

HarmonicDrive®

Ultra-Flat Brushless DC Actuators

FLA Series



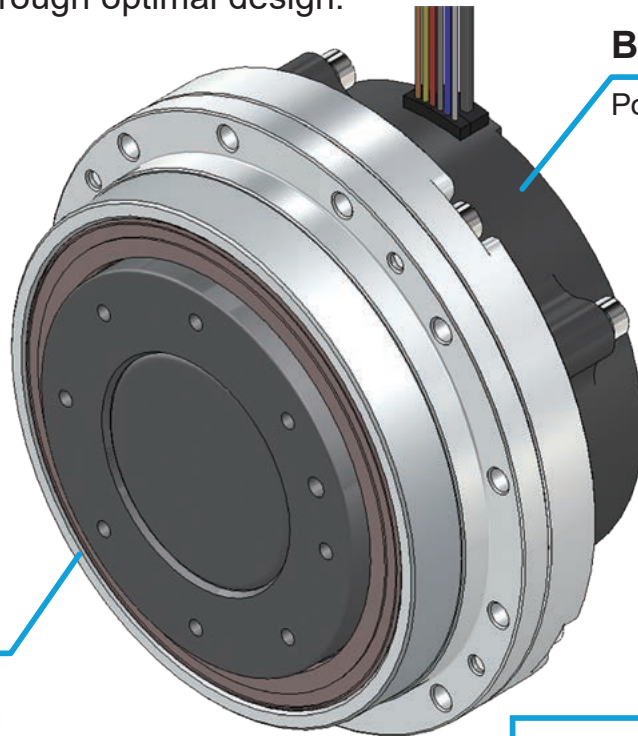
Ultra-Flat Actuators Combining a High-Performance Speed Reducer and a Brushless DC Motor

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.

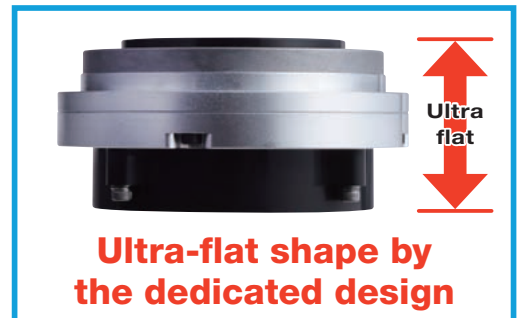


Brushless DC Motor

Power voltage: 24V
48V

Speed Reducer

HarmonicDrive® reducer
HarmonicPlanetary® gearhead



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

Recommended Drivers

■ Low-voltage brushless DC motor drive manufactured by Yaskawa Controls Co., Ltd.

S series (speed control, torque control)

Feature

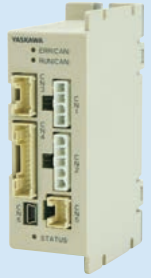
- ◆ Thinner and more compact design
- ◆ Aluminum board enhancing heat dissipation and reducing cost
- ◆ Enabling the CAN communication



F series (speed control, torque control)

Feature

- ◆ Smaller footprint design
- ◆ 3 control system increasing versatility
- ◆ Applicable to the CANopen standard



* For details of the drive specifications, contact Yaskawa Controls. Toll-free phone number: 0120-854-388
Email address for technical consultation: cmec@yaskawa.co.jp

■ Basic specifications (combination with FLA)

Item	Product	
	S series	F series
Model	CCMDSP-D40P4YC1	CCMDPE-D40P3YC1
Applied motor	Type	Brush-less DC motor (equipped with a sensor)
	Sensor	Hall sensor
Output	Rated output current	16.7 Arms to 8.4 Arms
	Maximum output current	25.0 Arms to 12.5 Arms
Power supply	Input voltage scope	24 VDC to 48 VDC
	Permissible voltage variation	-15%, +10%
Control characteristics	Control mode	Speed control, torque control
	Speed range ¹	Up to 10,000 min-1
Functions	Operation	CAN communication: Conformance to CAN2.0A
		External terminal (insulation), multi-function input (4ch), emergency stop (1ch fixed), analog input (1ch), multi-function output (4ch), brake (1ch fixed)
Others	Sub encoder	-
	Status display LED	One piece
Structure	Engineering tool	DriveWin
	Digital operator	DLC-UYC02-E
Environment	External dimensions	120 mm (W) x 70 mm (D) x 18 mm (H)
	Weight	135 g
Compliance with directive and Conforming standard	Ambient temperature	-10°C to +40°C
	Humidity	95% RH or less (non-condensing)
	Storage temperature	-20°C to +60°C

■ Cable list

S series			
Name	Connector part	Model	Length (L)
Power input cable	TB1, TB2	FA475011-00P5-E	0.5 m
		FA475011-01-E	1 m
		FA475011-01P5-E	1.5 m
Motor drive cable	TB3, TB4, TB5	FA475012-00P5-E	0.5 m
		FA475012-01-E	1 m
		FA475012-01P5-E	1.5 m
Motor sensor input cable	CN3	FA475009-00P5-E	0.5 m
		FA475009-01-E	1 m
		FA475009-01P5-E	1.5 m
External input/output signal cable ¹	CN4A	FA475010-00P5-E	0.5 m
		FA475010-01-E	1 m
		FA475010-01P5-E	1.5 m
Brake signal output cable ¹	CN4B	FA475014-00P5-E	0.5 m
		FA475014-01-E	1 m
		FA475014-01P5-E	1.5 m
CAN communication cable ¹	CN5	FA475013-00P5-E	0.5 m
		FA475013-01-E	1 m
		FA475013-01P5-E	1.5 m
Digital operator ²	CN6	DLC-UYC02-E	1 m
For connection to the engineering tool Cable ²	CN6	Use the USBminiB terminal cable on the device side	

F series			
Name	Connector part	Model	Length (L)
Power input cable	CN1	FA475017-00P5-E	0.5 m
		FA475017-01-E	1 m
		FA475017-01P5-E	1.5 m
Motor drive cable	CN2	FA475018-00P5-E	0.5 m
		FA475018-01-E	1 m
		FA475018-01P5-E	1.5 m
Motor sensor input cable	CN3	FA475019-00P5-E	0.5 m
		FA475019-01-E	1 m
		FA475019-01P5-E	1.5 m
External input/output signal cable ¹	CN4	FA475020-00P5-E	0.5 m
		FA475020-01-E	1 m
		FA475020-01P5-E	1.5 m
CAN communication cable ¹	CN5	FA475014-00P5-E	0.5 m
		FA475014-01-E	1 m
		FA475014-01P5-E	1.5 m
Digital operator ²	CN6	DLC-UYC02-E	1 m
For connection to the engineering tool Cable ²	CN6	Use the USBminiB terminal cable on the device side	

*1: The cable is required depending on the application on the customer side.

*2: To set the parameters, the engineering tool (DriveWin) or digital operator is required. Select any of them depending on the application.

■ Connector product number

Cable for S series			
Name	Connector part	Connector	Contact
Power input cable	TB1, TB2	-	R2-4
Motor drive cable	TB3, TB4, TB5	-	R2-4
Motor sensor input cable	CN3	GHR-06V-S manufactured by JST	SSHL manufactured by JST-002T-P0.2
External input/output signal cable	CN4A	ZER-16V-S manufactured by JST	SZE-002T-P0.3 manufactured by JST
Brake signal output cable	CN4B	ZER-02 V-S manufactured by JST	SZE-002T-P0.3 manufactured by JST
CAN communication cable	CN5	GHR-04 V-S manufactured by JST	SSHL manufactured by JST-002T-P0.2

Cable for F series			
Name	Connector part	Connector	Contact
Power input cable	CN1	39-01-4041 manufactured by Molex	5556T manufactured by Molex
Motor drive cable	CN2	39-01-4041 manufactured by Molex	5556T manufactured by Molex
Motor sensor input cable	CN3	PUDP-14V-S manufactured by JST	SPUD-002T-P0.5 manufactured by JST
External input/output signal cable	CN4	PUDP-28 V-S manufactured by JST	SPUD-002T-P0.5 manufactured by JST
CAN communication cable	CN5	PUDP-10V-S manufactured by JST	SPUD-002T-P0.5 manufactured by JST

Specification

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

DC24V

Item		Model	FLA-11A-08HP	FLA-14A-08HP	FLA-17A-09HP	FLA-20A-09HP
Driver Input Power Voltage	V		DC24			
Maximum Torque*1	N·m		1.8	3.7	7.3	12.1
Allowable Continuous Torque**2	N·m		0.6	1.2	3	4.1
Maximum Speed*1	r/min		500	500	500	400
Allowable Continuous Speed**2	r/min		100	100	100	100
Maximum Current*1	A		8.7	18.0	26.2	31.4
Allowable Continuous Current**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

Item		Model	FLA-11A-08HP	FLA-14A-08HP	FLA-17A-09HP	FLA-20A-09HP
Driver Input Power Voltage	V		DC48			
Maximum Torque*1	N·m		1.8	3.7	7.3	12.1
Allowable Continuous Torque**2	N·m		0.6	1.2	3	4.1
Maximum Speed*1	r/min		500	500	500	400
Allowable Continuous Speed**2	r/min		100	100	100	100
Maximum Current*1	A		4.5	9.6	13.6	17.8
Allowable Continuous Current**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: A typical characteristic when one of the following drivers is combined.

F Series: FLA-11A or FLA-14A

S Series: FLA-17A or FLA-20A

*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 ^{**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 ^{**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 ^{**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 ^{**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 ^{**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 ^{**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: A typical characteristic when one of the following drivers is combined.

F Series: FLA-11A or FLA-14A

S Series: FLA-17A or FLA-20A

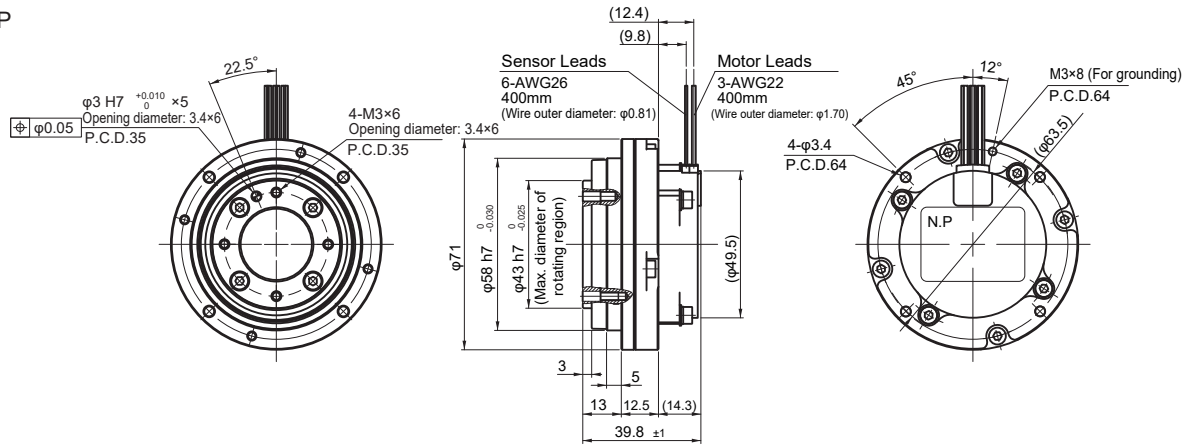
*2: The value during saturation of temperature rise when mounted on an aluminum heat radiation board of a size described below.

(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)

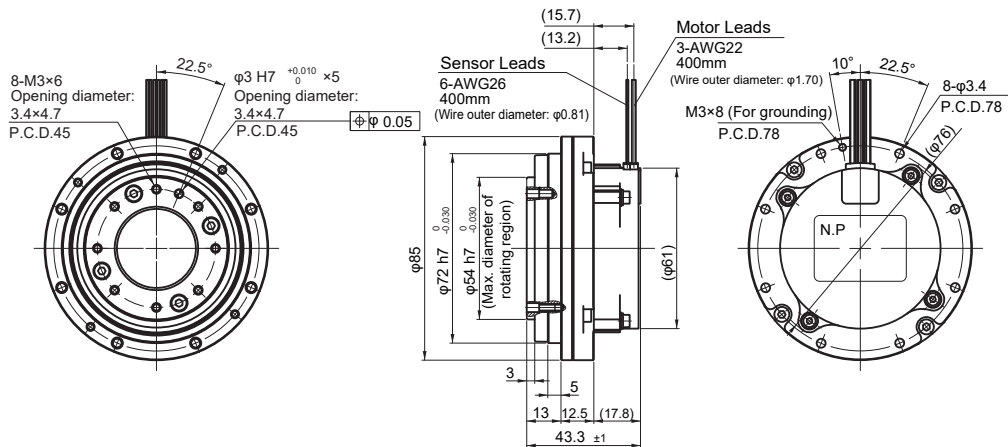
Outline Dimensions

Type FLA-HP

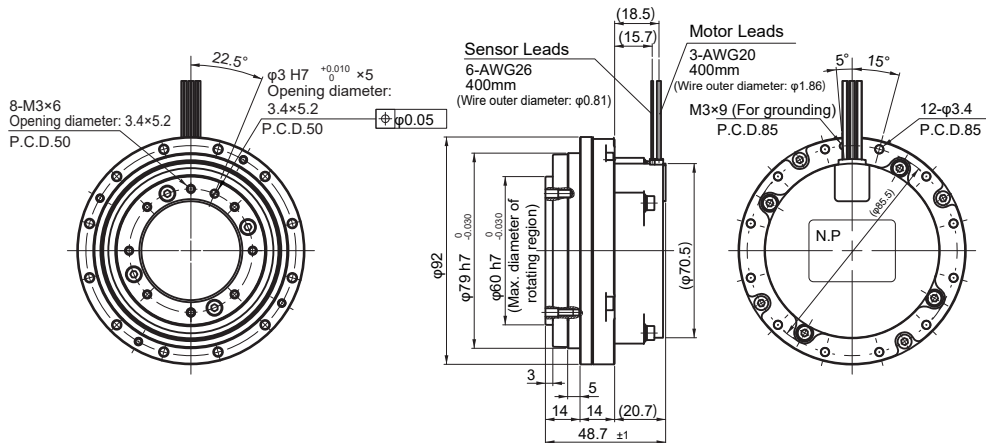
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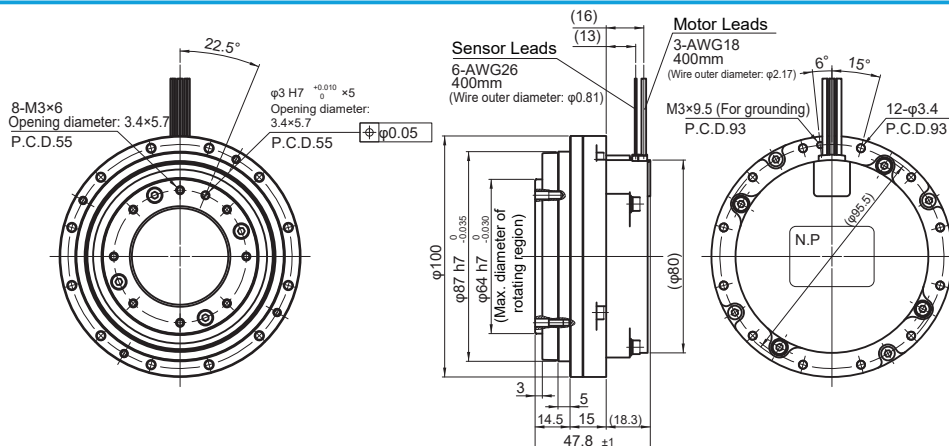
FLA-14A-HP



FLA-17A-HP

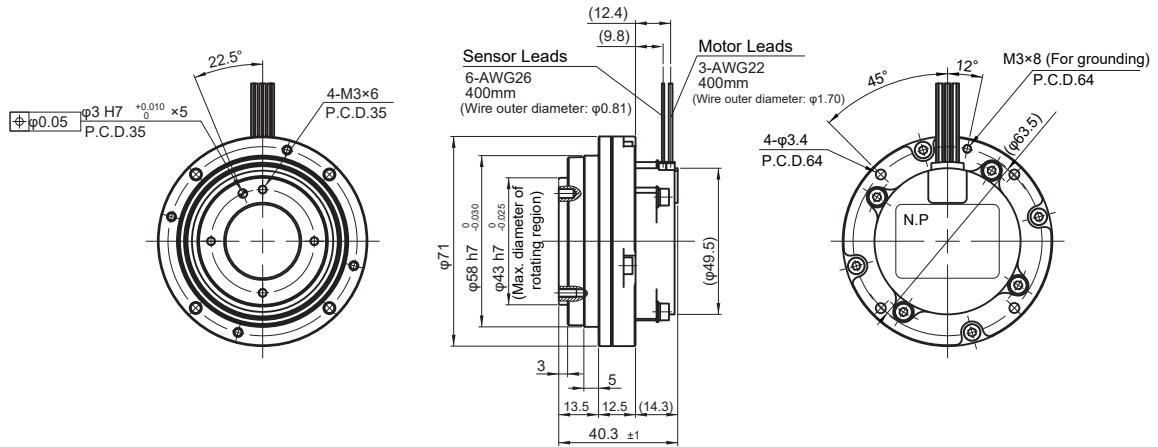


FLA-20A-HP

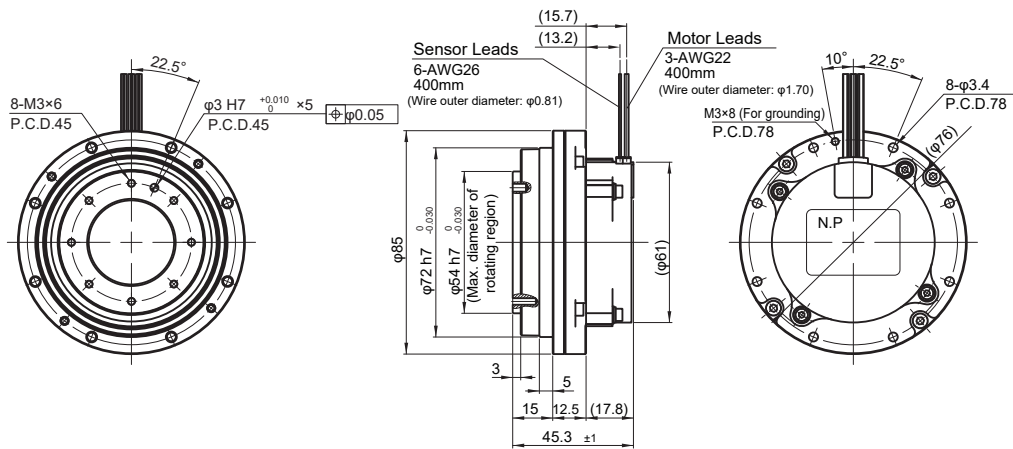


Type FLA-FB

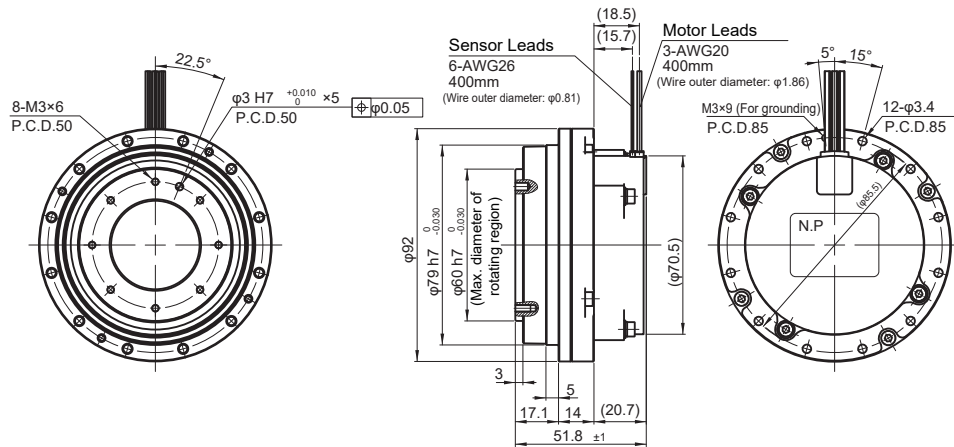
FLA-11A-FB



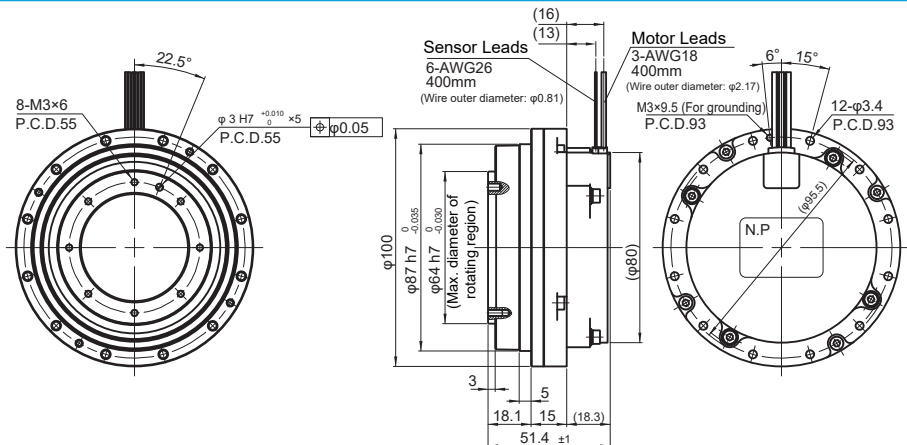
FLA-14A-FB



FLA-17A-FB



FLA-20A-FB





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

