

HarmonicDrive®

AC Servo Actuator

RSF Supermini Series

FHA-C Mini Series

Mitsubishi AC Servo
MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO

+ J4



SSCNET III/H
SERVO SYSTEM CONTROLLER NETWORK

Harmonic Drive and Mitsubishi Collaboration

New! Harmonic Drive RSF Supermini and FHA-C Mini actuators now connect directly with Mitsubishi MELSERVO-J4 (SSCNET III/H).

A Wide Range of Mini Actuators

RSF Supermini Series

Ultra Small

This AC servo actuator utilizes an ultra-small Harmonic Drive® gearhead and a brushless servo motor. The RSF series offers high torque in an ultra-small, lightweight package. RSF Supermini is available in two sizes: 3 and 5. Size 5 is available with an option brake.

■ Configuration

■ Speed Reducer

Standard Harmonic Drive® CSF Series

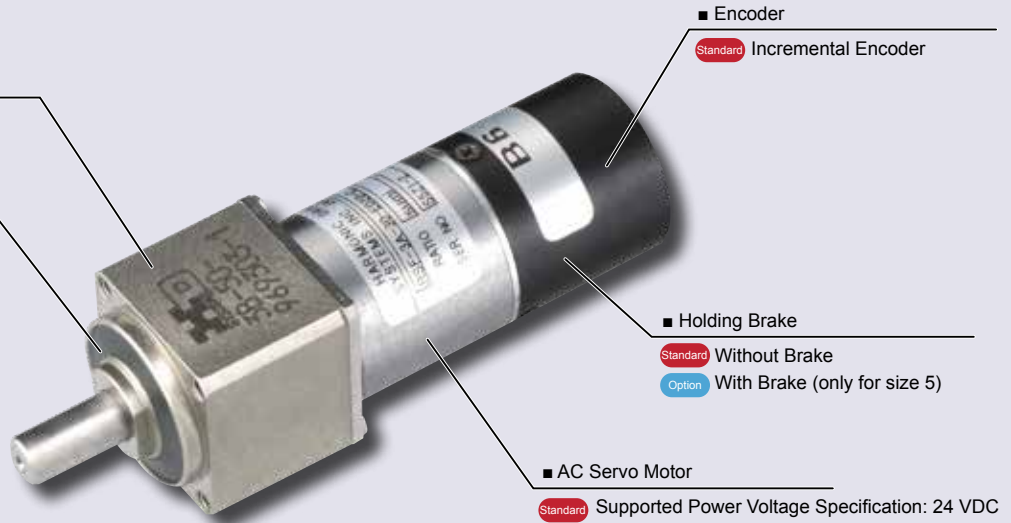
■ Output Shaft Bearing

Standard 4-Point Contact Ball Bearing

47 mm



RSF-3C



FHA-C Mini Series

Small, Flat

The FHA-C Mini Series is a family of compact Actuators that deliver high torque with exceptional accuracy and repeatability. The actuator combines a high precision Harmonic Drive® gear component with a pancake brushless servo motor.

■ Configuration

■ Speed Reducer

Standard Harmonic Drive® CSF Series

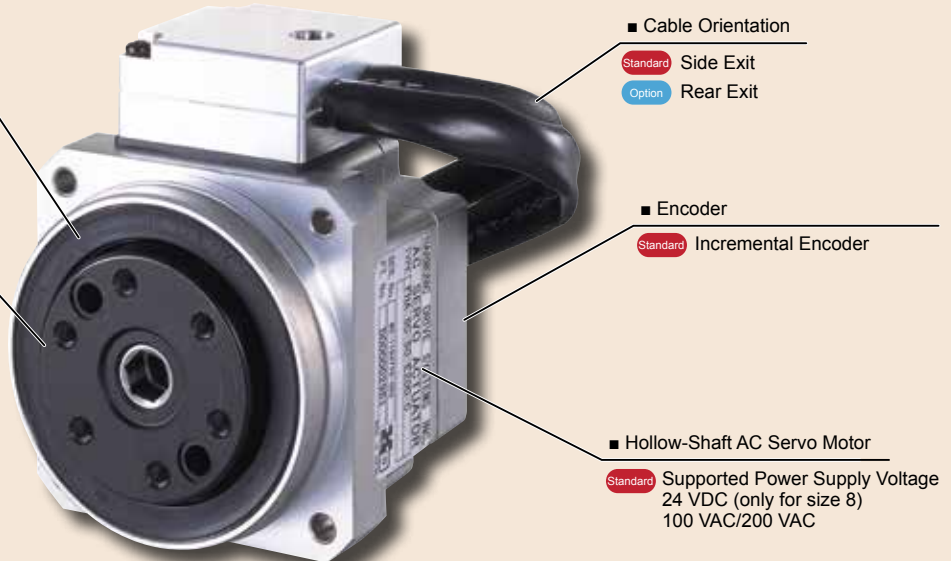
■ Output Shaft Bearing

Standard Cross Roller Bearing

48.5 mm



FHA-8C



■ Features

- Zero Backlash Harmonic Drive® CSF gearhead with flat AC Servo Motor
- Compact, Flat Configuration
- FHA-C Mini with incremental encoder features a hollow-through bore
- Plug and Play directly "MELSERVO-J4" SSCNET III/H communication

■ Combinations

The combination of the servo amplifier, actuator, and relay cable is listed below.

Actuator Series	Size	Power Supply Voltage (V)	Combined Servo Amplifier	Extension Cable ^{*3}
			Compatible with SSCNETIII/H	
RSF Supermini	3	24VDC	MR-J4W2-0303B6-MX940J ^{*1}	Encoder: EWA-E**-JST09-A10-M Motor: EWA-M**-JST04-NC-M Brake: EWA-B**-JST03-TMC ^{*4}
	5			
FHA-C Mini	8	24VDC	MR-J4W2-0303B6-MX940J ^{*1}	Encoder: EWC-E**-A12-A10-M Motor: EWC-M**-A06-NC-M
	8	200VAC	MR-J4-10B-RJ920J ^{*2}	
	11			
	14	200VAC	MR-J4-20B-RJ920J ^{*2}	
	8	100VAC	MR-J4-10B1-RJ920J ^{*2}	
	11			
14	100VAC	MR-J4-20B1-RJ920J ^{*2}		

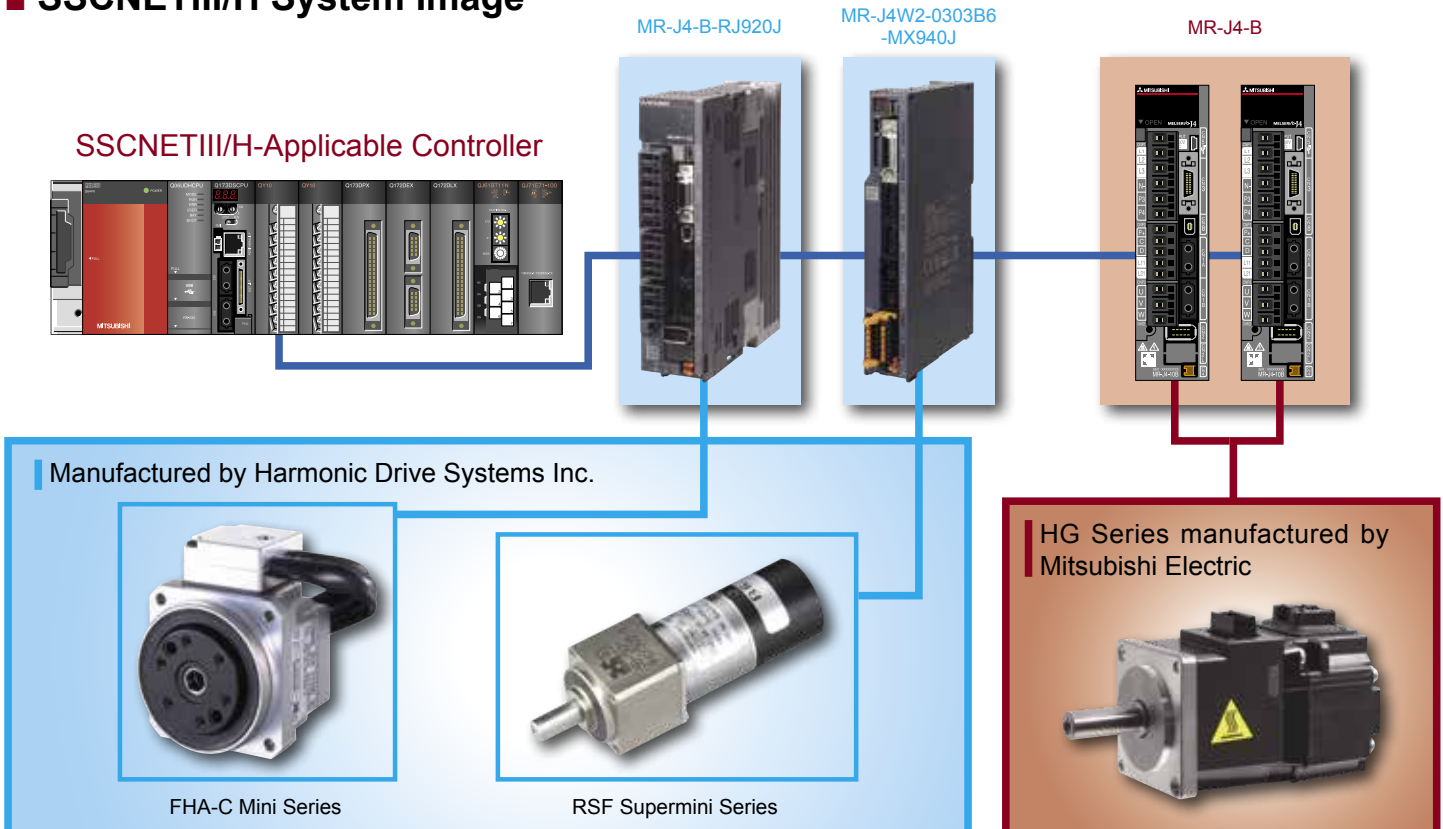
*1: For detailed materials please contact Mitsubishi (Material Number: BCN-B72000-227).

*2: For detailed materials please contact Mitsubishi (Material Number: BCN-B72000-230).

3: "" in the model code indicates the cable length (03 = 3 m, 05 = 5 m, and 10 = 10 m).

*4: RSF-3 is not available with brake option.

■ SSCNETIII/H System Image



■ Ordering Codes

RSF Supermini Series

RSF - 5 B - 50 - E 050 - CJ - SP

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

(1)	Series	RSF Series	
(2)	Size	3, 5	
(3)	Version Symbol	B Size 5 C Size 3	
(4)	Reduction Ratio		
	30	30:1	
	50	50:1	
	100	100:1	
(5)	Encoder		
	E	Incremental encoder	

(6)	Motor-Shaft Encoder Resolution	
	020	200 pulse/rev (size 3)
	050	500 pulse/rev (size 5)
(7)	Option:	
	C	With Connectors (Standard)
	B	With Brake (only for size 5)
	J	Mitsubishi Compatible
(8)	Custom Specification, (Leave blank for standard product)	

FHA-C Mini Series

FHA - 8 C - 30 - D200 - C □ J □ - SP

(1) (2) (3) (4) (5) (6) (7) (8) (9) (10)

(1)	Series	FHA-C Mini Series	
(2)	Size	8, 11, 14	
(3)	Version Symbol		
(4)	Reduction Ratio		
	30	30:1	
	50	50:1	
	100	100:1	
(5)	Encoder and Resolution		
	D	Incremental Encoder	
	Resolution	2000 pulse/rev	

(6)	With Connectors (Standard)	
(7)	Input Power Supply Voltage	
	Blank	100VAC and 200VAC Specifications
	E	24VDC Specifications (only for size 8)
(8)	Combined Servo Amplifier	
	J	Mitsubishi Compatible
(9)	Cable Orientation	
	Blank	Side Exit (Standard)
	K	Rear Exit (Option)
(10)	Custom Specification, (Leave blank for standard product)	

■ Specifications

RSF Supermini Series

Item		Model	RSF-3C			RSF-5B		
			30	50	100	30	50	100
Maximum torque ^{*2}	Nm		0.13	0.21	0.30	0.5	0.9	1.4
Allowable continuous torque ^{*2} (running at allowable continuous speed)	Nm		0.03	0.07	0.11	0.18	0.29	0.44
Allowable continuous stall torque	Nm		0.04	0.08	0.12	0.28	0.44	0.65
Maximum speed	rpm		243	146	73	243	146	73
Allowable continuous speed (output shaft)	rpm		150	90	45	150	90	45
Input power supply voltage (amplifier)	V		DC24±10%			DC24±10%		
Moment of Inertia (GD ² /4)	Without brake	kgm ²	0.11 × 10 ⁻⁴	0.29 × 10 ⁻⁴	1.17 × 10 ⁻⁴	0.66 × 10 ⁻⁴	1.83 × 10 ⁻⁴	7.31 × 10 ⁻⁴
	With brake		-			0.11 × 10 ⁻³	0.31 × 10 ⁻³	1.23 × 10 ⁻³
Reduction ratio			30	50	100	30	50	100
Allowable radial load (value at center of output shaft)	N		36			90		
Allowable thrust load	N		130			270		
Encoder			Incremental encoder					
Encoder resolution ^{*4}	pulse/rev		200 [800]			500 [2000]		
Actuator resolution ^{*4}	pulse/rev		[24,000]	[40,000]	[80,000]	[60,000]	[100,000]	[200,000]
One-way positioning accuracy	arc min		10			4	3	3
Brake	Input power supply voltage	V	-			DC24±10%		
	Holding torque	Nm	-			0.18	0.29	0.44
Weight ^{*5}	Without brake	g	31			66		
	With brake	g	-			86		

FHA-C Mini Series

Item		Model	FHA-8C			FHA-11C			FHA-14		
			30	50	100	30	50	100	30	50	100
Maximum torque ^{*2}	Nm		1.8	3.3	4.8	4.5	8.3	11	9.0	18	28
Allowable continuous torque ^{*2}	Nm		0.75	1.5	2	1.8	2.9	4.2	3.5	4.7	6.8
Maximum speed	rpm		193	116	58	193	116	58	193	116	58
Allowable continuous speed	rpm		117	70	35	117	70	35	100	60	30
Input power supply voltage (amplifier)	V		AC200 (three phases/single phase), AC100 (single phase), DC24±10%			AC200 (three phases/single phase), AC100 (single phase)					
Moment of Inertia (GD ² /4)	kgm ²		0.0026	0.0074	0.029	0.0060	0.017	0.067	0.018	0.050	0.20
Reduction ratio			30	50	100	30	50	100	30	50	100
Allowable moment load	Nm		15			40			75		
Moment Stiffness	Nm/rad		2 × 10 ⁴			4 × 10 ⁴			8 × 10 ⁴		
Encoder			Incremental encoder								
Encoder resolution ^{*4}	pulse/rev		2,000 [8,000]								
Actuator resolution ^{*4}	pulse/rev		[240,000]	[400,000]	[800,000]	[240,000]	[400,000]	[800,000]	[240,000]	[400,000]	[800,000]
One-way positioning accuracy	arc sec		150	120	120	120	90	90	120	90	90
Mass	kg		0.40			0.62			1.2		

*1: The values in the above table indicate the values for the output shaft.

*2: This value is obtained when combining (driven with the ideal sine wave) with the J4 servo amplifier MR-J4-**B-RJ920J (100-V and 200-V specifications) and MR-J4W2-0303B6-MX940J (24-V specifications).

*3: The values show typical values.

*4: The values in brackets indicate the resolution when combining with the servo amplifier with quadrature.

*5: The weight does not include that of the clamp filter. The weight of the clamp filter is 6 g per unit.

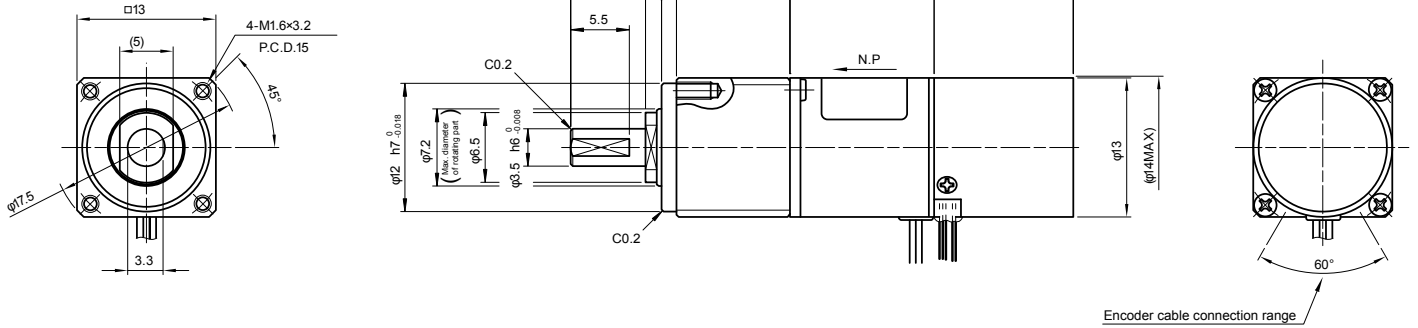
(Note) For details of terms, refer to the technical manual in the Harmonic Drive general catalog.

External Dimensions

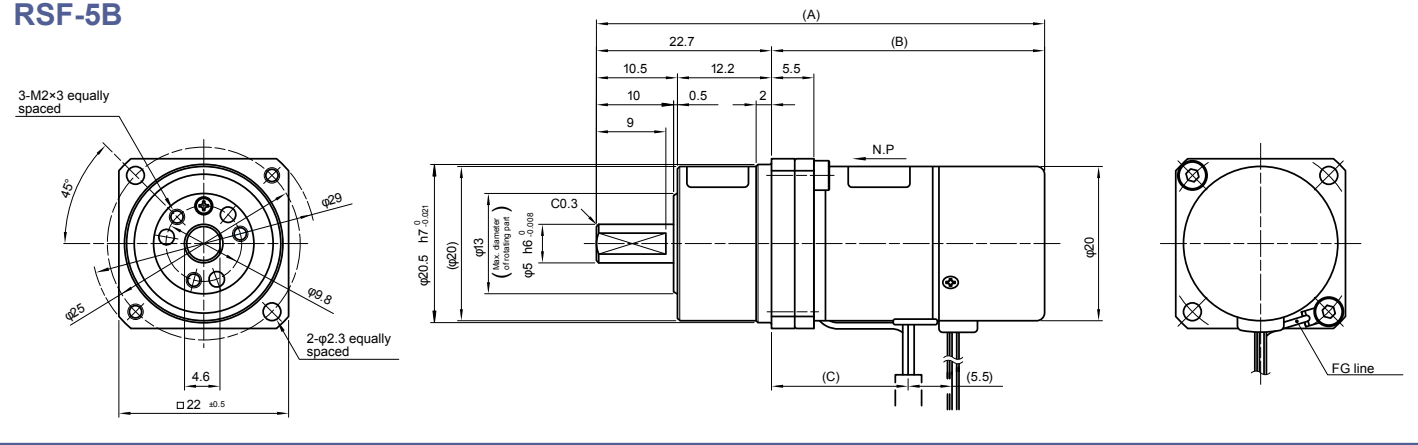
RSF Supermini Series

Unit: mm

RSF-3C



RSF-5B

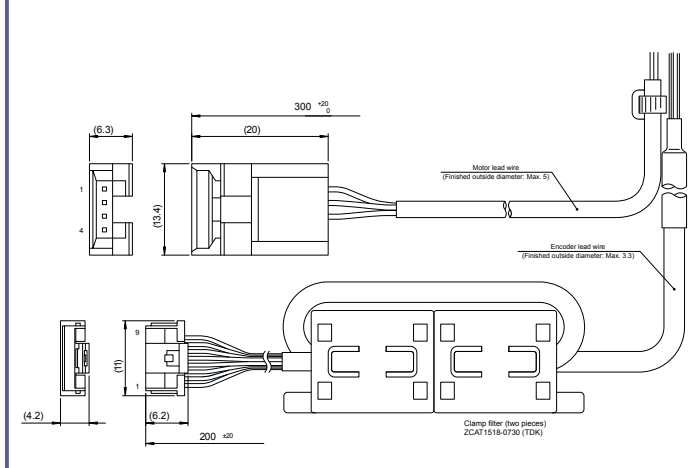


Dimensions

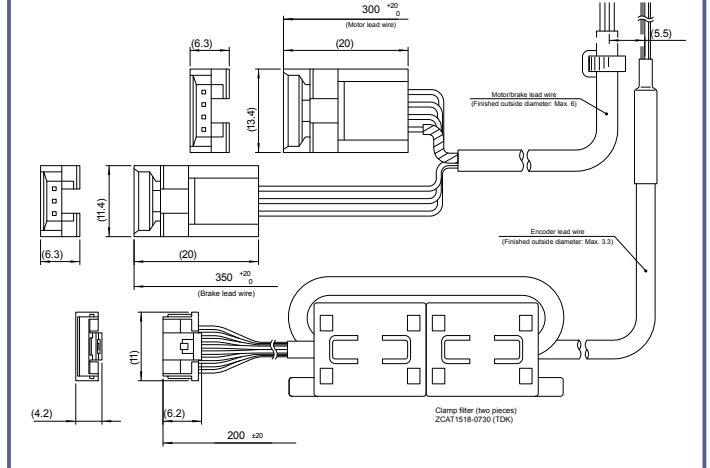
Unit: mm

	A	B	C
RSF-5B (without brake)	58.1	35.4	18
RSF-5B (with brake)	69.1	46.4	29

Lead wire of the motor and encoder (RSF-3C)



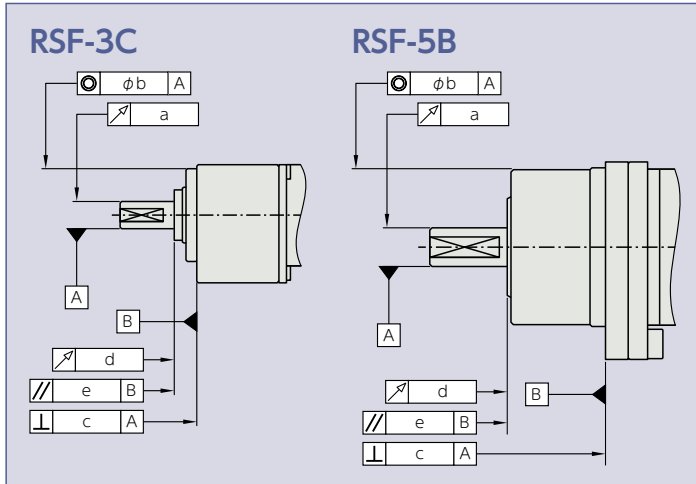
Lead wire of the motor, encoder, and brake (RSF-5B)



* Brake lead wires are not provided for RSF-5B without brake.

■ Mechanical Accuracy

RSF Supermini Series



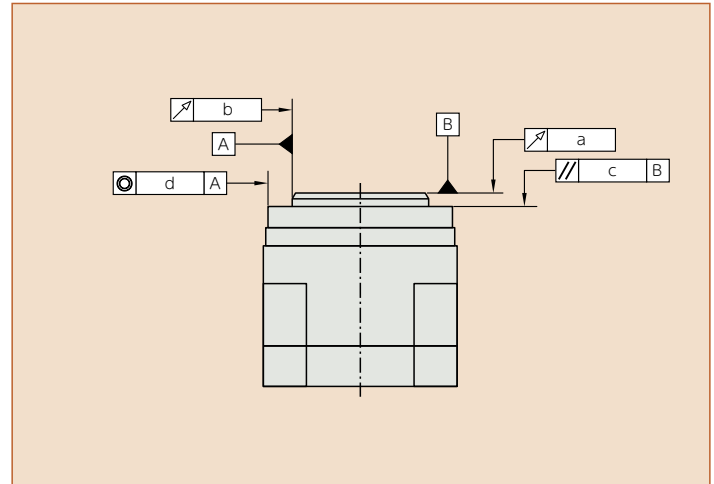
(T.I.R.* Unit: mm)

Symbol	Accuracy item	Accuracy value	
		RSF-3C	RSF-5B
a	Output shaft tip runout	0.03	0.03
b	Installation pilot concentricity	0.02	0.04
c	Installation surface perpendicularity	0.02	0.02
d	Output flange runout	0.005	0.005
e	Parallelism between the installation surface and the output flange	0.015	0.015

* Total indicator reading (T.I.R.): Indicates the total amount of reading of the dial gauge when the measured part is rotated one turn.

* Although a highly reliable oil seal is used in the output shaft, complete leakage prevention is not ensured. Customers must take actions to protect from grease or oil depending on the application.

FHA-C Mini Series



(T.I.R.* Unit: mm)

Symbol	Accuracy item	Accuracy value
		FHA-8/11/14C
a	Output shaft surface runout	0.010
b	Output shaft axial runout	0.010
c	Parallelism between the output shaft and the mounted surface	0.040
d	Concentricity between the output shaft and the pilot	0.040

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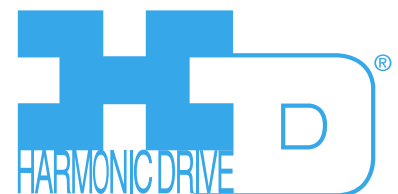
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