

RSF Series



Harmonic Drive™ actuator
Precision Gearing & Motion Control

RSF Series

The RSF series servo actuator combines a high performance brushless servomotor with a high accuracy Harmonic Drive™ gearhead to deliver high-torque with precision. When combined with a performance matched servo drive, the RSF actuator delivers precise, reliable motion control for machines requiring both high torque and long life.



Features

- **High resolution**
High resolution of maximum 800,000 pulses/revolution (0.00045°/pulse) using a Harmonic Drive™ gear.
- **High positional accuracy**
Harmonic Drive™ gears do not have backlash caused by gear play, assuring high-accuracy positioning.
- **Easy-to-operate dedicated driver**
A dedicated driver is set with parameters for a combined actuator.
Host system parameters and control parameters can be easily set on a 7-segment LED display.

Models and Symbols

RSF - 17 A - 50 - E 200

- Type: AC servo actuator RSF series
- Model Nos.: 17, 20, 25 and 32
- Version symbol
- Reduction ratios: 50 and 100
- Encoder type E: incremental encoder
- Encoder resolution 200: 2000p/revolution

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Specification

Time rating:	Continuous	Insulation resistance:	DC500V 100M ohm or higher	Storage temperature:	-20 to +60°C
Excitation method:	Permanent magnet	Structure:	Totally enclosed, self-cooled	Ambient humidity:	20 to 80% (no condensation)
Insulation class:	Class B	Ambient temperature:	0 to 40°C	Resistance to vibration:	25m/s ²
Dielectric strength:	AC1000V /min			Lubricant:	Grease (Harmonic grease)

Item	Model	RSF-17A		RSF-20A		RSF-25A		RSF-32A	
		50	100	50	100	50	100	50	100
Rated Output *3	W	62	62	120	111	180	190	310	310
Input Power Supply *3	V	AC200V							
Rated Torque *3	Nm	9.8	20	19	35	29	59	49	98
	kgfcm	100	200	190	360	300	600	500	1000
Rated Rotational Speed *3	r/min	60	30	60	30	60	30	60	30
Continuous Stall Torque *3	Nm	9.8	20	19	35	29	59	49	98
	kgfcm	100	200	190	360	300	600	500	1000
Maximum Momentary Torque *3	Nm	34	54	56	82	98	157	220	330
	kgfcm	350	550	570	840	1000	1600	2200	3400
Max. Rotational Speed *3	r/min	90	45	90	45	90	45	90	45
Moment of Inertia *4	GD ² /4 kgm ²	0.047	0.19	0.098	0.39	0.19	0.77	0.67	2.7
	J kgfcm ²	0.48	1.9	1.0	4.0	2.0	7.9	6.9	27
Reduction Ratio		50	100	50	100	50	100	50	100
Permissible Radial Load	N	780		1400		2900		4400	
	kgf	80		140		300		450	
Permissible Thrust Load	N	780		1370		2900		4400	
	kgf	80		140		300		450	
Detector Resolution (At x4) *5	Pulses/revolution	400,000	800,000	400,000	800,000	400,000	800,000	400,000	800,000
Mass	kg	2.1		2.9		4.7		8.7	
Combined Driver		HA-520-1R-200 HA-800-3B-200		HA-520-1R-200 HA-800-3B-200		HA-520-3-200 HA-800-3B-200		HA-800-6B-200	

* 1: The aforementioned values are those at the output shaft including the HarmonicDrive™ gear efficiency.

* 2: The actuator specification is the value when mounted on the following aluminum radiation plate:
 RSF-17, RSF-20 250 x 250 x 12mm
 RSF-25, RSF-32 300 x 300 x 15mm

* 3: The values are those recorded during temperature rise saturation, while the other values are those at 20° C.

* 4: The moment of inertia is the total of moments of inertia of the motor shaft and HarmonicDrive™ gear converted into the output shaft side.

* 5: Detector resolution is calculated by (Motor shaft encoder resolution) x 4 x (Reduction ratio).

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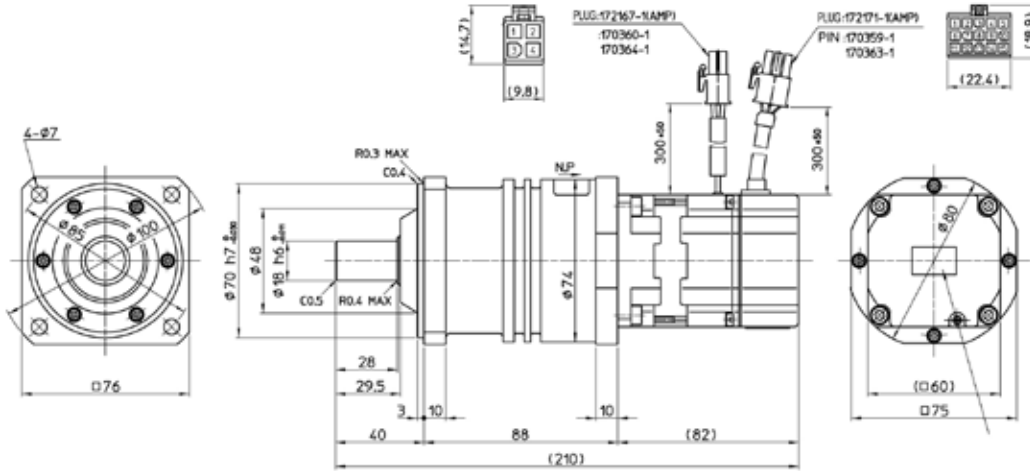
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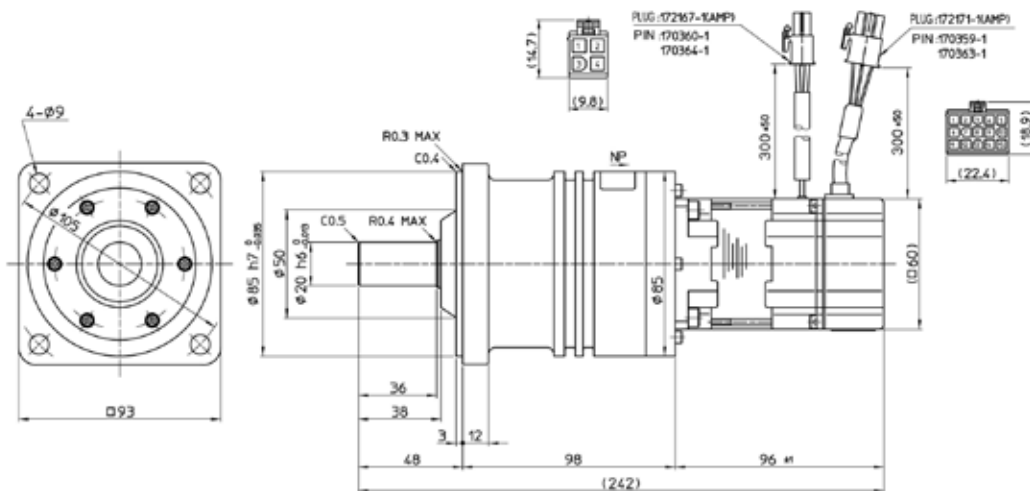
External Dimensions

■RSF-17A

Unit: mm



■RSF-20A



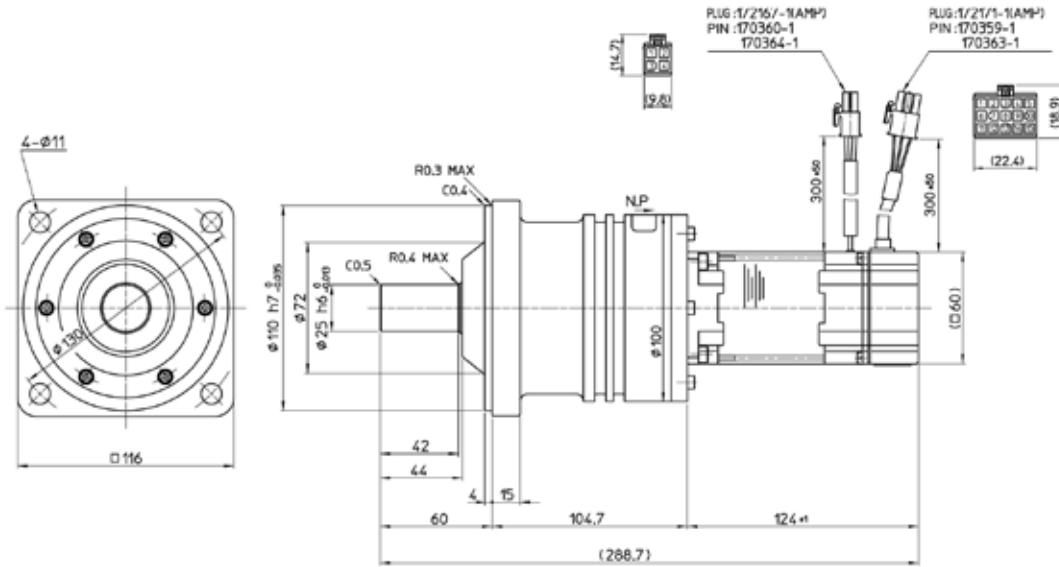
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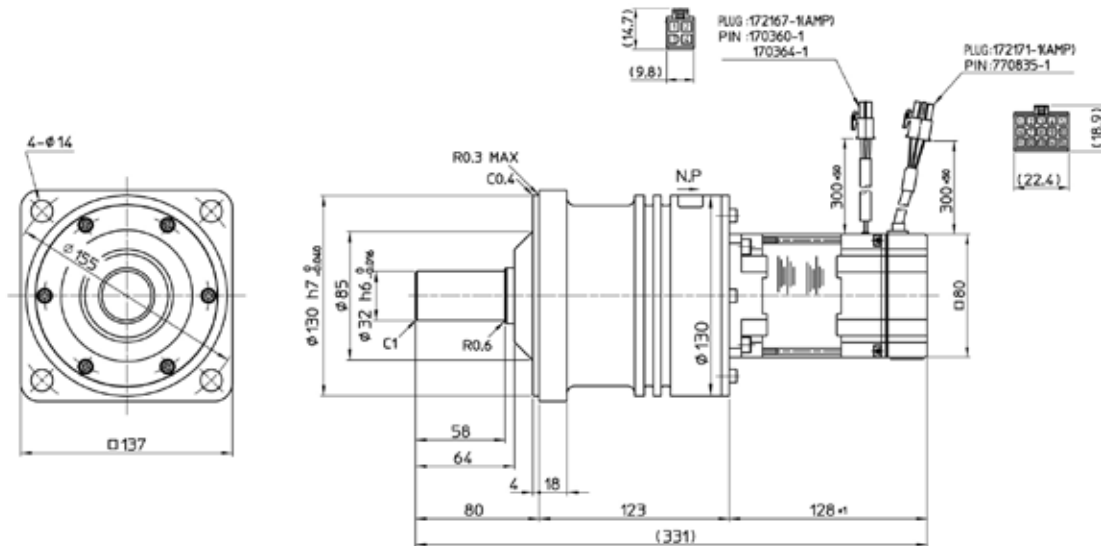
External Dimensions

■ RSF-25A

Unit: mm



■ RSF-32A



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Positional Accuracy

The “uni-directional positional accuracy,” “repeatability” and “reverse positional accuracy” are shown below. The following values represent typical values. (Source: JIS [Japanese Industrial Standards] B-6201-1987).

The RSF series contains a Harmonic Drive™ speed reducer for precision control and positioning errors of the motor shaft are therefore compressed to 1/50 or 1/100 by speed reduction. In reality, angular transmission errors of the speed reducer determine the positional accuracy. The measured values of angular transmission errors of the speed reducer are therefore shown as the positional accuracies of the RSF Series. The accuracies of the individual models are shown below.

Item	Model	RSF-17A	RSF-20A	RSF-25A	RSF-32A
Uni-directional Positional Accuracy	arc sec	120	90	90	90
	rad	5.82×10^{-4}	4.35×10^{-4}	4.35×10^{-4}	4.35×10^{-4}
Repeatability	arc sec	±30	±30	±25	±20
	rad	$\pm 1.46 \times 10^{-4}$	$\pm 1.46 \times 10^{-4}$	$\pm 1.21 \times 10^{-4}$	$\pm 0.97 \times 10^{-4}$

<Measurement conditions, Load: no load, rotational speed: rated value>

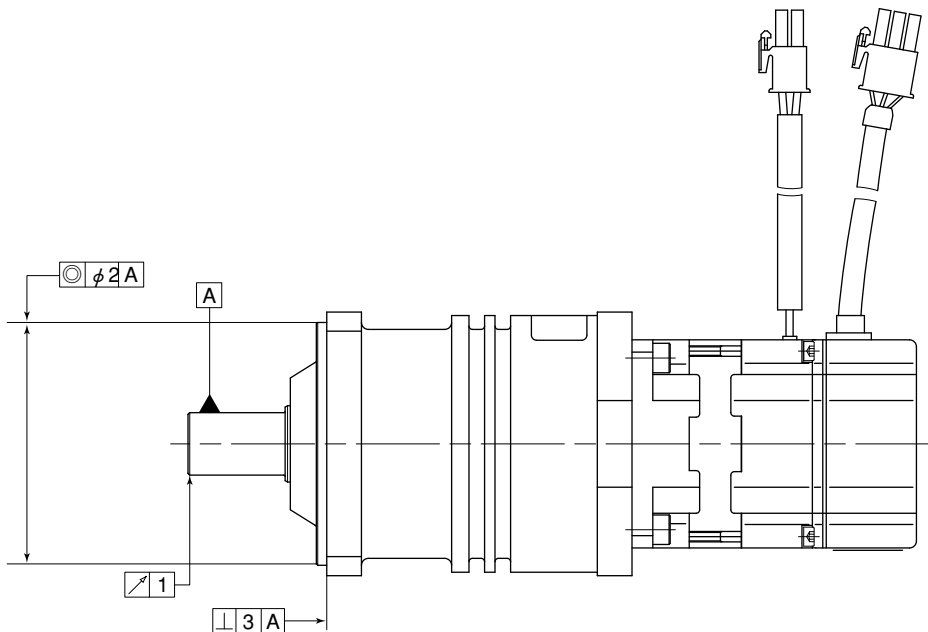
Mechanical Accuracy

The mechanical accuracies of the output shaft and mounting flange of the RSF series are as follows.

Unit: mm

Mechanical Accuracy	RSF-17A	RSF-20A	RSF-25A	RSF-32A
Accuracy Item				0.04
■ Output shaft surface runout	0.04	0.04	0.04	0.06
■ Concentricity of output shaft and fitting part	0.06	0.06	0.06	0.06
■ Perpendicularity between the output shaft and mounting surface	0.06	0.06	0.06	

* The aforementioned values are T.I.R (total indicator reading) values.



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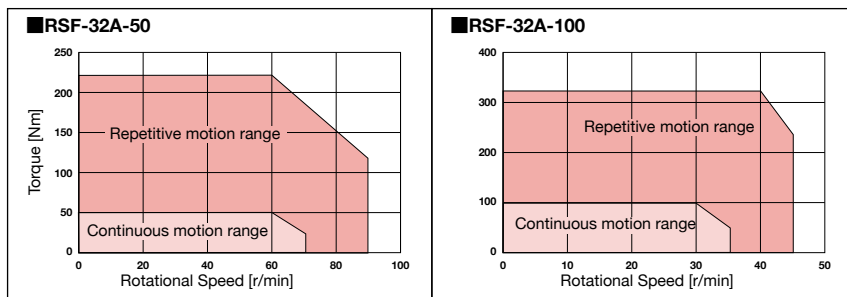
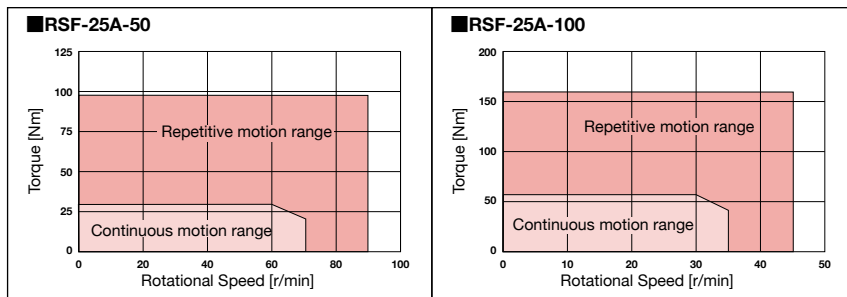
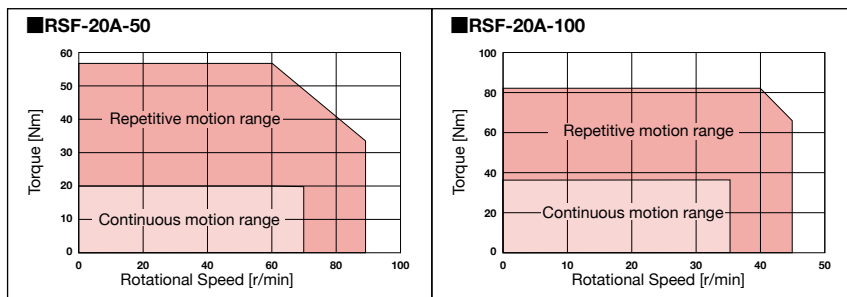
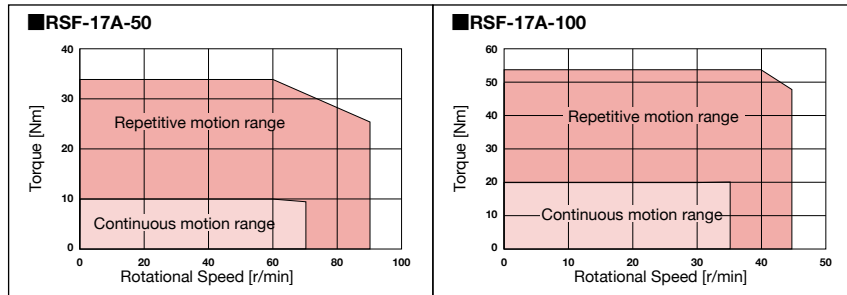
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Operable Range

The following diagrams show the operable range of the RSF series combined with an AC servo driver (HA-520/HA-800).

Continuous motion range: Range of continuously operable torque-rotational speed .

Repetitive motion range: Range of "rotational speed - torque" that can be operated momentarily. Normally, this range is used during acceleration and deceleration.



Note 1: The values in the graphs are those when mounted on the following aluminum radiation plate:

- RSF-17 : 250×250×12 (mm)
- RSF-20 : 250×250×12 (mm)
- RSF-25, RSF-32 : 300×300×15 (mm)

Note 2: Please consult Harmonic Drive Systems if your mode of motions is uni-directional continuous motion also in the continuous motion range.

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Options

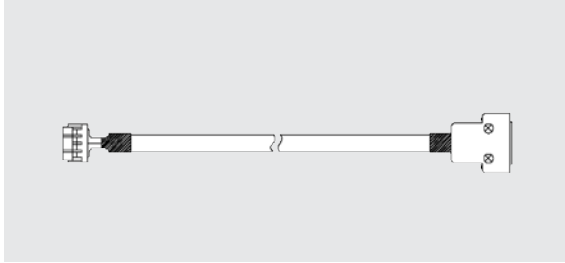
Relay Cable (For HA-520)

Order Code Example:

EWA-M ** -A04-WG04 (For motor)

EWA-E ** -A15-3M36 (For incremental encoder)

The cable for connecting the actuator to the servo driver HA-520.
Standard cable lengths are 3, 5 and 10m.



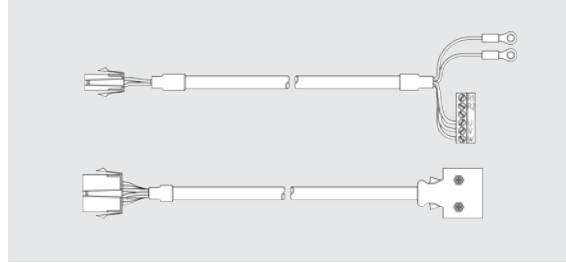
Relay Cable (For HA-800)

Order Code Example:

EWA-M ** -A04-TN (For motor)

EWA-E ** -A15-3M14 (For incremental encoder)

The cable for connecting the actuator to the servo driver HA-800A.
Standard cable lengths are 3, 5 and 10m.



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