brands.

● FI-5 Series



● FI-6 Series



Model No.	"H"
FI6-025-X-X-X	82.5±0.4
FI6-050-X-X-X	122.5±0.4

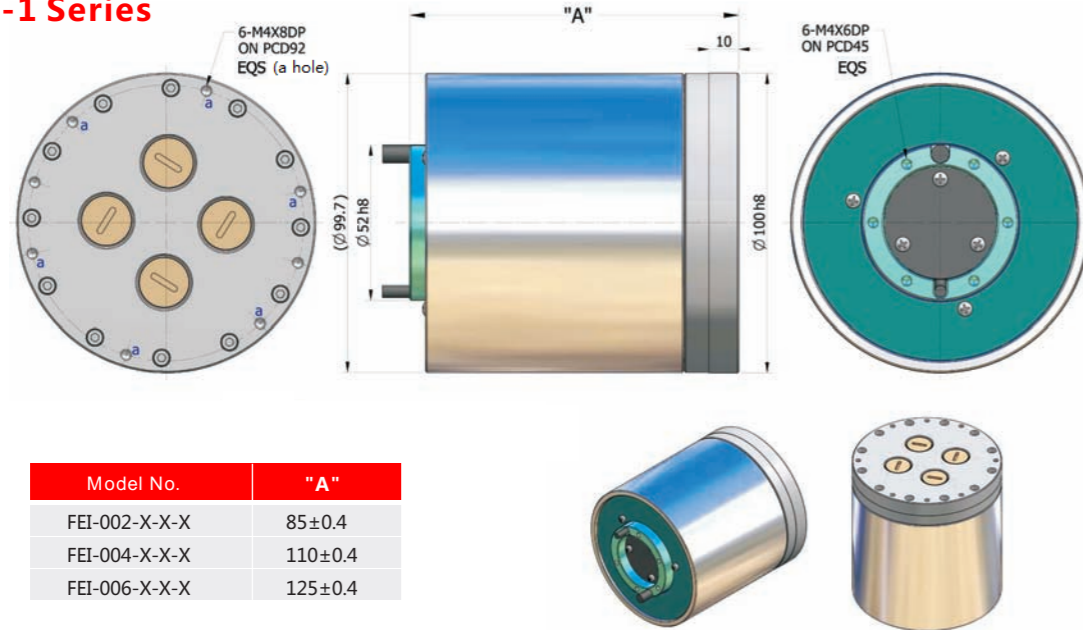
PERFORMANCE PARAMETER	SYMBOL	UNITS	FI5-002-S-A-1
Continuous Torque(At Tmax)	Tc	Nm	2
Peak Torque	Tp	Nm	6
Max Speed (220Vac)	Nmax	r/min	100
Repeat Accuracy	-	arc sec	±2
Positioning Accuracy	-	arc sec	±25
Continuous Current (at Tmax)	Ic	Arms	0.7
Peak Current (1s)	Ip	Arms	2.1
Torque Constant (25 °C±10%)	Tf	N/Arms	2.9
Back EMF Constant (25 °C±10%)	Ke	Vpp/rad/s	2.4
Back EMF Constant (25 °C±10%)	Ke	Vpp/100rpm	248
Electrical Resistance (25 °C±10%)	R	Ω(p-p)	7
Electrical inductance (25 °C±10%)	L	mH(p-p)	66
Pole pairs	p		24
Max Coil Temperature	Tmax	°C	80
Motor Weight	M	Kg	7.5
Rotor Inertia	Jm	Kg*m2	0.026

PERFORMANCE PARAMETER	SYMBOL	UNITS	FI6-025-S-A-1	FI6-050-S-A-1
Continuous Torque(At Tmax)	Tc	Nm	25	50
Peak Torque	Tp	Nm	75	150
Max Speed (220Vac)	Nmax	r/Min	500	250
Resolution	-	Position/rev	737280	737280
Repeat Accuracy	-	arc sec	±8	±8
Positioning Accuracy	-	arc sec	±25	±25
Continuous Current (at Tmax)	Ic	Arms	3.5	3.5
Peak Current (1s)	Ip	Arms	11	11
Torque Constant (25°C±10%)	Tf	N/Arms	7.3	14.5
Back EMF Constant (25°C±10%)	Ke	Vpp/rad/s	6	11.85
Back EMF Constant (25°C±10%)	Ke	Vpp/100rpm	624.2	1239.8
Electrical Resistance (25°C±10%)	R	Ω (p-p)	4.8	8
Electrical inductance (25°C±10%)	L	mH(p-p)	10.8	22
Pole pairs	p	/	16	16
Max Coil Temperature	Tmax	°C	120	120
Rotor Weight	M	kg	8.5	11
Rotor Inertia	Jm	kg*m2	0.025	0.04

Note: Standard products are equipped with drive ST3-S-4-230Vac-D-00

# FE Series (Frame type, external rotor)

## ● FE-1 Series



Model No.	"A"
FEI-002-X-X-X	85±0.4
FEI-004-X-X-X	110±0.4
FEI-006-X-X-X	125±0.4

### RATED PERFORMANCE

Model No	SYMBOL	UNIT	FE1-002	FE1-004	FE1-006
Continuous Torque(At Tmax)	Tc	Nm	2	4	6
Peak Torque	Tp	Nm	6	12	18
Max Speed (220Vac)	Nmax	Rpm	600	600	600
Resolution	/	Position/rev	3686400	3686400	3686400
Repeat Accuracy	/	arc sec	±2	±2	±2
Positioning Accuracy	/	arc sec	±20	±20	±20

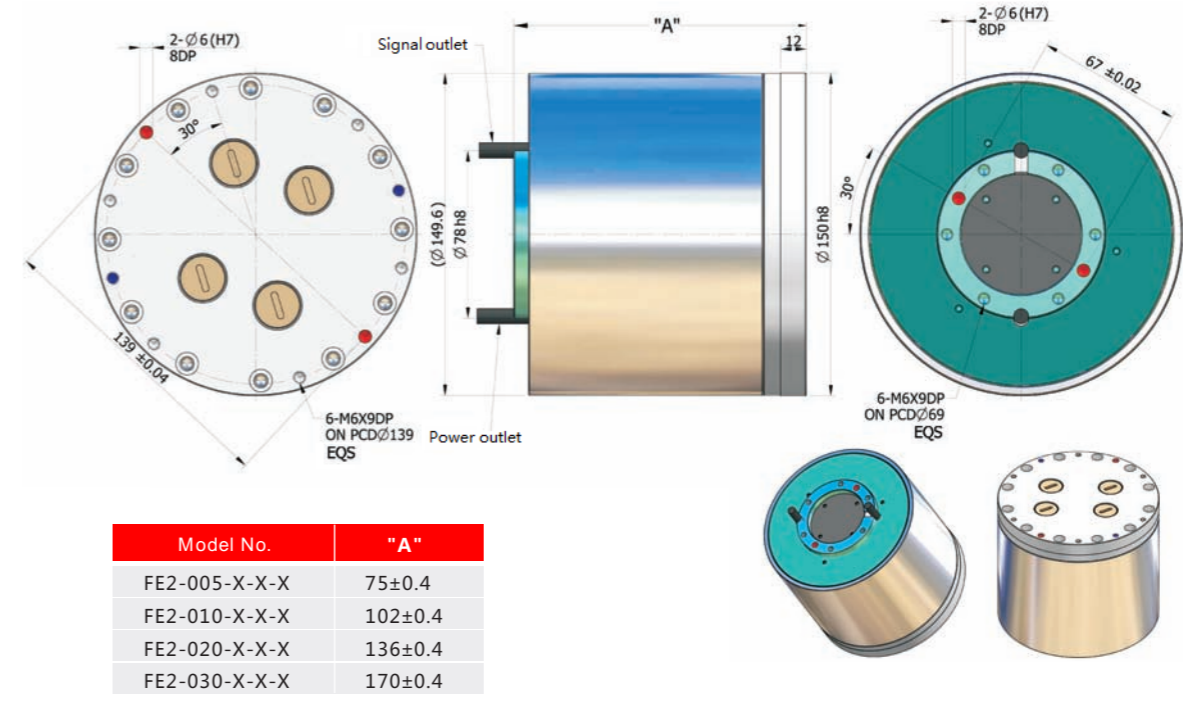
### ELECTRICAL SPECIFICATION

Continuous Current (at Tmax)	Ic	Arms	3.3	3.3	3.3
Peak Current (for 1s)	Ip	Arms	10	10	10
Torque Constant (25 °C±5%)	Tf	N/Arms	0.6	1.1	1.8
Back EMF Constant (25 °C±5%)	Te	Vrms/rad/s	0.2	0.4	0.6
Electrical Resistance (25 °C±5%)	R	Ω(p-p)	1.1	1.9	2.5
Electrical inductance (25 °C±10%)	L	mH(p-p)	0.9	1.5	2
Pole pairs	p		8	8	8
Max Coil Temperature	Tmax	°C	120	120	120

### MECHANICAL SPECIFICATION

Motor weight		KG	4.0	5.0	6.5
Rotor Weight	Mc	KG	2.1	2.5	2.9
Rotor Inertia	Jm	Kg*m2	0.003	0.004	0.0045
Axial Run out		mm	5	0.04	0.04
Radial Run out		mm	0.04	0.04	0.04

## ● FE-2 Series



Model No.	"A"
FE2-005-X-X-X	75±0.4
FE2-010-X-X-X	102±0.4
FE2-020-X-X-X	136±0.4
FE2-030-X-X-X	170±0.4

### RATED PERFORMANCE

Model No	SYMBOL	UNIT	FE2-005	FE2-010	FE2-020	FE2-030
Continuous Torque(At Tmax)	Tc	Nm	5	10	20	30
Peak Torque	Tp	Nm	15	30	60	90
Max Speed (220Vac)	Nmax	Rpm	600	600	480	300
Resolution	/	Position/rev	2097152	2097152	2097152	2097152
Repeat Accuracy	/	arc sec	±2	±2	±2	±2
Positioning Accuracy	/	arc sec	±26	±26	±26	±26

### ELECTRICAL SPECIFICATION

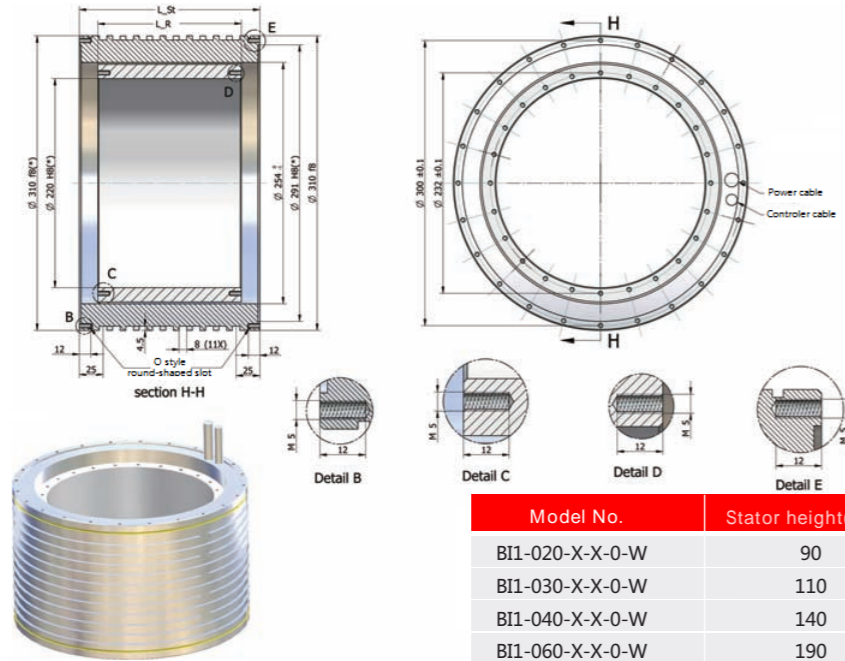
Continuous Current (at Tmax)	Ic	Arms	3.6	3.6	3.6	3.6
Peak Current (for 1s)	Ip	Arms	16	16	16	16
Torque Constant (25 °C±5%)	Tf	N/Arms	1.4	2.8	5.6	8.3
Back EMF Constant (25 °C±5%)	Te	Vrms/rad/s	0.5	0.9	1.9	2.8
Electrical Resistance (25 °C±5%)	R	Ω(p-p)	1.2	2	3.6	5.2
Electrical inductance (25 °C±10%)	L	mH(p-p)	3.6	7	12	17
Pole pairs	p		8	8	8	8
Max Coil Temperature	Tmax	°C	120	120	120	120

### MECHANICAL SPECIFICATION

Motor weight		KG	8	11	14.5	19
Rotor Weight	Mc	KG	3.55	4.75	5.62	6.55
Rotor Inertia	Jm	Kg*m2	0.013	0.0187	0.023	0.025
Axial Run out		mm	8	0.04	0.04	0.04
Radial Run out		mm	0.04	0.04	0.04	0.04

# BI Series (Frameless)

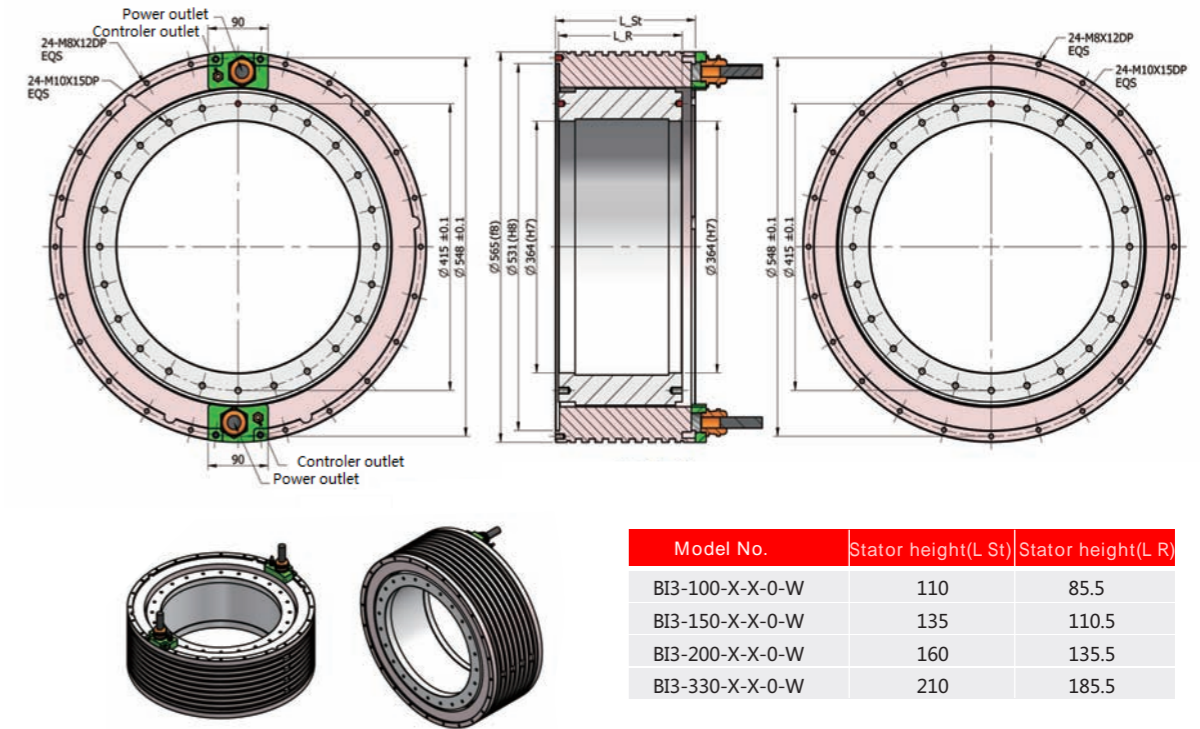
## ● BI-1 Series



Model No.	Stator height(L St)	Stator height(L R)
BI1-020-X-X-0-W	90	51
BI1-030-X-X-0-W	110	71
BI1-040-X-X-0-W	140	101
BI1-060-X-X-0-W	190	151

TECHNICAL PARAMETERS	UNIT	BI1-020	BI1-030	BI1-040	BI1-060
Number of Pole Pairs	/	22	22	22	22
Peak Torque	Nm	353	524	699	1100
Continuous Torque(WC)	Nm	184	294	408	632.7
Peak Current	Arms	30.3	30.3	31	31
Continuous Current(WC)	Arms	13.6	14.6	15.2	17.1
Torque Constant	Nm/A	13.56	20	26.8	37.0/42
Back EMF Constant	V/(rad/s)	11.07	16.33	21.88	30.21
Electrical Resistance	Ω	3.27	4.33	5.38	7.5
Electrical Inductance	mH	16	24.5	32	35
Max Speed at Tcw	rpm	356	236	153	93
No-load Max Speed	rpm	462	330	234	170
Cooling Water Flow	L/min	3.59	5.38	7.18	10.77
Cooling Water Temperature Difference	k	5	5	5	5
Rated Winding Temperature	°C	130	130	130	130
Rotor Weight	kg	4	5.9	7.9	11.7
Stator Weight	kg	14	18	23	31
Rotor Inertia	kgm <sup>2</sup>	0.051	0.071	0.101	0.12

## ● BI-3 Series



Model No.	Stator height(L St)	Stator height(L R)
BI3-100-X-X-0-W	110	85.5
BI3-150-X-X-0-W	135	110.5
BI3-200-X-X-0-W	160	135.5
BI3-330-X-X-0-W	210	185.5

TECHNICAL PARAMETERS	UNIT	BI3-100	BI3-150	BI3-200	BI3-330
Pole Pairs	—	33	33	33	33
Peak Torque	Nm	1800	2600	3600	5500
Continuous Torque(WC)	Nm	1100	1600	2200	3300
Peak Current (1s)	Arms	114	114	114	292
Continuous Current(WC)	Arms	70	70	70	140
Torque Constant	Nm/A	16	24	32	24
Back EMF Constant	V/(rad/s)	26.1	19.4	26.1	19.4
Electrical Resistance p-p (25°C)	Ω	0.24	0.36	0.48	0.18
Electrical Inductance p-p	mH	3.4	5.1	6.7	2.52
Rated Speed at Tcw	rpm	205	190	140	224
No-load Max Speed	rpm	240	260	190	281
Cooling Water Flow	L/min	3.8	4.8	6.4	8
Cooling Water Temperature Difference	k	10	10	10	15
Rated Winding Temperature	°C	130	130	130	130
Rotor Weight	kg	27	40	54	81
Stator Weight	kg	27	41	55	82.5
Rotor Inertia	kgm <sup>2</sup>	0.19	0.258	0.36	3.47