

HarmonicDrive®

Ultra-Flat Brushless DC Actuators

FLA Series



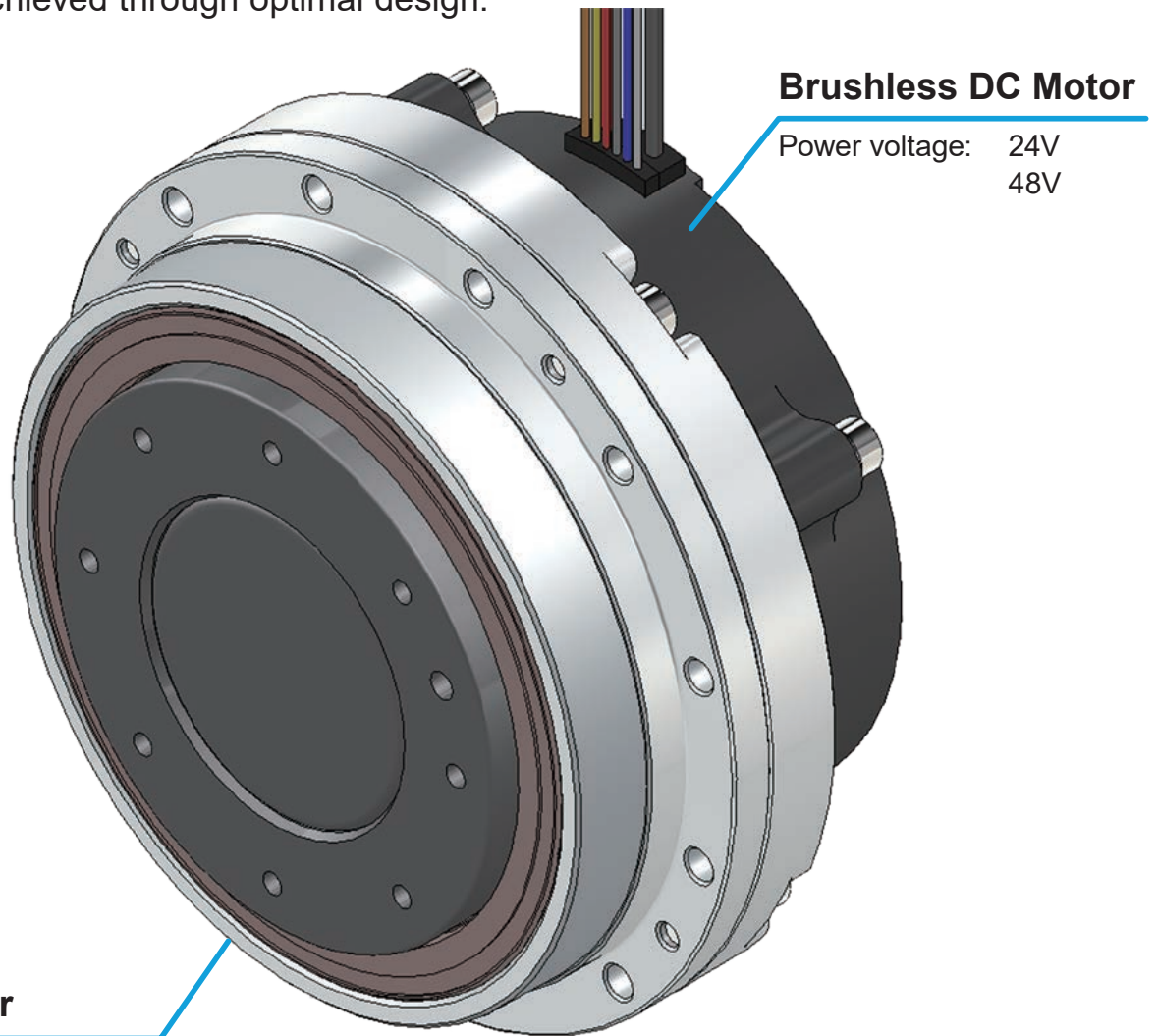
Ultra-Flat Actuators Combining a High-Performance Speed Reducer and a Brushless DC Motor

The new ultra-flat, ultra-light brushless actuators combine our high-precision/high-performance reducers with a compact, high-output brushless DC motor. FLA actuators are available with our high-speed, high-efficiency Harmonic Planetary® gearhead or with our high-precision, high-torque Harmonic Drive® reducer. This new series targets a broad customer base and is ideal for wide range of applications such as AGV wheel drives and powered exoskeletons. We offer both 24VDC and 48VDC versions to work with battery-powered applications.

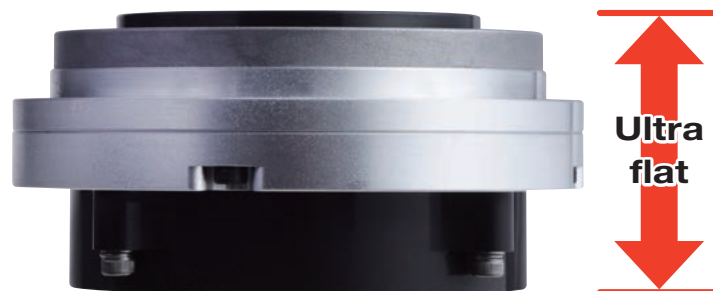


Features

- An ultra-flat shape achieved through dedicated design of a high-performance speed reducer and brushless DC motor.
- A versatile combination offering four models, three speed reduction ratios and two voltage options in the product lineup.
- Light weight achieved through optimal design.



HarmonicDrive® reducer
HarmonicPlanetary® gearhead



Ultra-flat shape by the dedicated design

Model and Symbols

FLA - **11** **A** - **08** **HP** - **H** - **24** - **SP**

(1) (2) (3) (4) (5) (6) (7) (8)

(1)	Series Name	Brushless DC actuator FLA series
(2)	Size	11, 14, 17, 20
(3)	Version Symbols	A
(4)	Reduction Ratio	HarmonicPlanetary® planetary speed reducer 08: 1/8 (Size 11 and 14 only) 09: 1/9 (Size 17 and 20 only) HarmonicDrive® speed reducer 50: 1/50 100: 1/100 (Size 11, 14, and 17 only)

(5)	Speed Reducer Type	HP: Planetary speed reducer HarmonicPlanetary® FB: Precision control speed reducer HarmonicDrive®
(6)	Sensor Type	H: Hall sensor
(7)	Input Power Voltage	24: DC24V 48: DC48V
(8)	Special Specification	No symbol: Standard product SP: Special specification

Driver Selection

Select a driver based on your system configuration (high-end equipment, power supply, installation environment, etc.) after carefully checking the actuator specifications. Check the “FLA Series Brushless DC Actuator Manual” at the time of selection.

Specification

■ Type FLA-HP (HarmonicPlanetary® Planetary Speed Reducer)

DC24V

Model		FLA-11A-08HP	FLA-14A-08HP	FLA-17A-09HP	FLA-20A-09HP
Item					
Driver Input Power Voltage	V	DC24			
Maximum Torque* ¹	N·m	1.8	3.7	7.3	12.1
Allowable Continuous Torque* ^{1,2}	N·m	0.6	1.2	3	4.1
Maximum Speed* ¹	r/min	500	500	500	400
Allowable Continuous Speed* ^{1,2}	r/min	100	100	100	100
Maximum Current* ¹	A	8.7	18.0	26.2	31.4
Allowable Continuous Current* ^{1,2}	A	3.0	6.0	10.4	10.7
Moment of Inertia (GD ² /4)	kg·m ²	0.00013	0.00039	0.001	0.0026
Reduction Ratio		1:8	1:8	1:9	1:9
Allowable Moment Load	N·m	1.2	1.6	2.0	2.4
Moment Rigidity	N·m/rad	2.0 x 10 ³	3.3 x 10 ³	4.4 x 10 ³	5.1 x 10 ³
Motor Position Sensor		Hall sensor			
Positioning Resolution per Motor Rotation	pls/rev	30	30	30	48
Output Shaft Resolution	pls/rev	240	240	270	432
Weight	g	390	620	870	1,060
Installation Direction		Can be installed in any direction			
Protective Structure		Fully enclosed self-cooling type (IP40)			
Safety standard		CE mark, UL certification			

DC48V

Model		FLA-11A-08HP	FLA-14A-08HP	FLA-17A-09HP	FLA-20A-09HP
Item					
Driver Input Power Voltage	V	DC48			
Maximum Torque* ¹	N·m	1.8	3.7	7.3	12.1
Allowable Continuous Torque* ^{1,2}	N·m	0.6	1.2	3	4.1
Maximum Speed* ¹	r/min	500	500	500	400
Allowable Continuous Speed* ^{1,2}	r/min	100	100	100	100
Maximum Current* ¹	A	4.5	9.6	13.6	17.8
Allowable Continuous Current* ^{1,2}	A	1.6	3.0	5.3	6.0
Moment of Inertia (GD ² /4)	kg·m ²	0.00013	0.00039	0.001	0.0026
Reduction Ratio		1:8	1:8	1:9	1:9
Allowable Moment Load	N·m	1.2	1.6	2.0	2.4
Moment Rigidity	N·m/rad	2.0 x 10 ³	3.3 x 10 ³	4.4 x 10 ³	5.1 x 10 ³
Motor Position Sensor		Hall sensor			
Positioning Resolution per Motor Rotation	pls/rev	30	30	30	48
Output Shaft Resolution	pls/rev	240	240	270	432
Weight	g	390	620	870	1,060
Installation Direction		Can be installed in any direction			
Protective Structure		Fully enclosed self-cooling type (IP40)			
Safety standard		CE mark, UL certification			

The above values are typical values on the output shaft.

*1: These are typical characteristics when driven by an ideal sine wave (electric current).

*2: The value during saturation of temperature rise when mounted on an aluminum heat radiation board of a size described below.

(Heat radiation board dimensions: Size 11: 220 x 220 x 8mm, Size 14: 250 x 250 x 10mm, Size 17: 280 x 280 x 12mm, Size 20: 300 x 300 x 15mm)

■ Type FLA-FB (HarmonicDrive® Speed Reducer)

DC24V

Item		Model	FLA-11A-xxFB		FLA-14A-xxFB		FLA-17A-xxFB		FLA-20A-xxFB
			50	100	50	100	50	100	50
Driver Input Power Voltage	V	DC24							
Maximum Torque ^{*1}	N·m	6.7	11	11.2	18.2	23	34	33	
Allowable Continuous Torque ^{*1*2}	N·m	1.7	2.4	2.6	3.8	7.9	11.4	13	
Maximum Speed ^{*1}	r/min	100	50	100	50	100	50	80	
Allowable Continuous Speed ^{*1*2}	r/min	60	30	60	30	60	30	50	
Maximum Current ^{*1}	A	6.0	5.0	9.7	8.7	18.4	14.3	19.2	
Allowable Continuous Current ^{*1*2}	A	1.9	1.7	3.0	2.5	6.8	5.3	8.7	
Moment of Inertia (GD ² /4)	kg·m ²	0.0073	0.029	0.019	0.077	0.048	0.19	0.12	
Reduction Ratio		1:50	1:100	1:50	1:100	1:50	1:100	1:50	
Allowable Moment Load	N·m	1.2		1.6		2.0		2.4	
Moment Rigidity	N·m/rad	2.0 x 10 ³		3.3 x 10 ³		4.4 x 10 ³		5.1 x 10 ³	
Motor Position Sensor		Hall sensor							
Positioning Resolution per Motor Rotation	pls/rev	30		30		30		48	
Output Shaft Resolution	pls/rev	1,500	3,000	1,500	3,000	1,500	3,000	2,400	
Weight	g	420		720		940		1,170	
Installation Direction		Can be installed in any direction							
Protective Structure		Fully enclosed self-cooling type (IP40)							
Safety standard		CE mark, UL certification							

DC48V

Item		Model	FLA-11A-xxFB		FLA-14A-xxFB		FLA-17A-xxFB		FLA-20A-xxFB
			50	100	50	100	50	100	50
Driver Input Power Voltage	V	DC48							
Maximum Torque ^{*1}	N·m	6.7	11	11.2	18.2	23	34	33	
Allowable Continuous Torque ^{*1*2}	N·m	1.7	2.4	2.6	3.8	7.9	11.4	13	
Maximum Speed ^{*1}	r/min	100	50	100	50	100	50	80	
Allowable Continuous Speed ^{*1*2}	r/min	60	30	60	30	60	30	50	
Maximum Current ^{*1}	A	3.1	2.6	4.8	4.2	9.4	7.2	10.7	
Allowable Continuous Current ^{*1*2}	A	1.0	0.8	1.5	1.2	3.4	2.9	5.1	
Moment of Inertia (GD ² /4)	kg·m ²	0.0073	0.029	0.019	0.077	0.048	0.19	0.12	
Reduction Ratio		1:50	1:100	1:50	1:100	1:50	1:100	1:50	
Allowable Moment Load	N·m	1.2		1.6		2.0		2.4	
Moment Rigidity	N·m/rad	2.0 x 10 ³		3.3 x 10 ³		4.4 x 10 ³		5.1 x 10 ³	
Motor Position Sensor		Hall sensor							
Positioning Resolution per Motor Rotation	pls/rev	30		30		30		48	
Output Shaft Resolution	pls/rev	1,500	3,000	1,500	3,000	1,500	3,000	2,400	
Weight	g	420		720		940		1,170	
Installation Direction		Can be installed in any direction							
Protective Structure		Fully enclosed self-cooling type (IP40)							
Safety standard		CE mark, UL certification							

The above values are typical values on the output shaft.
*1: These are typical characteristics when driven by an ideal sine wave (electric current).
*2: The value during saturation of temperature rise when mounted on an aluminum heat radiation board of a size described below.
(Heat radiation board dimensions: Size 11: 220 x 220 x 8mm, Size 14: 250 x 250 x 10mm, Size 17: 280 x 280 x 12mm, Size 20: 300 x 300 x 15mm)

Type FLA-HP

Front View:

- Top feature: $\phi 3 \text{ H7 } \begin{smallmatrix} +0.010 \\ 0 \end{smallmatrix} \times 5$
- Opening diameter: 3.4×6
- P.C.D. 35
- Bottom feature: $4\text{-M}3 \times 6$
- Opening diameter: 3.4×6
- P.C.D. 35
- Angle: 22.5°

Side View:

- Sensor Leads: 6-AWG26, 400mm (Wire outer diameter: $\phi 0.81$)
- Motor Leads: 3-AWG22, 400mm (Wire outer diameter: $\phi 1.70$)
- Dimensions: $\phi 71$, $\phi 58 \text{ h7 } \begin{smallmatrix} 0 \\ -0.030 \end{smallmatrix}$, $\phi 43 \text{ h7 } \begin{smallmatrix} 0 \\ -0.025 \end{smallmatrix}$ (Max. diameter of rotating region), $\phi 49.5$
- Lengths: 13, 12.5, 14.3, 39.8 ± 1
- Other dimensions: 12.4, 9.8

Rear View:

- Top feature: 45°
- Bottom feature: 12°
- M3x8 (For grounding)
- P.C.D. 64
- Angle: 45°
- Feature: $4\text{-}\phi 3.4$
- P.C.D. 64
- Feature: $\phi 63.5$
- Feature: N.P.

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Front View:

- 8-M3×6
- Opening diameter: 3.4×5.2
- P.C.D. 50
- 22.5°
- φ3 H7 $^{+0.010}_0$ ×5
- Opening diameter: 3.4×5.2
- P.C.D. 50
- ±0.05

Side View:

- Sensor Leads
- 6-AWG26
- 400mm
- (Wire outer diameter: φ0.81)
- Motor Leads
- 3-AWG20
- 400mm
- (Wire outer diameter: φ1.86)
- φ92
- φ79 h7 $^{+0.030}_0$
- φ60 h7 $^{+0.030}_0$
- (Max. diameter of rotating region)
- 3
- 5
- 14
- 14
- 48.7 ±1
- (20.7)
- φ70.5

Rear View:

- 5°
- 15°
- 12-φ3.4
- P.C.D. 85
- M3×9 (For grounding)
- P.C.D. 85
- N.P.
- (φ60.5)

Front View:

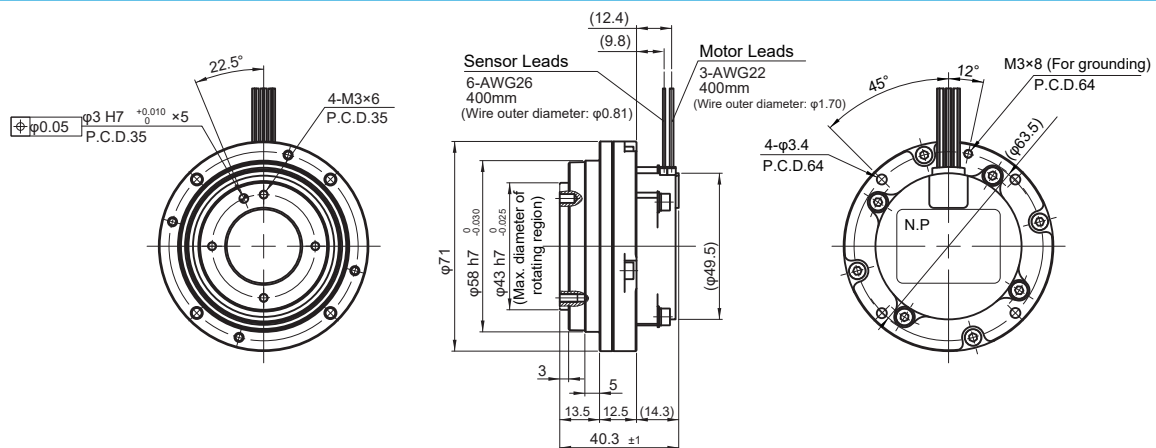
- 8-M3x6
- Opening diameter: 3.4x5.7
- P.C.D.55
- 22.5°
- φ3 H7 ^{+0.010}/₀ x5
- Opening diameter: 3.4x5.7
- P.C.D.55
- φp0.05

Side View:

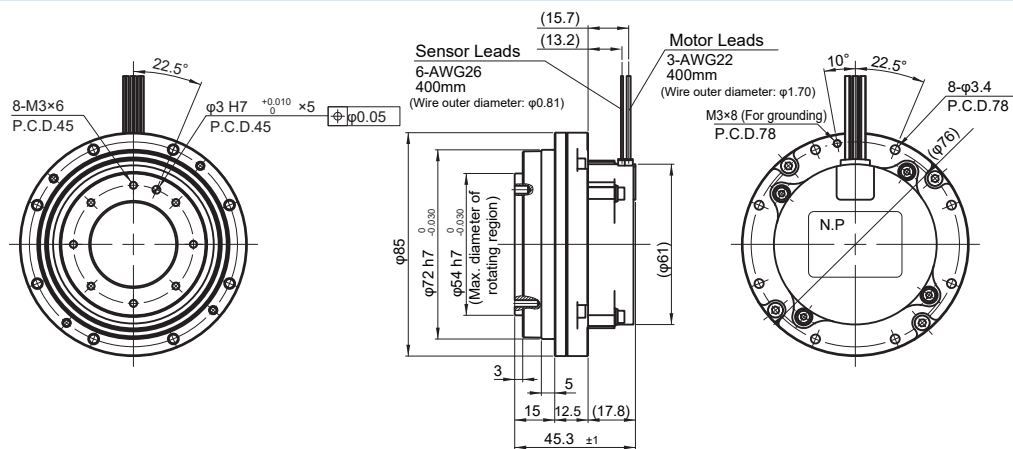
- φ100
- φ87 h7 ⁰/_{-0.036}
- φ64 h7 ⁰/_{-0.030}
- (Max. diameter of rotating region)
- φ80
- 14.5
- 15
- 18.3
- 47.8 ±1
- (16)
- (13)
- Sensor Leads**
- 6-AWG26
- 400mm
- (Wire outer diameter: φ0.81)
- Motor Leads**
- 3-AWG18
- 400mm
- (Wire outer diameter: φ2.17)
- 6°
- 15°
- M3x9.5 (For grounding)
- P.C.D.93
- 12-p3.4
- P.C.D.93
- N.P.
- (φ6x5)

Type FLA-FB

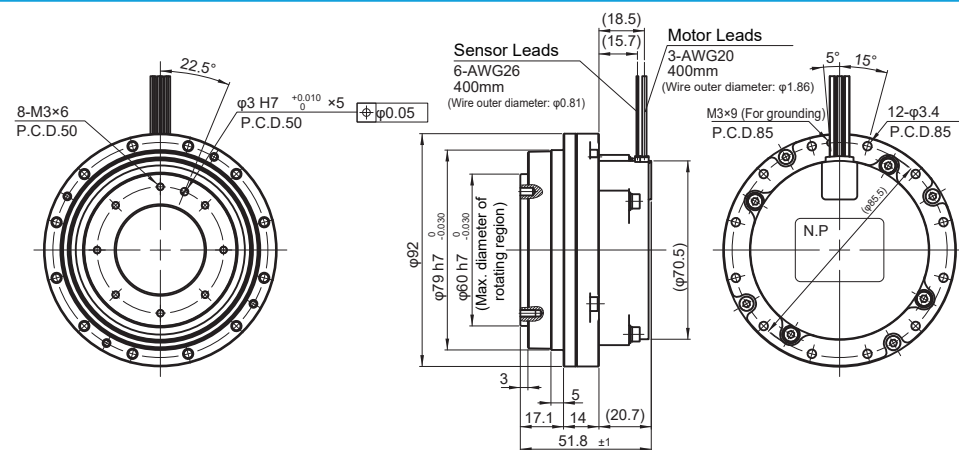
FLA-11A-FB



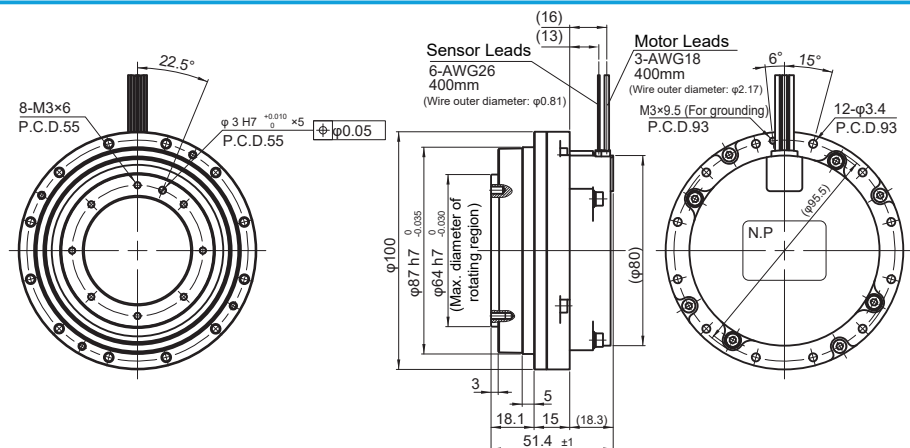
FLA-14A-FB



FLA-17A-FB



FLA-20A-FB





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The academic or generic term of our “HarmonicDrive” products is “strain wave gearing.”