

# FANUC

## DRIVE SYSTEMS

Product Overview



# 100% FANUC

## No. 1 in the world

FANUC is the leading global manufacturer of factory automation, with more than 60 years experience in the development of computer numerical control equipment. It has 4 million CNC controls and 20,000 laser systems installed worldwide, and satisfied customers in every corner of the globe.

# 1

FANUC Laser Systems



FANUC CNC Controls



FANUC Motors



FANUC Amplifiers



# Widest range – highest reliability

FANUC offers the widest range of drive systems on the market: servo and spindle motors of all sizes in optimized packages with perfectly matched amplifiers. That's our strength. You'll always find the best system delivering perfect results for your requirements – with outstanding performance and work piece surface quality.

All FANUC motors and amplifiers are developed and manufactured in-house at FANUC Japan. This results in superior functional reliability, ease of availability, simple installation and maintenance, and optimized energy efficiency.

**That's how we increase your productivity.**

## Your benefits:

- Perfectly matched packages for highest productivity
- Plug and play technology for easy installation
- Highest reliability through 100% FANUC quality
- Outstanding performance
- Easy maintenance
- Optimized energy efficiency

Up to  
**32,000,000**  
pulses per  
revolution

More than  
**50 years**  
mean time  
between failures\*

\*for 0i D



# Servo motors

## *βi* series



Economical servo motors with a good cost/performance ratio for feed axes of entry level machines, positioning axis, live tools and peripheral units.

- Medium inertia – quick acceleration
- Two versions available: F – ferrite magnet, S – strong motor (neodymium magnets)
- Rated torque output 0.2-40 Nm
- Smooth rotation
- Maximum speed up to 6000 rpm
- High resolution *βi* Series encoder (1,000,000/rev)
- Protection class IP65 – optional IP67

## *αi* series



Servo motors with excellent acceleration – for use in high speed and high precision machining for large industrial machines (e.g. press-machines).

- High feed smoothness
- Two versions available: F – ferrite magnet, S – strong motor (neodymium magnets)
- Wide torque output range 1-3000 Nm
- Maximum speed up to 8000 rpm
- High resolution *αi* Series encoder (32,000,000/rev)
- Protection class IP65 – optional IP67

<i>βi</i> series															
Torque [Nm]	0.2	0.3	0.4	0.5	1	2	4	4	8	12	12	22	30	40	
Flange [mm]	40			60			90		130			174			
Brake option [Nm]	0.32		0.65		1.2		3		8		12		35		
<i>βi</i> S 200V	•	•	•	•	•	•	•		•	•			•	•	•
<i>βi</i> Sc 200V						•	•		•	•			•		
<i>βi</i> F200V								•	•		•	•	•		
<i>βi</i> S (HV) 400V				•	•	•	•		•	•		•	•	•	
<i>βi</i> Sc (HV) 400V						•	•		•	•					

<i>αi</i> series																				
Torque [Nm]	1	2	4	4	8	12	12	22	30	40	50	60	150	300	500	1000	1500	2000	3000	
Flange [mm]	90			130			174						265			380		500		
Brake option [Nm]	3			8		12		35			70			-						
<i>αi</i> S 200V		•	•		•	•		•	•	•	•	•	•	•	•					
<i>αi</i> F 200V	•	•		•	•		•	•	•	•										
<i>αi</i> S (HV) 400V		•	•		•	•		•	•	•	•	•	•	•	•	•	•	•	•	
<i>αi</i> F (HV) 400V				•	•		•	•	•	•										



# DD motors

## DiS series built-in servo motors



The ideal solution for tables, turrets and the high precision rotary axis of 5-axes machines.

- Strong neodymium magnets for high torque
- Maximum torque 35-10000 Nm, continuous torque 15-4500 Nm
- High speed models up to 2000 rpm
- Low ripple – optimum magnetic circuit design
- Maintenance free direct drive

STANDARD MODELS	DiS15/1000-B		DiS60/400-B		DiS80/400 (HV)-B	DiS120/600-230 (HV)-B	DiS180/800-B		DiS300/300 (HV)-B		DiS600/600-B		DiS1000/150-385HV-B	DiS1500/300-385HV-B	DiS2000/150		DiS5000/50
Maximum torque [Nm]	35		130		200	275	400		600		1200		1800	2500	4000		10000
Continuous Torque [Nm]	16	15	65	60	80	120	180	270	280	550	620	920	1340	2200	4500		
Diameter [mm]	140		180		230	230	230		310		310		385	385	565	795	
Height [mm]	80		100		80	100	120		100		150		160	210	160	180	
Speed [min <sup>-1</sup> ]	600	1000	200	400	400	600	400	800	300		300	600	150	300	75	150	50
DiS 200V	•		•		•	•	•		•		•				•		
DiS 400V		•		•	•	•		•		•		•		•		•	•

HIGH SPEED MODELS	DiS60/2000-B		DiS70/1500-B		DiS180/3000HV-B	DiS500/1200-B		DiS1000/1000-385-B		DiS1000/1000-B		DiS5000/500
Maximum torque [Nm]	120		130		360	1000		1600		1600		8000
Continuous Torque [Nm]	60		70		150	550		1090		960		4500
Diameter [mm]	180		230		230	310		385		455		795
Height [mm]	100		80		120	150		160		130		180
Speed [min <sup>-1</sup> ]	1000	2000	1000	1500	3000	1200	1200	500	1000	500	1000	500
DiS 200V	•		•		•	•		•		•		
DiS 400V		•		•	•		•		•		•	•

# Spindle motors

## *βil*-B series



Compact motors providing high power/torque and an excellent price/performance ratio.

- High efficiency and low heat generation
- Output power 3.7-15 Kw
- Suitable for small and medium size machines such as compact lathes
- Protection class *ip*40, with oil seal *ip*54

## *αil*-B series



Powerful motors for high acceleration with high mechanical precision and low vibration (V3) – suited to spindles of high performance and large size machines.

- Wide range of constant power up to high speed by winding switching
- Power range 0.55-150 Kw
- Large torque at low speed available
- Special versions with hollow shaft for centre-through-coolant or liquid Cooled motors available
- Protection class *ip*40, with oil seal *ip*54, *ip*65 as option for some models

<i>βil</i> -B series						
Power [kW]	3.7	5.5	7.5	9	11	15
<i>βil</i> -B (200V) Standard induction	•	•	•		•	•
Maximum speed [rpm]	12000				10000	8000
<i>βil</i> -B (400V) Standard induction	•	•	•		•	•
Maximum speed [rpm]	12000				10000	8000
<i>βilP</i> -B (200V) Wide constant power		•	•	•	•	•
Maximum speed [rpm]		6000	8000		8000 <sup>1</sup> 6000 <sup>2</sup>	
<i>βilC</i> -B (200V) Without speed feedback	•	•	•			
Maximum speed [rpm]	6000					
<i>βilT</i> -B (200V) Hollow shaft					•	•
Maximum speed [rpm]					10000	8000

<i>αil</i> -B series																				
Power [kW]	0.55	1.1	1.5	2.2	3.7	5.5	7.5	9	11	15	18.5	22	26	30	37	45	60	75	100	150
<i>αil</i> -B (200V) Standard induction	•	•	•	•	•	•	•		•	•	•	•		•	•	•				
Maximum speed [rpm]	10000 15000	10000	10000 20000	10000 20000 24000	10000 12000 20000	10000 12000 15000	8000 10000 12000		8000 12000					6000 7000		5000				
<i>αil</i> -B (400V) Standard induction	•	•	•	•	•	•	•		•	•		•		•	•	•	•	•	•	•
Maximum speed [rpm]	1000			10000 20000	10000		8000 12000		8000	8000 10000		8000 10000		6000 7000		5000				
<i>αilP</i> -B (200V) Wide constant power range						•	•	•	•	•	•	•								
Maximum speed [rpm]							8000				6000	5000 6000								
<i>αilP</i> -B (400V) Wide constant power range							•		•		•									
Maximum speed [rpm]							8000		8000		6000	5000 6000								
<i>αilT</i> -B (200V) Coolant through			•	•	•	•	•		•	•										
Maximum speed [rpm]			20000	20000 24000	12000 20000	12000 15000			12000	15000		10000								
<i>αilT</i> -B (400V) Coolant through			•	•	•	•			•	•		•								
Maximum speed [rpm]			20000		12000				15000		10000									
<i>αilL</i> -B (200V) Liquid cooled										•	•			•						
Maximum speed [rpm]										20000	15000		15000							
<i>αilL</i> -B (400V) Liquid cooled										•	•		•							
Maximum speed [rpm]										20000	15000		15000							

1) *βilP* 30/8000  
2) *βilP* 40/6000



# Asynchronous built-in spindle motors

## Bi series



Compact built-in motors for compact, high speed, and high performance machines.

- Large torque at low speed – high power at high speed
- Power range 0.75-50kW
- Larger torque and higher power achieved by efficient heat radiation of stator resin mold (option) or copper-bar rotor (some models)
- Maximum speed up to 70000 rpm

Standard 200V	Bi150S/30000	Bi150M/25000	Bi150L/25000	Bi150L/30000	Bi180S/20000	Bi180S/20000	Bi180S/30000	Bi180M/15000	Bi180M/15000	Bi100S/12000	Bi180M/30000	Bi180L/8000	Bi100S/12500	Bi112S/15000	Bi112M/15000	Bi112L/15000	Bi112LL/15000	Bi132L/14000	Bi160M/13000	Bi160L/13000	
<b>Stator outer Diameter [mm]</b>	88				120				156	120			156	180				210	240		
<b>Rotor inner Diameter [mm]</b>	34.8				41				58	41			58	74				84	101		
<b>Continuous power [kW]</b>	0.75	1	1.5	5.5	1.5	2.2	7.5	1.5	2.2	3.7	11	1.1	2.2	15	18.5	18.5	22	22	22	26	
<b>Length [mm]</b>	71	100	154		135				195		152	205	245	202	219	272	330	394	360	321	406
<b>Speed [min<sup>-1</sup>]</b>	25000	20000	25000	30000	20000		30000	15000		12000	30000	8000	12500	15000				14000	13000		

Standard 200V	Bi16LL/13000	Bi170S/6000	Bi170M/6000	Bi180M/10000	Bi180L/10000	Bi180LL/10000	Bi1200S/6000	Bi1200M/6000	Bi1200L/6000	Bi1250S/6000	Bi1250M/3000
<b>Stator outer Diameter [mm]</b>	240			292			300			370	
<b>Rotor inner Diameter [mm]</b>	101	110		124			146			168	
<b>Continuous power [kW]</b>	26	11	22	26	30	37	15	15	15	22	37
<b>Length [mm]</b>	461	265	335	363	455	515	302	322	394	395	522
<b>Speed [min<sup>-1</sup>]</b>	13000	6000		10000			5000	6000		4000	3000

High speed 200V	Bi40S/70000	Bi60SS/50000	Bi60S/50000	Bi100S/20000	Bi100S/30000	Bi112SS/20000	Bi112S/20000	Bi112S/20000	Bi112M/20000	Bi112L/20000	Bi160M/20000	Bi160L/20000	Bi160LL/20000
<b>Stator outer Diameter [mm]</b>	88	110		156			159		180			240	
<b>Rotor inner Diameter [mm]</b>	28	37		70			74		74			101.4	
<b>Continuous power [kW]</b>	0.55	3.7	5.5	11	15	2.2	11	15	18.5	18.5	18.5	25	30
<b>Length [mm]</b>	71	106	145	202	202	155	200	219	272	330	321	406	461
<b>Speed [min<sup>-1</sup>]</b>	70000	50000		20000	30000	20000							



Standard molded (TYPE M) 200V	B;i150S/30000 TYPE M	B;i150M/25000 TYPE M	B;i150L/30000 TYPE M	B;i180M/15000 TYPE M	B;i180M/30000 TYPE M	B;i100S/12000 TYPE M	B;i100S/12500 TYPE M	B;i112S/15000 TYPE M	B;i112M/15000 TYPE M	B;i112L/15000 TYPE M	B;i112LL/15000 TYPE M	B;i160M/13000 TYPE M	B;i160L/13000 TYPE M	B;i160LL/13000 TYPE M	B;i170S/8000 TYPE M	B;i170M/8000 TYPE M	B;i180M/10000 TYPE M	B;i180L/10000 TYPE M	B;i180LL/10000 TYPE M	B;i200S/6000 TYPE M	B;i200M/6000 TYPE M	B;i200L/6000 TYPE M
Stator outer Diameter [mm]	107			138		167	180	200				267			332			340				
Rotor inner Diameter [mm]	34.8			52	41	70	58	74				101			110		124			146		
Continuous power [kW]	1.1	1.2	3	2.2	15	5.5	3.7	15	18.5	18.5	22	26	30	30	22	22	26	30	37	22	22	15
Length [mm]	86	113	165	210	210	159	227	237	299	350	414	342	421	494	288	358	385	475	535	317	337	415
Speed [min <sup>-1</sup> ]	30000	20000	30000	15000	30000	12000	12500	15000				13000			8000	6000	10000			6000		

High speed molded (TYPE M) 200V	B;i160S/50000 TYPE M	B;i100S/30000 TYPE M	B;i112SS/20000 TYPE M	B;i112S/20000 TYPE M	B;i112M/20000 TYPE M	B;i112L/20000 TYPE M
Stator outer Diameter [mm]	129	180			200	
Rotor inner Diameter [mm]	37	70	74			
Continuous power [kW]	7.5	18.5	3.7	11	18.5	
Length [mm]	158	227	170	215	299	350
Speed [min <sup>-1</sup> ]	50000	30000	20000			

Standard 400V	B;i180S/20000	B;i100S/12500	B;i112S/15000	B;i112M/15000	B;i112L/15000	B;i112LL/15000	B;i160M/13000	B;i160L/13000	B;i160LL/13000	B;i170S/8000	B;i170M/8000	B;i200S/6000	B;i200M/6000	B;i200L/6000	B;i250S/4000	B;i250M/6000
Stator outer Diameter [mm]	120	156	180				240				300			370		
Rotor inner Diameter [mm]	41	58	74				101			110		146			168	
Continuous power [kW]	2.2	3.7	15	15	18.5	25	25	25	25	15	26	22	25	15	22	37
Length [mm]	135	202	219	272	330	394	321	406	461	265	335	302	322	394	395	522
Speed [min <sup>-1</sup> ]	20000	12500	15000				13000				6000				4000	6000

High speed 400V	B;i100S/20000	B;i112SS/20000	B;i112S/20000	B;i112M/20000	B;i112L/20000	B;i112L/25000	B;i160LL/20000	
Stator outer Diameter [mm]	156	159			180		240	
Rotor inner Diameter [mm]	70	74			74		101.4	
Continuous power [kW]	11	7.5	18.5	22		25	50	
Length [mm]	202	155	200	272	330	330	461	
Speed [min <sup>-1</sup> ]	20000	20000			20000		25000	20000

Ask your local FANUC partner for dedicated customized motor/amplifier combinations.

# Synchronous built-in spindle motors

## BiS series



Compact built-in motors with high torque for tough material (e.g. Titanium) and heavy cutting processes.

- Large torque at low speed – strong neodymium magnet rotor structure
- Power rating 11 – 80 kW
- Low ripple – optimum magnetic circuit design
- Larger torque and high power achieved by efficient heat radiation of stator resin mold
- Suitable for lathe and gear cutting machines
- Maximum speed – 33000 rpm

Standard 200V	BiS100L2/10000	BiS132L2/3000	BiS132L3/2500	BiS160L4/1400	BiS200L4/750
Frame [mm]	100	132		160	200
Stator outer Diameter [mm]	160	205		250	350
Rotor inner Diameter [mm]	60	92		120	170
Continuous Power [kW]	7.5	11	12	16	14
Stator length [mm]	170	200	250	310	324
Speed [min <sup>-1</sup> ]	6000 10000	3000	2500	1400	750

Standard 400V	BiS90L3/33000	BiS132L2/7000	BiS132L3/7000	BiS160L4/6000	BiS160L6/4500	BiS200L4/3000	BiS200L6/3000
Frame [mm]	90	132		160		200	
Stator outer Diameter [mm]	135	205		250		350	
Rotor inner Diameter [mm]	70	92		120		170	
Continuous Power [kW]	80	24	25	33	25	31	30
Stator length [mm]	170	200	250	310	410	324	424
Speed [min <sup>-1</sup> ]	33000	7000		6000	4500	3000	

# Amplifiers and power supply modules

## *αi*-B series



The energy efficient solution with power source regeneration and low loss power devices.

- Modular structure with *αi*PS-B (power supply), *αi*SP-B (spindle amplifier), and *αi*SV-B (servo amplifier)
- Compact amplifier unit for 1 spindle & 3 axes
- Built-in Leakage Detection function
- Safe Torque Off function in servo and spindle amplifier
- Quick maintenance by circuit board and fan replacement without disassembly
- 75/100kW spindle amplifier (400V) with high-efficiency SIC (silicon carbide) power circuit available
- Various power supply modules *αi*PSs-B with sinusoidal input – stabilized DC link
- SSM modules for voltage protection of spindle and servo amplifier

Width [mm]	<i>αi</i> -B amplifier (200V)					
	Power supply <i>αi</i> PS-B [kW]	Spindle amplifier <i>αi</i> SP-B[kW]	Servo amplifier <i>αi</i> SV-B			Servo/Spindle multi-axes amplifier <i>αi</i> SVP-B
			1 axis [A]	2 axes [A]	3 axes [A]	3 axes [A] – 1 spindle [kW]
60 (without fin)	3		4 20	4/4 4/20 20/20	4/4/4 20/20/20	
60 (with fin)	7.5	2.2 5.5	40 80 160	20/40 40/40 40/80 80/80	20/20/40 40/40/40	20/20/20-2.2 40/40/40-2.2
90 (with fin)	11 15	11 15	360S	80/160 160/160	80/80/80	20/20/20 - 5.5
150 (with fin)	26 30 37	22 26 30 37	360			
300 (with fin)	55	45 55				

Width [mm]	<i>αi</i> -B (HV) amplifier (400V)					
	Power supply <i>αi</i> PS-B [kW]	Spindle amplifier <i>αi</i> SP-B [kW]	Servo amplifier <i>αi</i> SV-B			Servo/Spindle multi-axes amplifier <i>αi</i> SVP-B
			1 axis [A]	2 axes [A]	3 axes [A]	3 axes [A] – 1 spindle [kW]
60 (without fin)			10	10/10	10/10/10	
60 (with fin)		5.5	20 40 80	10/20 20/20 20/40 40/40	10/10/20 20/20/20	
90 (with fin)	11 18	11 15	180S	40/80 80/80	40/40/40	10/10/10-5.5
150 (with fin)	30 45 60	22 30 45 60	180			
300 (with fin)	75 100 125	75 100	360 540			

# Amplifiers and power supply modules

## *βi*-B series



The cost efficient solution with integrated power supply.

- Servo amplifier for up to 2 axes
- Compact amplifier unit for 1 spindle & up to 3 axes
- Low loss power devices
- Safe torque off function
- Quick maintenance by circuit board and fan replacement without disassembly
- Servo amplifier suitable for auxiliary axes
- *βi*SVSP-B / *βi*SVSPc-B especially for economical small/medium size compact lathe or milling machines

Width [mm]	<i>βi</i> -B amplifier (200V)				<i>βi</i> -B amplifier (400V)		
	Servo amplifier <i>βi</i> SV-B		Compact servo/spindle amplifier <i>βi</i> SVSP-B/ <i>βi</i> SVSPc-B		Servo amplifier <i>βi</i> SV-B	Compact Servo/Spindle amplifier <i>βi</i> SVSP-B	
	1 axis [A]	2 axes [A]	2 axes [A] – 1 spindle [kW]	3 axes [A] – 1 spindle [kW]	1 axes [A]	2 axes [A] – 1 spindle [kW]	3 axes [A] – 1 spindle [kW]
75 (compact modules)	4 20						
60 (with fin)	40 80	20/20			10 20 40		
90 (with fin)		40/40					
180 (with fin)			20/20-7.5 20/20-11	20/20/40-7.5 20/20/40-11 40/40/40-11		10/10-11 20/20/20-11	
160 (with fin)			40/40-15 40/40-18 80/80-18	40/40/40-15 40/40/80-15 40/40/80-18 80/80/80-18		40/40-18	20/20/40-15 40/40/40-18 40/40/80-15

## Extra equipment



### Power Failure Backup Modules (PFBM)

In case of main power shutdown:

- Power supply module quickly recognizes the power drop
- With PFB-24 module the CNC and drives can be supplied with 24Vdc control power from DC-link.
- Power Failure Backup Modules (PFB-C + capacitors) buffer energy to supply control power and to provide sufficient energy for a safe retraction of servo axes, preventing damage on tools and work piece.
- By using additional resistor modules (PFB-R) the servo and spindle motors can be stopped quickly, avoiding free-run.



### Energy Charge Module (ECM)

Suitable for large machines equipped with large servomotors, e.g. press machines that generate power peaks during acceleration and deceleration. Energy Charge Module reduces this peak of electrical power consumption and minimizes the voltage fluctuation of electrical facilities. Energy released during deceleration can be stored in capacitor modules and used for acceleration. This ensures the electric power consumption can be balanced effectively.

## Accessories

### Separate Detector Unit (SDU)

- To connect scales or rotary encoders with FANUC serial or analogue interface

### Position coders

- $\alpha$ BZ
- $\alpha$ CZ
- $\alpha$  Position Coders

### High resolution interface circuits

### Rechargeable battery unit

- Buffering absolute axes position in Power OFF status and CNC data

### Filter modules necessary to meet EMC-requirements

- AC line filters/AC reactors
- Noise filters

### Switching and protection devices to detect overcurrent and overvoltage

- Magnetic contactors
- Circuit breakers
- Lightning surge absorbers

### Connection material

- Customized cables – power/feedback/device interlinks
- Connectors
- Short bars
- Transformers
- 24V power supplies



## **Our strength: Service and Support**

Intensive application support and personal customer service are at the heart of the FANUC ServiceFirst philosophy – from the first step to the last. A highly skilled and dedicated service team will help you to build and operate the most efficient machines. Always flexible, always fast, always near. With the FANUC commitment to lifetime support, you can have confidence that FANUC will be there for the life of your machine.



## **FANUC Repair Center**

Benefit from worry-free repair services by FANUC experts while you can concentrate on your business. We grant reliable repairs for amplifiers, motors, CNC, PCB and laser power supply.

**Extend the lifetime of your equipment.**



# Wherever you need us: we are there

With the largest global network of local subsidiaries across all continents, we are always there to meet your needs when you need us. Fast and efficient – 24/7. You will always have a local contact that speaks your language.



## FANUC Academy

We help you get the most potential out of your automation by enhancing the skills of your employees. Certified FANUC instructors train them in our fully equipped professional training centers, or at your own premises, using standard training modules as well as customized training packages to meet your specific needs.

**Let's optimize your productivity.**



**Service First** 



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