

SANMOTION

5-PHASE STEPPING SYSTEMS

F

F series DRIVER / F series MOTORS / M series MOTORS



Vol. **2**

SANYO DENKI

E
ENGLISH

Extensive Lineup

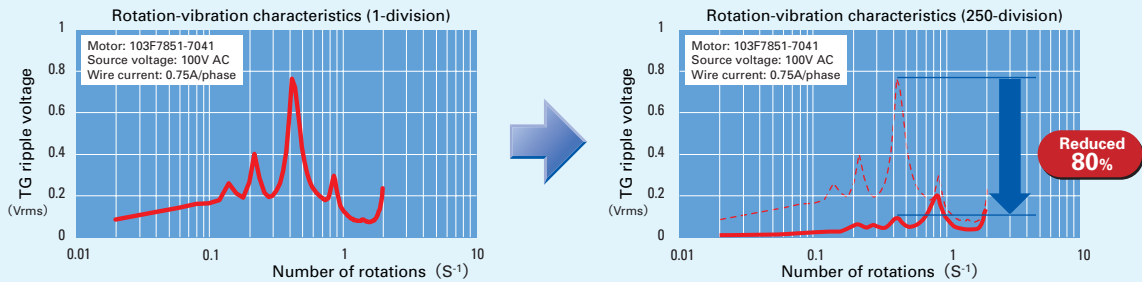
SANMOTION F

STEPPING SYSTEMS

F-Series Driver

Reduces 80% of vibration

Auto-micro function and micro-stepping function can reduce vibration by 80% as compared to our conventional products.



Auto-micro function

Vibration can be suppressed regardless of controller restrictions.

Micro-stepping function

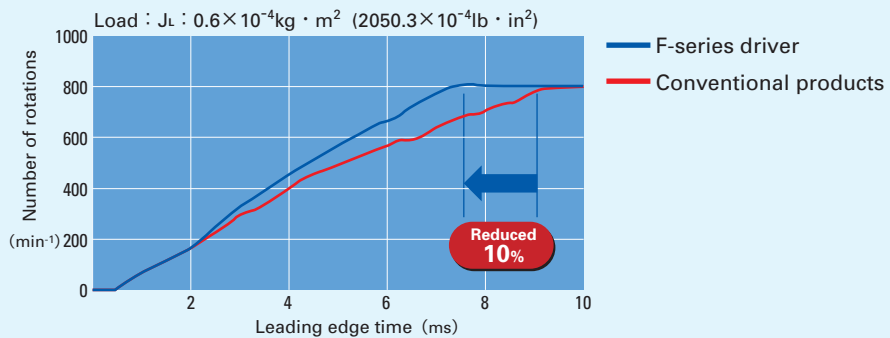
Resolution can be selected (16 settings) from 1 to 250 divisions of the basic step angle (0.72 degrees) to provide smooth operation without vibration.

$$\frac{0.72}{1 \sim 250 \text{ divisions}} = 0.72 \sim 0.00288 \text{ degrees/pulse}$$

Reduces cycle time

Reduction of response time by 10% (compared to our conventional products) allows cycle time of the device to be reduced when the same operation is repeatedly performed.

* Achieved higher response (improved by 10% compared to our existing models) and reduced cycle time of equipment when the same operation is repeated.



Reduces space for control panel

Volume is reduced by 50% (compared to our conventional products).



Easier maintenance

2-digit LED with 7 segments can display the system's status and alarms for troubleshooting and recovery of the system.

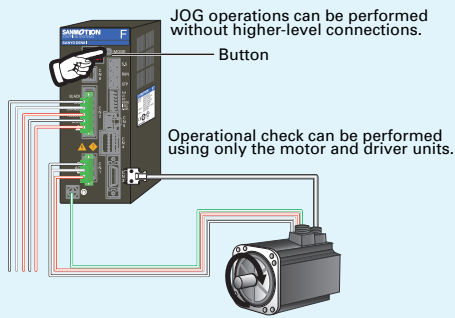
Industry's first





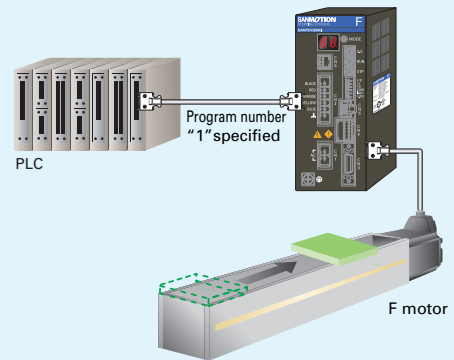
Test Operations (JOG Functions) Positioning-function-included

Built-in JOG functions can be used to check connections between motor and driver enabling test operations without having to enter position or speed commands.



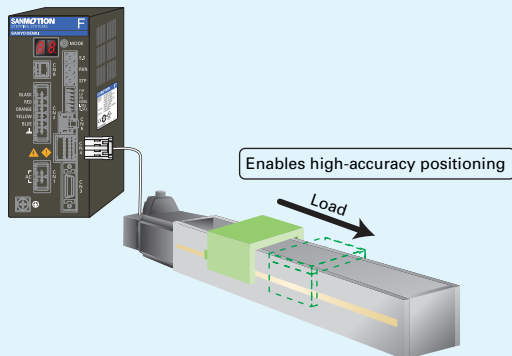
Positioning by General-purpose I/O Positioning-function-included

System can be easily positioned by specifying a program number via general-purpose I/O from an upper-level controller (PLC, etc.).



Encoder I/F Control Positioning-function-included

Step-out detection can be performed by connecting to a motor encoder. 500 P/R (1000/2000 multiplication function) line-driver system



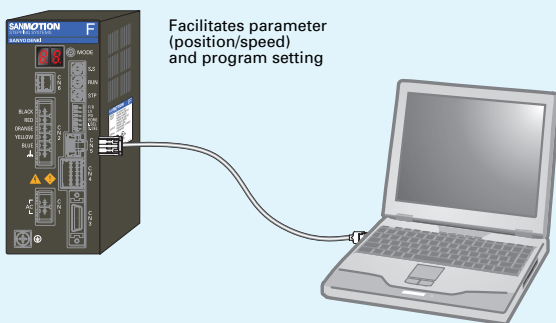
Conforms to International Standards

Standard specifications of F-series stepping drivers comply with UL, CSA, and EN international standards. Sanyo Denki provides stepping motors conforming to UL and EN international standards and EMC filters satisfying EMC directives.



Laptop-based Setup Monitor

Parameter and program settings can be made with setup software.



Characteristic

System Configuration

Type Code Convention

Specifications

Common Specifications

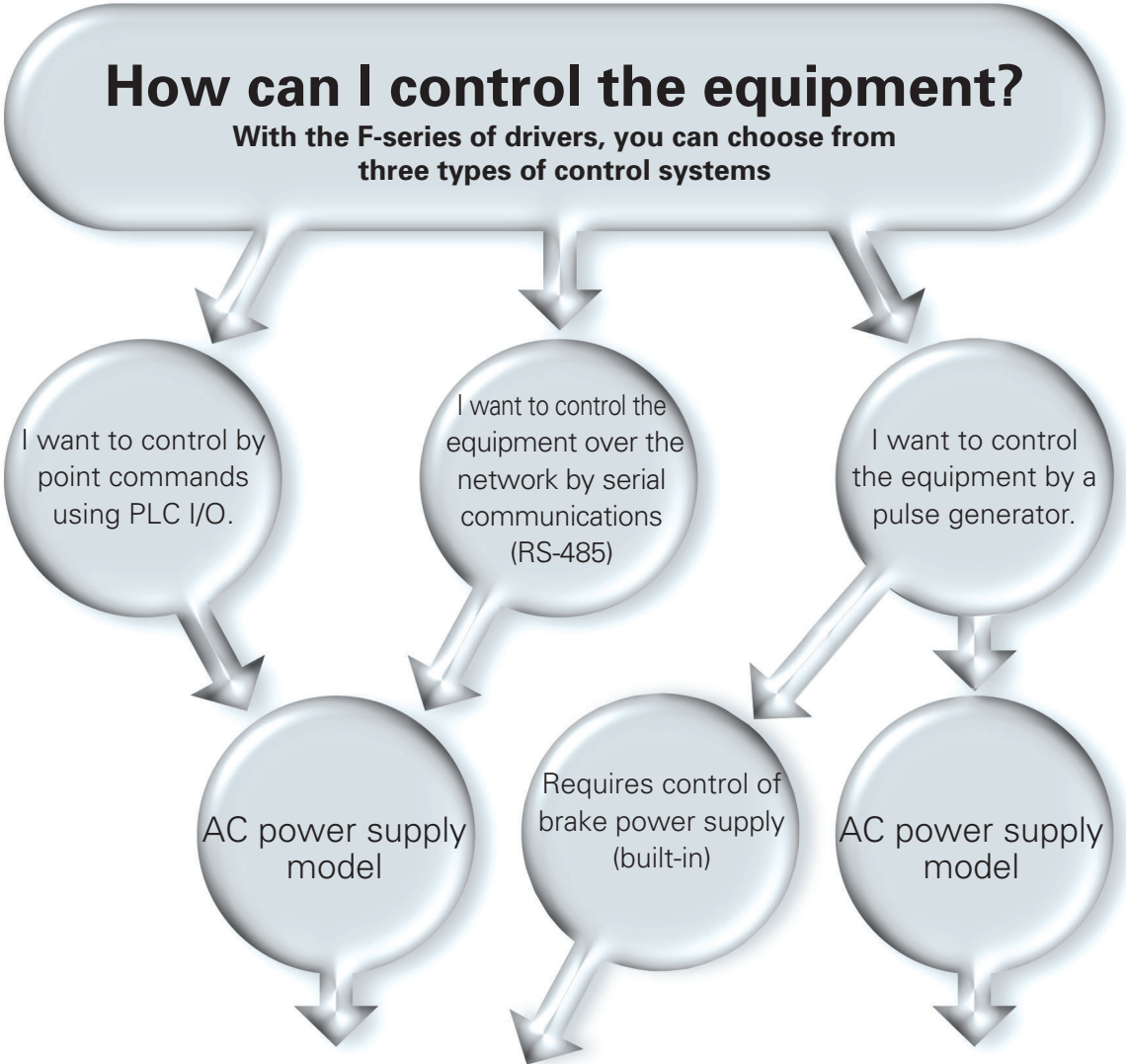
Dimensions



Driver

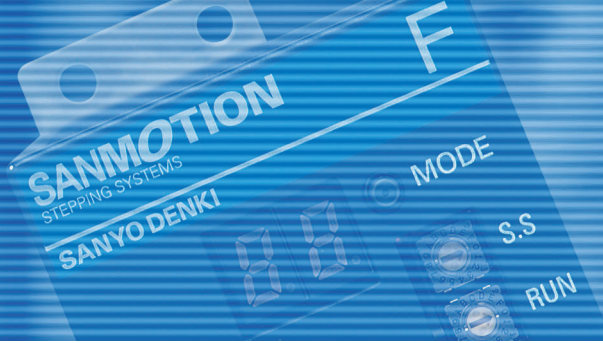
Extensive Lineup

SANMOTION F

STEPPING SYSTEMS



SANMOTION F P Type			SANMOTION F S Type		
					
<p>For startup by I/O: Starts up a command program specifying speed, acceleration/deceleration, and movement stored beforehand in the driver.</p>			<p>Operates system based on pulse input commands from upper-level control equipment.</p>		
<p>For startup by serial communications: Controls equipment by transmitting speed, acceleration/deceleration, and movement data by serial communications.</p>					
System configuration	P07	Common specifications	P23 · P24	Drivers	P33~P36
Numbering convention	P09	Motor dimensions	P25~P29		
Motor specifications	P11~P22	Driver dimensions	P30		
System configuration	P05	Motor dimensions	P25~P29		
Numbering convention	P09	Driver dimensions	P30		
Motor specifications	P11~P22	Drivers	P31 · P32		
Common specifications	P23 · P24				



Standard model

System includes an F-series driver and an F-series motor.

P.11

Motor dimensions



CE/UL model

System includes an F-series driver and an M-series motor.

P.13

Motor dimensions



Low-backlash gear model

System includes a low-backlash gear with a gear output stage and a cone gear that can engage with the output stage.

P.15

Motor dimensions



Reduction gear ratios



Spur gear model

System using a spur gear for gear reduction.

P.18

Motor dimensions



Reduction gear ratios



Harmonic gear model

System using a harmonic gear for gear reduction.

P.19

Motor dimensions



Reduction gear ratios



Electromagnetic brake model

System using an electromagnetic brake, which can maintain position for vertical operation or hold the load even when the system is turned off.

P.21

Motor dimensions



Characteristic

System Configuration

Type Code Convention

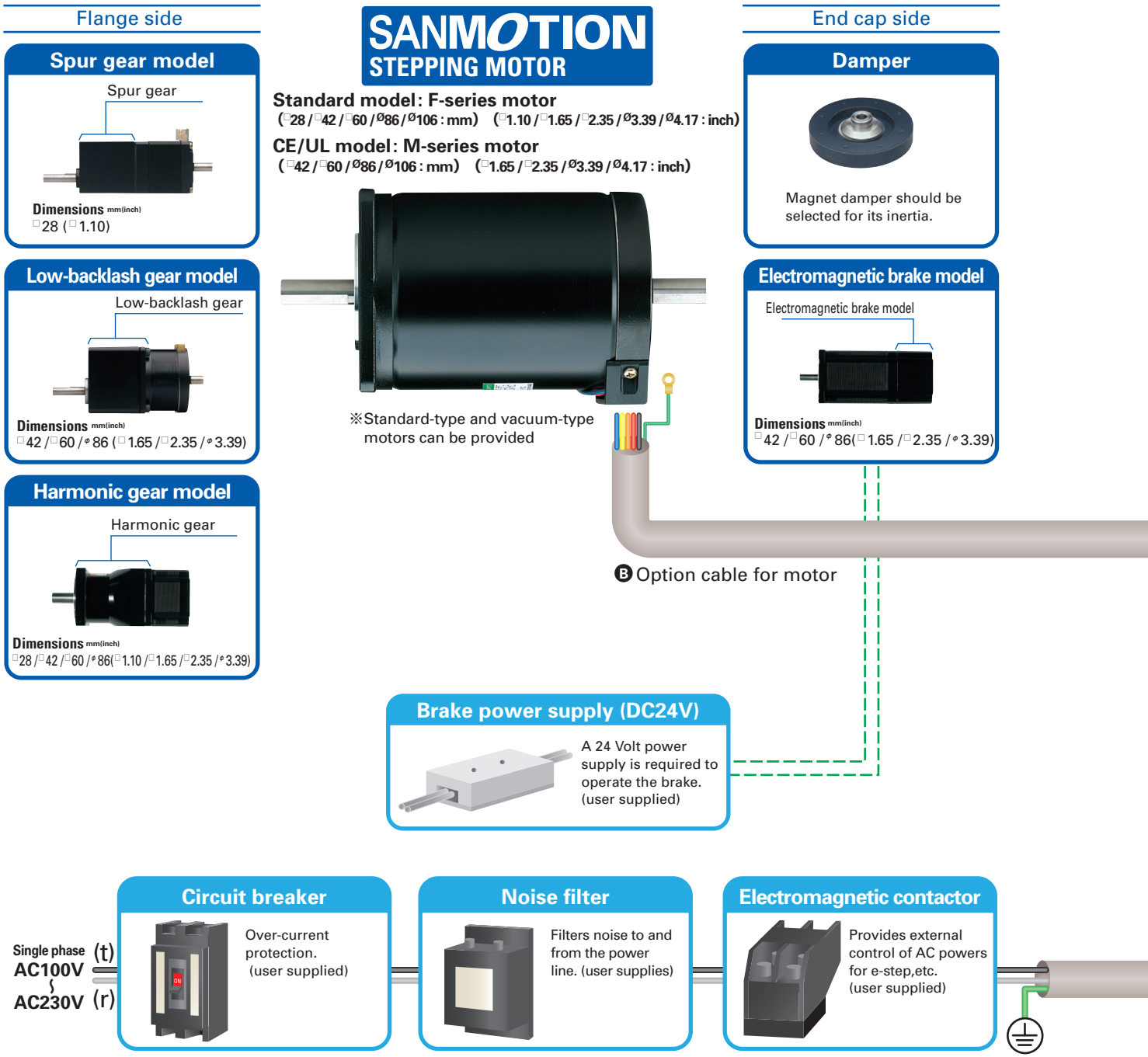
Specifications

Common Specifications

Dimensions

Driver

System Configuration (standard type)



■ Auxiliary connectors

Connector type	Corresponding housing type	Corresponding contact type	Corresponding
① AC power connector	1-178128-2 (AMP)	1-175218-5 (AMP)	—————
② Motor connector	1-178128-6 (AMP)	1-175216-5 (AMP)	□28mm(□1.10inch) □42mm(□1.65inch)
	1-178128-6 (AMP)	1-175217-5 (AMP)	□60mm(□2.35inch) φ86mm(φ3.39inch)
	1-178128-6 (AMP)	1-175218-5 (AMP)	φ106mm
③ I/O signal connector	10314-52A0-008 (3M)	10114-3000VE (3M)	—————

SANMOTION STEPPING DRIVER



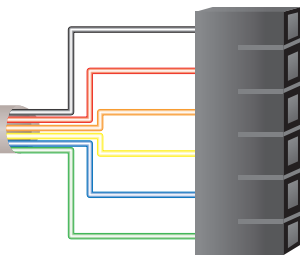
Control unit

PLC

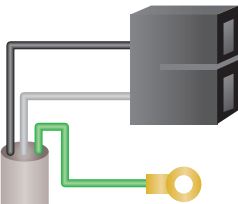
Controller

Can be connected to products of other companies, as well as our control unit products.

② Motor connector (auxiliary)



① AC power connector (auxiliary)



④ Optional cable for AC power

③ Optional cable for input/output signal

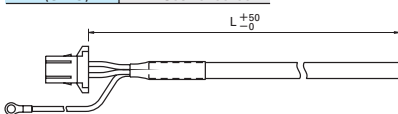
③ Input/output signal connector (auxiliary)

Characteristic
System Configuration
Type Code Convention
Specifications
Common Specifications
Dimensions
Driver

Optional cable

④ AC power cable

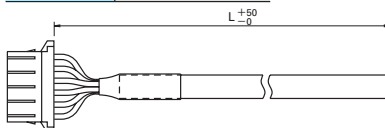
L:m(feet)	Part number
10(32.8)	PM-C03P1000-05
5(16.4)	PM-C03P0500-05
3(9.84)	PM-C03P0300-05
1(3.28)	PM-C03P0100-05



Cable	600V vinyl cab tire cable 3-wire AWG16(1.25mm ²)
Housing	1-178128-2 (AMP)
Contact	1-175218-5 (AMP)
Round-type crimp tool	1.25M4(J.S.T. Mfg Co.)

② Motor cable

L:m(feet)	Part number
10(32.8)	PM-C06M1000-11
5(16.4)	PM-C06M0500-11
3(9.84)	PM-C06M0300-11
1(3.28)	PM-C06M0100-11

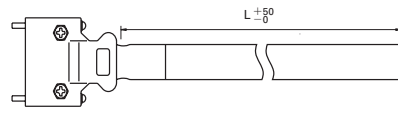


Cable	600V vinyl cab tire cable 6-wire AWG18(0.75mm ²)
Housing	1-178128-6 (AMP)
Round-type crimp terminal	1-175218-5 (AMP)

* If you need a cable of 10 m or longer, please contact us.

③ I/O signal cable

L:m(feet)	Part number
2(6.56)	PM-C14S0200-03
1(3.28)	PM-C14S0100-03



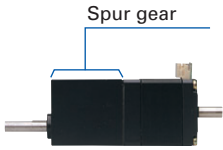
Cable	7-pair PVC shielded cable AWG28 (0.08mm ²)
Shell	10314-52A0-008 (3M)
Plug	10114-3000VE (3M)

* If you need a cable of 10 m or longer, please contact us.

System Configuration (positioning-function-included type)

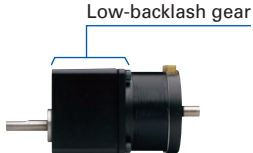
Flange side

Spur gear model



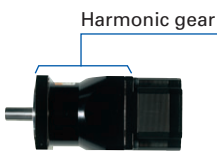
Dimensions mm(inch)
□28 (□1.10)

Low-backlash gear model



Dimensions mm(inch)
□42 / □60 / φ86 (□1.65 / □2.35 / φ3.39)

Harmonic gear model

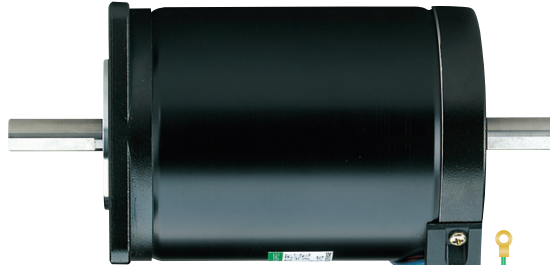


Dimensions mm(inch)
□28 / □42 / □60 / φ86 (□1.10 / □1.65 / □2.35 / φ3.39)

SANMOTION STEPPING MOTOR

Standard model: F-series motor
(□28 / □42 / □60 / φ86 / φ106 : mm) (□1.10 / □1.65 / □2.35 / φ3.39 / φ4.17 : inch)

CE/UL model: M-series motor
(□42 / □60 / φ86 / φ106 : mm) (□1.65 / □2.35 / φ3.39 / φ4.17 : inch)



※Standard-type and vacuum-type motors can be provided

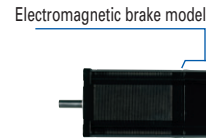
End cap side

Damper



Magnet damper should be selected for its inertia.

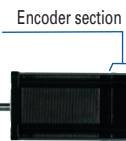
Electromagnetic brake model



Dimensions mm(inch)
□42 / □60 / φ86 (□1.65 / □2.35 / φ3.39)

Ⓑ Option cable for motor

Encoder attachment



※Option

Circuit breaker



Over-current protection.
(user supplied)

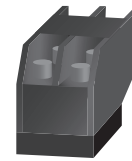
Single phase (t)
AC100V
AC230V (r)

Noise filter



Filters noise to and from the power line.
(user supplies)

Electromagnetic contactor



Provides external control of AC powers for e-step, etc.
(user supplied)

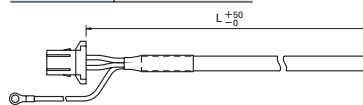
Auxiliary connectors

Connector type	Corresponding housing type	Corresponding contact type	Corresponding
● AC power connector	1-178128-2 (AMP)	1-175218-5 (AMP)	—
● Motor connector	1-178128-6 (AMP)	1-175216-5 (AMP)	□28mm(□1.10inch) □42mm(□1.65inch)
	1-178128-6 (AMP)	1-175217-5 (AMP)	φ60mm(φ2.35inch) φ86mm(φ3.39inch)
● I/O signal connector	1-178128-6 (AMP)	1-175218-5 (AMP)	φ106mm
	10320-52A0-008 (3M)	10120-3000VE (3M)	—

Optional cable

Ⓐ AC power cable

L:m(feet)	Part number
10(32.8)	PM-C03P1000-05
5(16.4)	PM-C03P0500-05
3(9.84)	PM-C03P0300-05
1(3.28)	PM-C03P0100-05

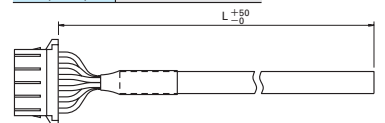


Cable	600V vinyl cab tire cable 3-wire AWG16(1.25mm ²)
Housing	1-178128-2 (AMP)
Contact	1-175218-5 (AMP)
Round-type crimp tool	1.25M4(J.S.T. Mfg Co.)

※ If you need a cable of 10 m or longer, please contact us.

Ⓑ Motor cable

L:m(feet)	Part number
10(32.8)	PM-C06M1000-11
5(16.4)	PM-C06M0500-11
3(9.84)	PM-C06M0300-11
1(3.28)	PM-C06M0100-11



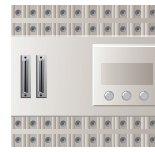
Cable	600V vinyl cab tire cable 6-wire AWG18(0.75mm ²)
Housing	1-178128-6 (AMP)
Round-type crimp terminal	1-175218-5 (AMP)

※ If you need a cable of 10 m or longer, please contact us.

SANMOTION STEPPING DRIVER

Control unit

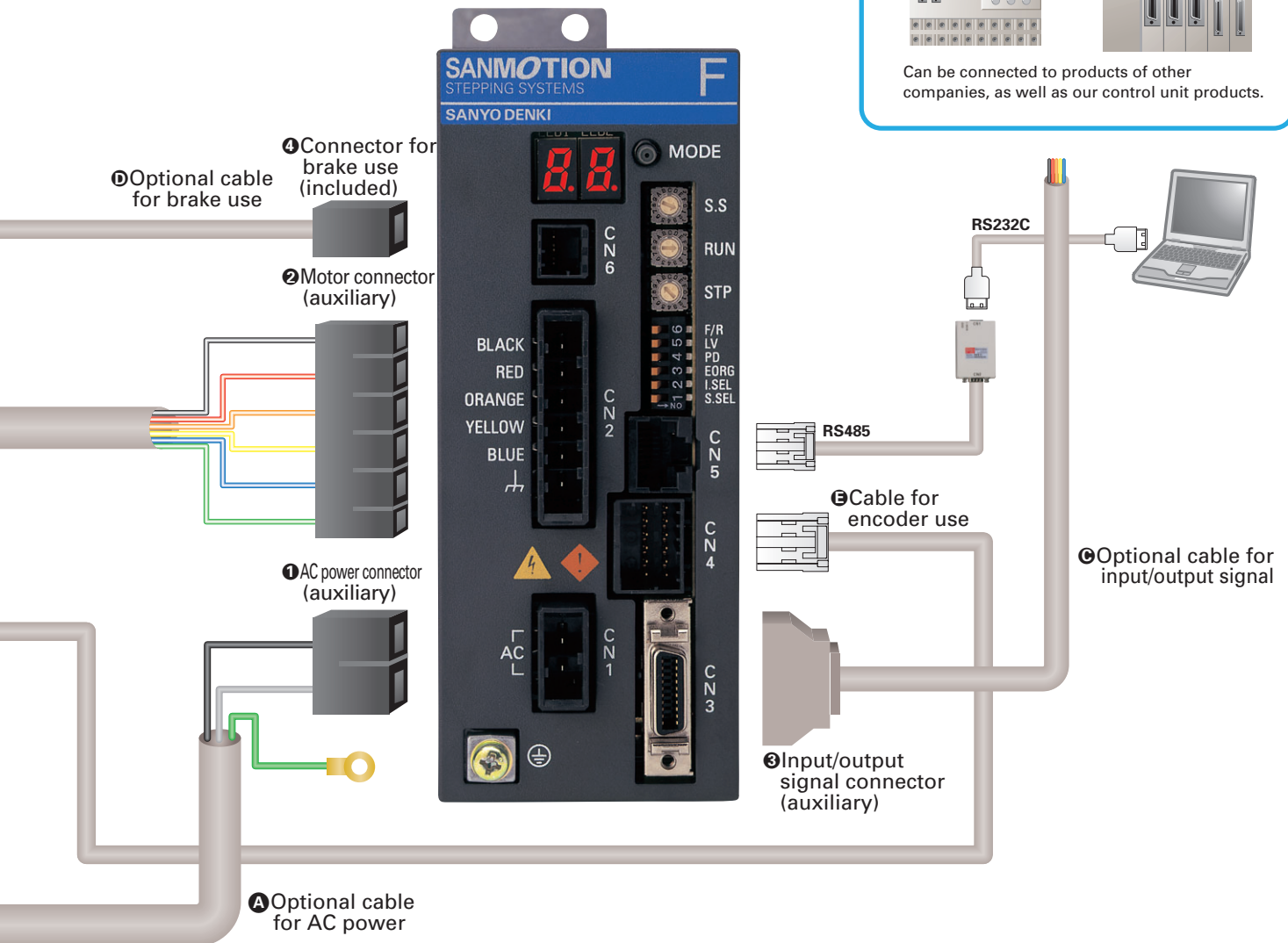
PLC



Controller



Can be connected to products of other companies, as well as our control unit products.



Characteristic

System Configuration

Type Code Convention

Specifications

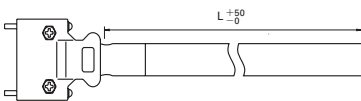
Common Specifications

Dimensions

Driver

G I/O signal cable

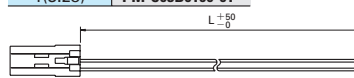
L:m(feet)	Part number
2(6.56)	PM-C20S0200-01
1(3.28)	PM-C20S0100-01



Cable	10-pair PVC shielded cable AWG28 (0.08mm ²)
Shell	1032052A0-008 (3M)
Plug	10120-3000VE (3M)

D Cable for brake use

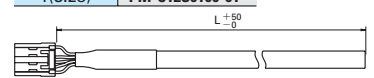
L:m(feet)	Part number
10(32.8)	PM-C03B1000-01
5(16.4)	PM-C03B0500-01
3(9.84)	PM-C03B0300-01
1(3.28)	PM-C03B0100-01



Cable	PVC cable AWG22 (0.3mm ²)
Housing	1-1318120-3(AMP)
Contact	1318107-1(AMP)

E Cable for encoder use

L:m(feet)	Part number
10(32.8)	PM-C12S1000-01
5(16.4)	PM-C12S0500-01
3(9.84)	PM-C12S0300-01
1(3.28)	PM-C12S0100-01

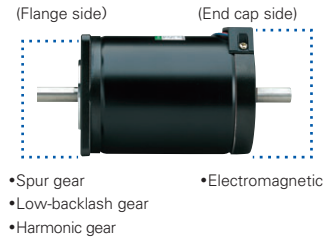


Cable	4-pair PVC shielded cable AWG22 (0.2mm ²)
Housing	1-1318118-6(AMP)
Contact	1318107-1(AMP)

Part Numbering Convention

Part number convention

The following part number specifies a system with an F-series driver (type code: FS1W075P) and a single shaft F-series motor (type code: 103F7851-7041), □60mm(□2.36inch) in dimension, and 46.5mm(1.83inch) motor length, equipped with low-backlash gear (reduction ratio of 1/3.6).



7. System spec.

System type	I (Flange side)	II (End cap side)	III (Reduction ratio)
Spur gear	G		
Low-backlash gear	C		
Harmonic gear	H		
No system at Flange side	X		
Electromagnetic brake		B	
No system at End cap side		X	
Gear ratio			3.6 ~ 100

6. Stepping motor shaft spec.
S : Single shaft D : Double shaft

5. Stepping motor total length

Code	Motor dimensions									
	□28mm (□1.10inch)		□42mm (□1.65inch)		□60mm (□2.36inch)		*86mm (*3.39inch)		*106mm (*4.17inch)	
	Type code	Motor length	Type code	Motor length	Type code	Motor length	Type code	Motor length	Type code	Motor length
1	3505	31mm (1.22inch)	5505	34mm (1.34inch)	7851	46.5mm (1.83inch)	8581	62.2mm (2.45inch)		
2			5508	40mm (1.57inch)	7852	55mm (2.17inch)	8582	92.2mm (3.63inch)	89582	163.3mm (6.43inch)
3					7853	87.5mm (3.44inch)	8583	125.9mm (4.96inch)	89583	221.3mm (8.71inch)
4			5510	49mm (1.93inch)						
6	3515	50.5mm (1.99inch)								

4. Stepping motor dimensions
 35 : □28mm(□1.10inch) 85 : φ 86mm(φ 3.39inch)
 55 : □42mm(□1.65inch) 89 : φ 106mm(φ 4.17inch)
 78 : □60mm(□2.36inch)

3. Stepping motor series name
 F : F-series motor
 M : M-series motor (CE/UL)

2. S: standard type (wide-range power-supply input AC100V-AC230V)
 P: positioning-function-included type (wide-range power-supply input AC100V-AC230V)

1. Indicates F-series driver

Combination List of 5-Phase Stepping Driver and Motor

Type code of combination of F-series driver + F-series motor

System type	Motor dimensions mm(inch)	Single shaft			Double shaft			
		System code		Combination stepping motor type code	System code		Combination stepping motor type code	
		Stype	Ptype		Stype	Ptype		
Standard model	□28 (□1.10)	FSF351S	FPF351S	103F3505-7041	FSF351D	FPF351D	103F3505-7011	
		FSF356S	FPF356S	103F3515-7041	FSF356D	FPF356D	103F3515-7011	
		FSF551S	FPF551S	103F5505-7041	FSF551D	FPF551D	103F5505-7011	
	□42 (□1.65)	FSF552S	FPF552S	103F5508-7041	FSF552D	FPF552D	103F5508-7011	
		FSF554S	FPF554S	103F5510-7041	FSF554D	FPF554D	103F5510-7011	
		FSF781S	FPF781S	103F7851-7041	FSF781D	FPF781D	103F7851-7011	
	□60 (□2.36)	FSF782S	FPF782S	103F7852-7041	FSF782D	FPF782D	103F7852-7011	
		FSF783S	FPF783S	103F7853-7041	FSF783D	FPF783D	103F7853-7011	
		FSF851S	FPF851S	103F8581-7041	FSF851D	FPF851D	103F8581-7011	
	φ86 (φ3.39)	FSF852S	FPF852S	103F8582-7041	FSF852D	FPF852D	103F8582-7011	
		FSF853S	FPF853S	103F8583-7041	FSF853D	FPF853D	103F8583-7011	
		FSF892S	FPF892S	103F89582-7041	FSF892D	FPF892D	103F89582-7011	
	φ106 (φ4.17)	FSF893S	FPF893S	103F89583-7041	FSF893D	FPF893D	103F89583-7011	
		□42 (□1.65)	FSF551S-CX3.6	FPF551S-CX3.6	103F5505-70CXA4	FSF551D-CX3.6	FPF551D-CX3.6	103F5505-70CXA1
			FSF551S-CX7.2	FPF551S-CX7.2	103F5505-70CXB4	FSF551D-CX7.2	FPF551D-CX7.2	103F5505-70CXB1
FSF551S-CX10	FPF551S-CX10		103F5505-70CXE4	FSF551D-CX10	FPF551D-CX10	103F5505-70CXE1		
FSF551S-CX20	FPF551S-CX20		103F5505-70CXG4	FSF551D-CX20	FPF551D-CX20	103F5505-70CXG1		
FSF551S-CX30	FPF551S-CX30		103F5505-70CXJ4	FSF551D-CX30	FPF551D-CX30	103F5505-70CXJ1		
FSF551S-CX36	FPF551S-CX36		103F5505-70CKK4	FSF551D-CX36	FPF551D-CX36	103F5505-70CKK1		
□60 (□2.36)	FSF781S-CX3.6	FPF781S-CX3.6	103F7851-70CXA4	FSF781D-CX3.6	FPF781D-CX3.6	103F7851-70CXA1		
	FSF781S-CX7.2	FPF781S-CX7.2	103F7851-70CXB4	FSF781D-CX7.2	FPF781D-CX7.2	103F7851-70CXB1		
	FSF781S-CX10	FPF781S-CX10	103F7851-70CXE4	FSF781D-CX10	FPF781D-CX10	103F7851-70CXE1		
	FSF781S-CX20	FPF781S-CX20	103F7851-70CXG4	FSF781D-CX20	FPF781D-CX20	103F7851-70CXG1		
	FSF781S-CX30	FPF781S-CX30	103F7851-70CXJ4	FSF781D-CX30	FPF781D-CX30	103F7851-70CXJ1		
	FSF781S-CX36	FPF781S-CX36	103F7851-70CKK4	FSF781D-CX36	FPF781D-CX36	103F7851-70CKK1		
φ86 (φ3.39)	FSF851S-CX3.6	FPF851S-CX3.6	103F8581-70CXA4	FSF851D-CX3.6	FPF851D-CX3.6	103F8581-70CXA1		
	FSF851S-CX7.2	FPF851S-CX7.2	103F8581-70CXB4	FSF851D-CX7.2	FPF851D-CX7.2	103F8581-70CXB1		
	FSF851S-CX10	FPF851S-CX10	103F8581-70CXE4	FSF851D-CX10	FPF851D-CX10	103F8581-70CXE1		
	FSF851S-CX20	FPF851S-CX20	103F8581-70CXG4	FSF851D-CX20	FPF851D-CX20	103F8581-70CXG1		
	FSF851S-CX30	FPF851S-CX30	103F8581-70CXJ4	FSF851D-CX30	FPF851D-CX30	103F8581-70CXJ1		
	FSF851S-CX36	FPF851S-CX36	103F8581-70CKK4	FSF851D-CX36	FPF851D-CX36	103F8581-70CKK1		
Spur gear model	□28 (□1.10)	FSF351S-GX3.6	FPF351S-GX3.6	103F3505-70GXA4	FSF351D-GX3.6	FPF351D-GX3.6	103F3505-70GXA1	
		FSF351S-GX7.2	FPF351S-GX7.2	103F3505-70GXB4	FSF351D-GX7.2	FPF351D-GX7.2	103F3505-70GXB1	
		FSF351S-GX10	FPF351S-GX10	103F3505-70GXE4	FSF351D-GX10	FPF351D-GX10	103F3505-70GXE1	
		FSF351S-GX20	FPF351S-GX20	103F3505-70GXG4	FSF351D-GX20	FPF351D-GX20	103F3505-70GXG1	
		FSF351S-GX30	FPF351S-GX30	103F3505-70GXJ4	FSF351D-GX30	FPF351D-GX30	103F3505-70GXJ1	
		FSF351S-GX50	FPF351S-GX50	103F3505-70GXL4	FSF351D-GX50	FPF351D-GX50	103F3505-70GXL1	
Harmonic gear model	□28 (□1.10)	FSF351S-HX50	FPF351S-HX50	103F3505-70HXL4	FSF351D-HX50	FPF351D-HX50	103F3505-70HXL1	
		FSF351S-HX100	FPF351S-HX100	103F3505-70HXM4	FSF351D-HX100	FPF351D-HX100	103F3505-70HXM1	
	□42 (□1.65)	FSF551S-HX30	FPF551S-HX30	103F5505-70HXJ5	FSF551D-HX30	FPF551D-HX30	103F5505-70HXJ2	
		FSF551S-HX50	FPF551S-HX50	103F5505-70HXL5	FSF551D-HX50	FPF551D-HX50	103F5505-70HXL2	
	□60 (□2.36)	FSF781S-HX50	FPF781S-HX50	103F7851-70HXL4	FSF781D-HX50	FPF781D-HX50	103F7851-70HXL1	
		FSF781S-HX100	FPF781S-HX100	103F7851-70HXM4	FSF781D-HX100	FPF781D-HX100	103F7851-70HXM1	
	φ86 (φ3.39)	FSF851S-HX50	FPF851S-HX50	103F8581-70HXL4	FSF851D-HX50	FPF851D-HX50	103F8581-70HXL1	
		FSF851S-HX100	FPF851S-HX100	103F8581-70HXM4	FSF851D-HX100	FPF851D-HX100	103F8581-70HXM1	
	Electromagnetic brake model	□42 (□1.65)	FSF551S-XB	FPF551S-XB	103F5505-70XB41	-	-	-
			FSF552S-XB	FPF552S-XB	103F5508-70XB41	-	-	-
			FSF554S-XB	FPF554S-XB	103F5510-70XB41	-	-	-
		□60 (□2.36)	FSF781S-XB	FPF781S-XB	103F7851-70XB41	-	-	-
FSF782S-XB			FPF782S-XB	103F7852-70XB41	-	-	-	
FSF783S-XB			FPF783S-XB	103F7853-70XB41	-	-	-	
φ86 (φ3.39)		FSF851S-XB	FPF851S-XB	103F8581-70XB41	-	-	-	
		FSF852S-XB	FPF852S-XB	103F8582-70XB41	-	-	-	
		FSF853S-XB	FPF853S-XB	103F8583-70XB41	-	-	-	

Type code of combination of F-series driver + M-series motor

System type	Motor dimensions mm(inch)	Single shaft			Double shaft		
		System code		Combination stepping motor type code	System code		Combination stepping motor type code
		Stype	Ptype		Stype	Ptype	
CE/UL mode	□42mm	FSM551S	FPM551S	103M5505-7041	FSM551D	FPM551D	103M5505-7011
		FSM552S	FPM552S	103M5508-7041	FSM552D	FPM552D	103M5508-7011
		FSM554S	FPM554S	103M5510-7041	FSM554D	FPM554D	103M5510-7011
	□60mm	FSM781S	FPM781S	103M7851-7041	FSM781D	FPM781D	103M7851-7011
		FSM782S	FPM782S	103M7852-7041	FSM782D	FPM782D	103M7852-7011
		FSM783S	FPM783S	103M7853-7041	FSM783D	FPM783D	103M7853-7011
	φ86mm	FSM851S	FPM851S	103M8581-7041	FSM851D	FPM851D	103M8581-7011
		FSM852S	FPM852S	103M8582-7041	FSM852D	FPM852D	103M8582-7011
		FSM853S	FPM853S	103M8583-7041	FSM853D	FPM853D	103M8583-7011
	φ106mm	FSM892S	FPM892S	103M89582-7041	FSM892D	FPM892D	103M89582-7011
		FSM893S	FPM893S	103M89583-7041	FSM893D	FPM893D	103M89583-7011

Characteristic
 System Configuration
 Type Code Convention
 Specifications
 Common Specifications
 Dimensions
 Driver

Specifications

Standard Model

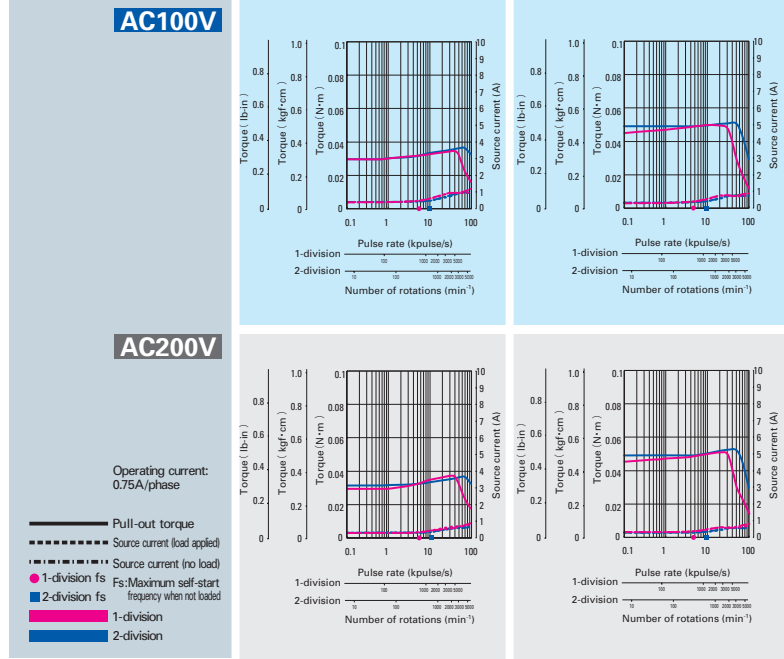
F-series driver + F-series motor

Motor dimensions



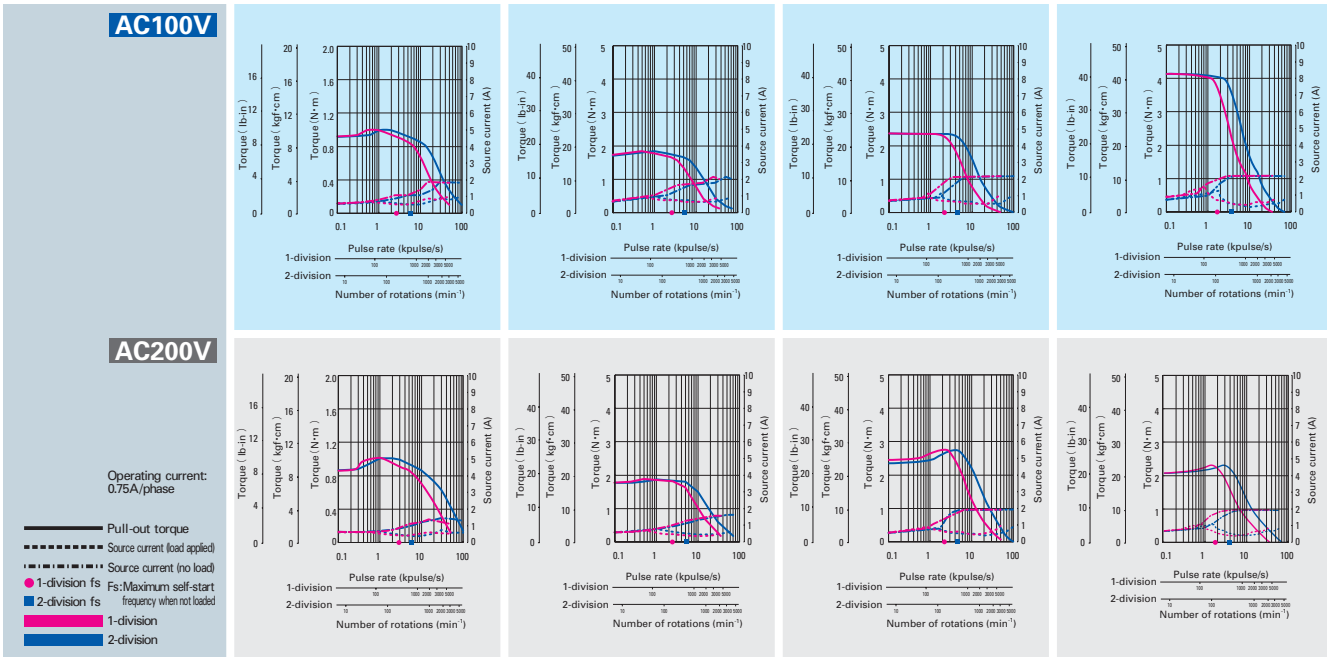
Size	Motor dimensions	□28mm			
	Motor length	31mm		50.5mm	
Set part number	Single shaft	FSF351S	FPF351S	FSF356S	FPF356S
	Double shaft	FSF351D	FPF351D	FSF356D	FPF356D
Holding torque	N·m	0.036		0.065	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2(^{\ast}2)$	0.009		0.016	
Mass	kg	0.11		0.2	
Allowable thrust load	N	3		3	
Allowable radial load ^{*1}	N	34		34	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



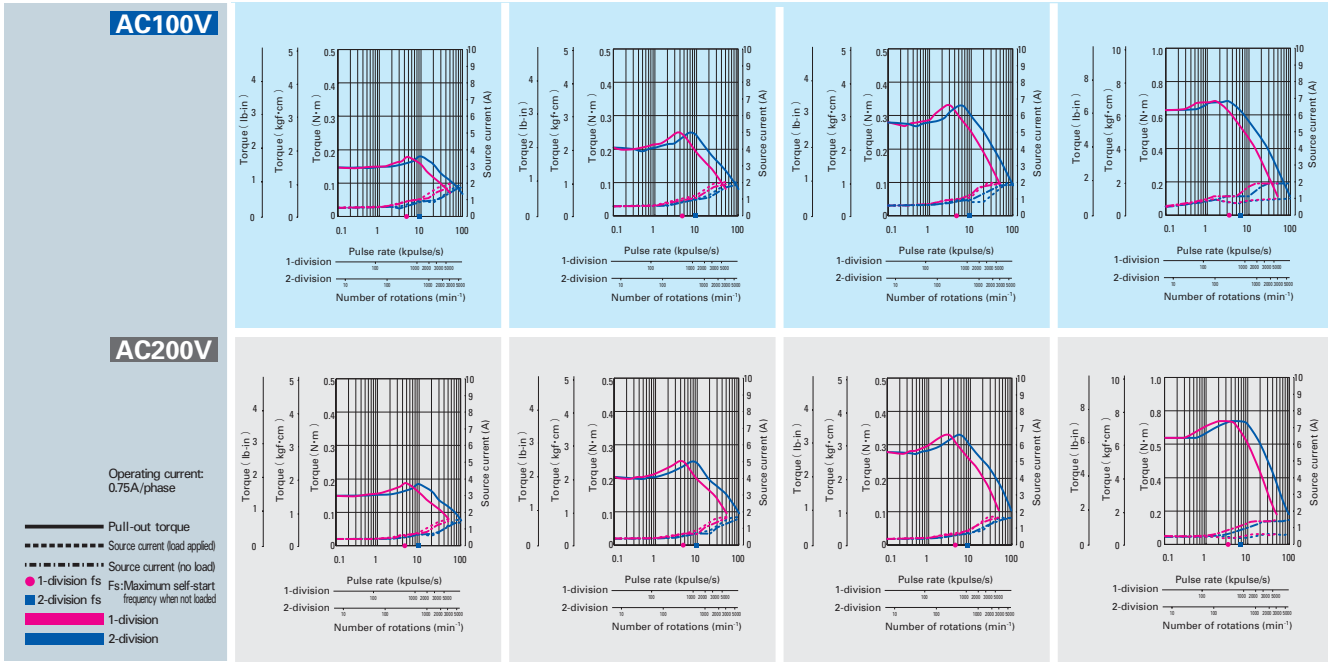
Size	Motor dimensions	□60mm				φ86mm			
	Motor length	55mm		87.5mm		62.15mm		92.2mm	
Set part number	Single shaft	FSF782S	FPF782S	FSF783S	FPF783S	FSF851S	FPF851S	FSF852S	FPF852S
	Double shaft	FSF782D	FPF782D	FSF783D	FPF783D	FSF851D	FPF851D	FSF852D	FPF852D
Holding torque	N·m	0.93		1.79		2.06		4.02	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2(^{\ast}2)$	0.4		0.84		1.45		2.9	
Mass	kg	0.78		1.36		1.5		2.5	
Allowable thrust load	N	20		20		60		60	
Allowable radial load ^{*1}	N	80		80		220		220	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



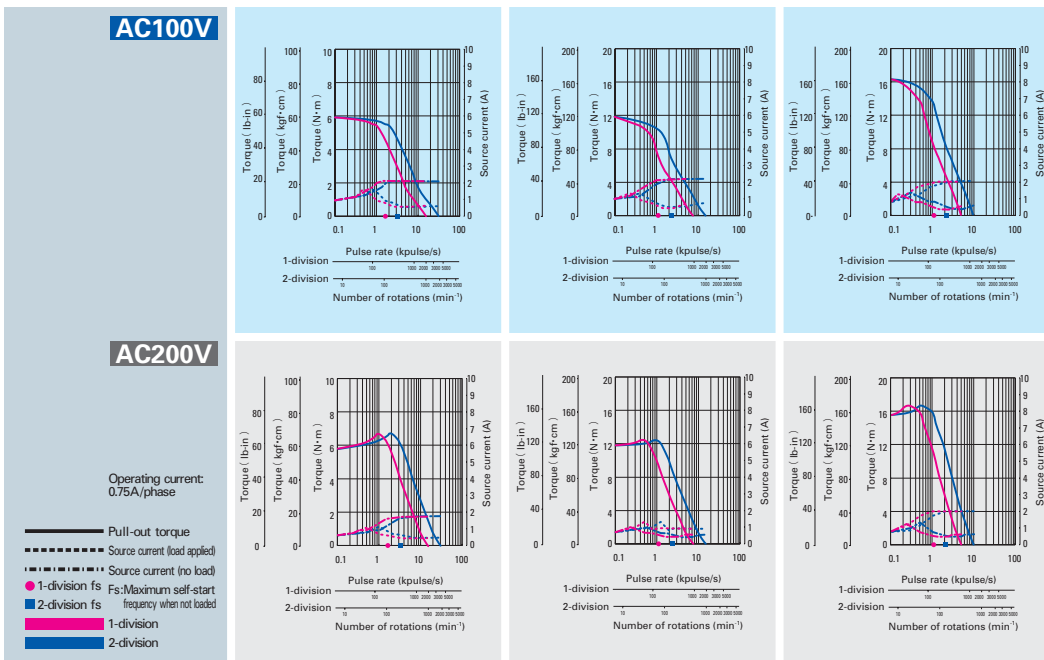
Size	Motor dimensions	□42mm						□60mm	
	Motor length	34mm		40mm		49mm		46.5mm	
Set part number	Single shaft	FSF551S	FPF551S	FSF552S	FSF552S	FSF554S	FPF554S	FSF781S	FPF781S
	Double shaft	FSF551D	FPF551D	FSF552D	FSF552D	FSF554D	FPF554D	FSF781D	FPF781D
Holding torque	N·m	0.13		0.18		0.26		0.6	
Rotor inertia	$\times 10^{-4} \text{kgm}^2$ (*2)	0.03		0.053		0.065		0.275	
Mass	kg	0.23		0.28		0.37		0.6	
Allowable thrust load	N	10		10		10		20	
Allowable radial load (*1)	N	35		35		35		80	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Size	Motor dimensions	φ86mm		φ106mm			
	Motor length	125.85mm		163.3mm	221.3mm		
Set part number	Single shaft	FSF853S	FPF853S	FSF892S	FPF892S	FSF893S	FPF893S
	Double shaft	FSF853D	FPF853D	FSF892D	FPF892D	FSF893D	FPF893D
Holding torque	N·m	6.17		10.8		16	
Rotor inertia	$\times 10^{-4} \text{kgm}^2$ (*2)	4.4		14.6		22	
Mass	kg	3.5		7.5		10.5	
Allowable thrust load	N	60		100		100	
Allowable radial load (*1)	N	220		360		360	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Characteristic

System Configuration

Type Code Convention

Specifications

Common Specifications

Dimensions

Driver

Specifications

CE/UL Model F-series driver + M-series motor

Motor dimensions



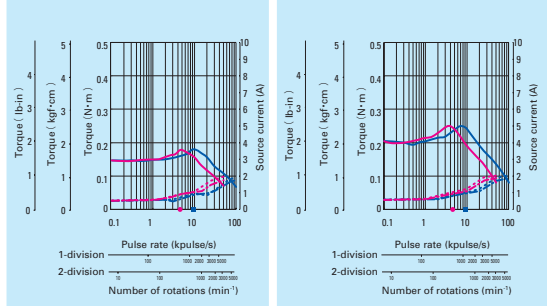
Size	Motor dimensions Motor length	φ42mm			
		34mm		40mm	
Set part number	Single shaft	FSM551S	FPM551S	FSM552S	FPM552S
	Double shaft	FSM551D	FPM551D	FSM552D	FPM552D
Holding torque	N·m	0.13		0.18	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (^{*2})	0.03		0.053	
Mass	kg	0.23		0.28	
Allowable thrust load	N	10		10	
Allowable radial load ^{*1}	N	35		35	

^{*1}) When load is applied at 1/3 length from output shaft edge.

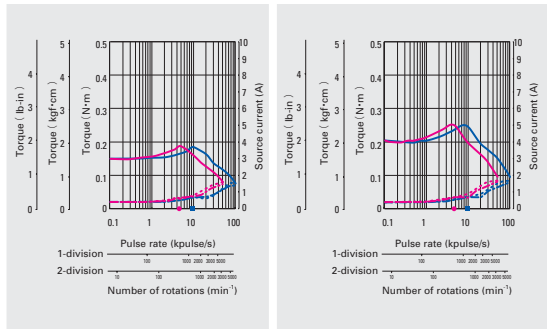
^{*2}) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



AC100V



AC200V



Operating current:
0.75A/phase

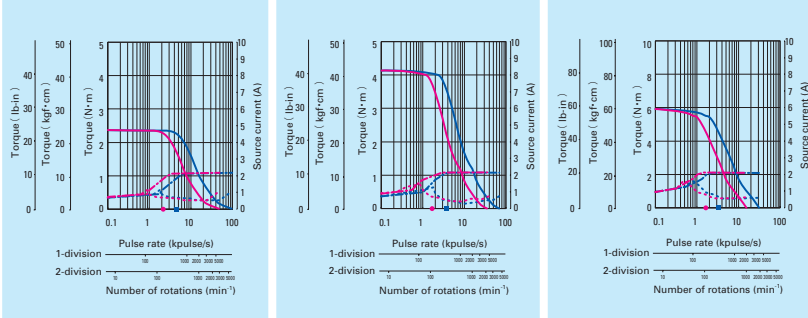
- Pull-out torque
- - - Source current (load applied)
- - - Source current (no load)
- 1-division fs F_s : Maximum self-start frequency when not loaded
- 2-division fs
- 1-division
- 2-division

Size	Motor dimensions Motor length	φ86mm					
		62.15mm		92.2mm		125.85mm	
Set part number	Single shaft	FSM851S	FPM851S	FSM852S	FPM852S	FSM853S	FPM853S
	Double shaft	FSM851D	FPM851D	FSM852D	FPM852D	FSM853D	FPM853D
Holding torque	N·m	2.06		4.02		6.17	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (^{*2})	1.45		2.9		4.4	
Mass	kg	1.5		2.5		3.5	
Allowable thrust load	N	60		60		60	
Allowable radial load ^{*1}	N	220		220		220	

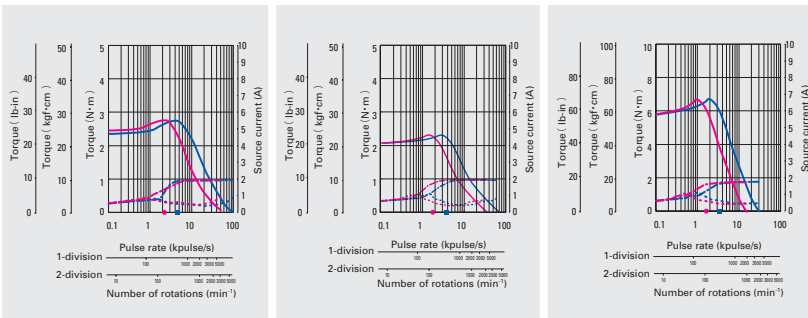
^{*1}) When load is applied at 1/3 length from output shaft edge.

^{*2}) $\times 10^{-4} \text{lb}\cdot\text{in}^2$

AC100V



AC200V



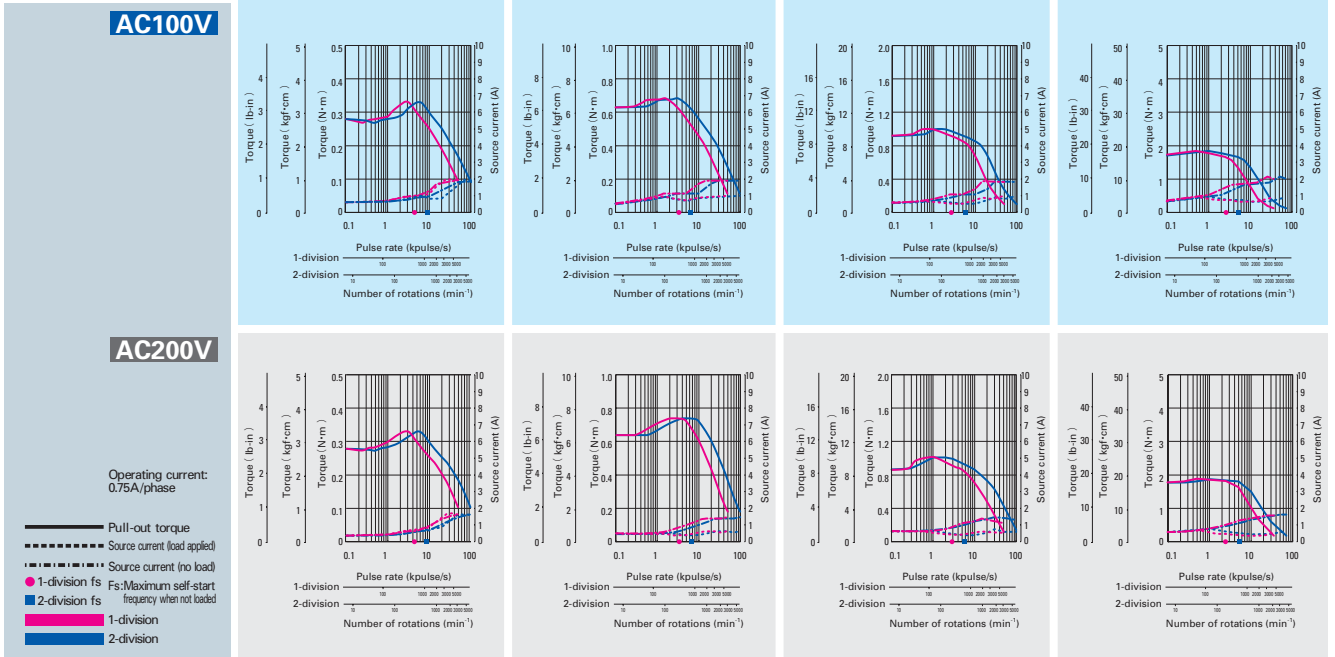
Operating current:
0.75A/phase

- Pull-out torque
- - - Source current (load applied)
- - - Source current (no load)
- 1-division fs F_s : Maximum self-start frequency when not loaded
- 2-division fs
- 1-division
- 2-division

Size	Motor dimensions	$\square 42\text{mm}$				$\square 60\text{mm}$			
	Motor length	49mm		46.5mm		55mm		87.5mm	
Set part number	Single shaft	FSM554S	FPM554S	FSM781S	FPM781S	FSM782S	FPM782S	FSM783S	FPM783S
	Double shaft	FSM554D	FPM554D	FSM781D	FPM781D	FSM782DD	FPM782DD	FSM783D	FPM783D
Holding torque	N·m	0.26		0.6		0.93		1.79	
Rotor inertia	$\times 10^{-4}\text{kgm}^2$ (#2)	0.65		0.275		0.4		0.84	
Mass	kg	0.37		0.6		0.78		1.36	
Allowable thrust load	N	10		20		20		20	
Allowable radial load ^{#1}	N	35		80		80		80	

*1) When load is applied at 1/3 length from output shaft edge.

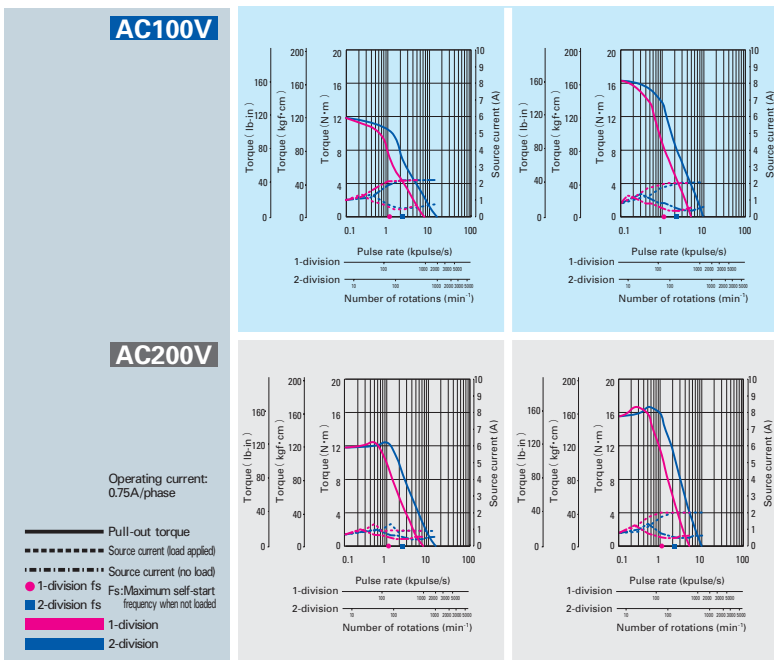
*2) $\times 10^{-4}\text{lb}\cdot\text{in}^2$



Size	Motor dimensions	$\phi 106\text{mm}$			
	Motor length	163.3mm		221.3mm	
Set part number	Single shaft	FSM892S	FPM892S	FSM893S	FPM893S
	Double shaft	FSM892D	FPM892D	FSM893D	FPM893D
Holding torque	N·m	10.8		16	
Rotor inertia	$\times 10^{-4}\text{kgm}^2$ (#2)	14.6		12	
Mass	kg	7.5		10.5	
Allowable thrust load	N	100		100	
Allowable radial load ^{#1}	N	360		360	

*1) When load is applied at 1/3 length from output shaft edge.

*2) $\times 10^{-4}\text{lb}\cdot\text{in}^2$



Characteristic

System Configuration

Type Code Convention

Specifications

Common Specifications

Dimensions

Driver

Specifications

Low-Backlash Gear Model

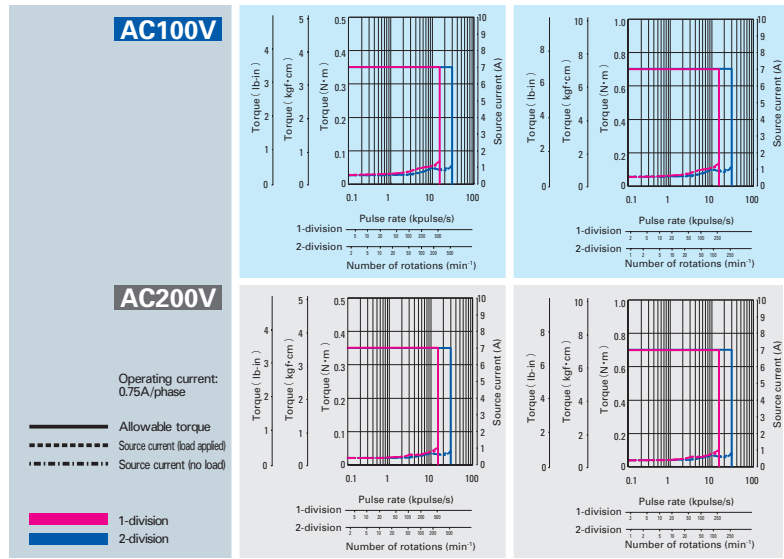
F-series driver + F-series motor with low-backlash gear

Motor dimensions



Size	Motor dimensions Motor+gear length	$\square 42\text{mm}$			
		64.5mm		64.5mm	
Set part number	Single shaft	FSF551S-CX3.6	FPF551S-CX3.6	FSF551S-CX7.2	FPF551S-CX7.2
	Double shaft	FSF551D-CX3.6	FPF551D-CX3.6	FSF551D-CX7.2	FPF551D-CX7.2
Allowable torque	N·m	0.35		0.7	
Rotor inertia	$\times 10^{-4}\text{kgm}^2(*2)$	0.03		0.03	
Basic step angle		0.2		0.1	
Gear ratio		1 : 3.6		1 : 7.2	
Backlash	DEG	0.6		0.4	
Allowable speed	min^{-1}	500		250	
Mass	kg	0.36		0.36	
Allowable thrust load	N	15		15	
Allowable radial load (*1)	N	20		20	

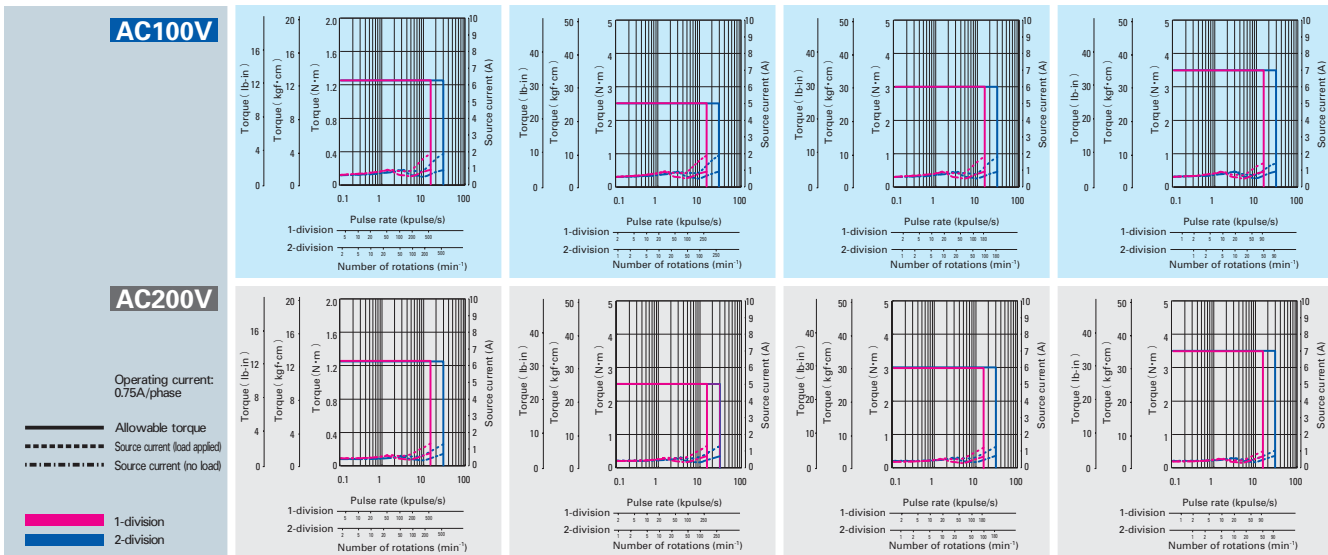
*1) Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.
 *2) $\times 10^{-4}\text{lb}\cdot\text{in}^2$



Size	Motor dimensions Motor+gear length	$\square 60\text{mm}$							
		92mm		92mm		92mm		92mm	
Set part number	Single shaft	FSF781S-CX3.6	FPF781S-CX3.6	FSF781S-CX7.2	FPF781S-CX7.2	FSF781S-CX10	FPF781S-CX10	FSF781S-CX20	FPF781S-CX20
	Double shaft	FSF781D-CX3.6	FPF781D-CX3.6	FSF781D-CX7.2	FPF781D-CX7.2	FSF781D-CX10	FPF781D-CX10	FSF781D-CX20	FPF781D-CX20
Allowable torque	N·m	1.25		2.5		3		3.5	
Rotor inertia	$\times 10^{-4}\text{kgm}^2(*2)$	0.275		0.275		0.275		0.275	
Basic step angle		0.2		0.1		0.072		0.036	
Gear ratio		1 : 3.6		1 : 7.2		1 : 10		1 : 20	
Backlash	DEG	0.55		0.25		0.25		0.17	
Allowable speed	min^{-1}	500		250		180		90	
Mass	kg	0.97		0.97		0.97		0.97	
Allowable thrust load	N	30		30		30		30	
Allowable radial load (*1)	N	100		100		100		100	

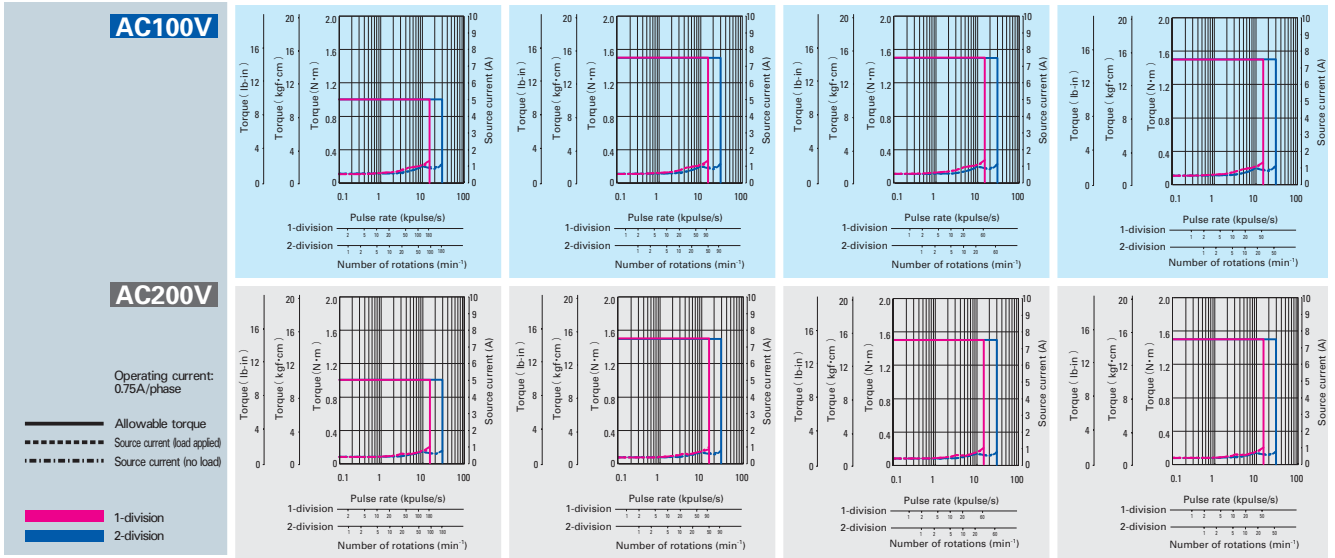
*1) Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.

*2) $\times 10^{-4}\text{lb}\cdot\text{in}^2$



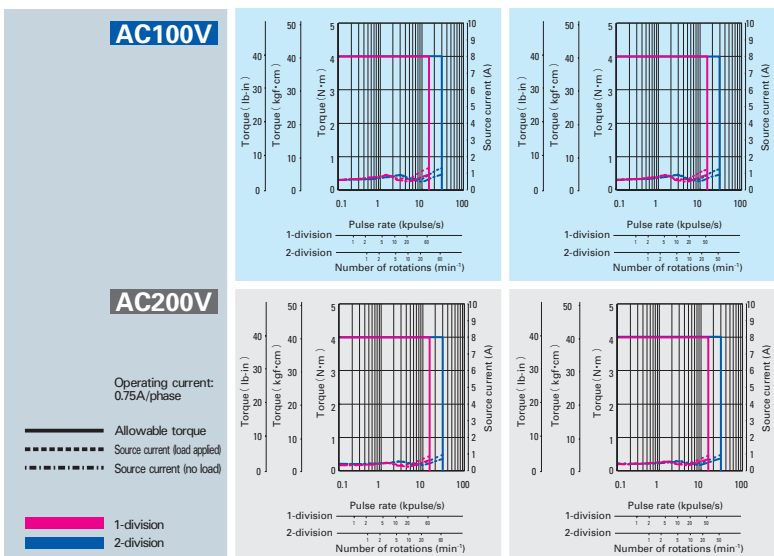
Size	Motor dimensions	□42mm							
	Motor+gear length	64.5mm		64.5mm		64.5mm		64.5mm	
Set part number	Single shaft	FSF551S-CX10	FPF551S-CX10	FSF551S-CX20	FPF551S-CX20	FSF551S-CX30	FPF551S-CX30	FSF551S-CX36	FPF551S-CX36
	Double shaft	FSF551D-CX10	FPF551D-CX10	FSF551D-CX20	FPF551D-CX20	FSF551D-CX30	FPF551D-CX30	FSF551D-CX36	FPF551D-CX36
Allowable torque	N·m	1		1.5		1.5		1.5	
Rotor inertia	$\times 10^{-4} \text{kgm}^2$ (*)2	0.03		0.03		0.03		0.03	
Basic step angle		0.072		0.036		0.024		0.02	
Gear ratio		1 : 10		1 : 20		1 : 30		1 : 36	
Backlash	DEG	0.35		0.25		0.25		0.25	
Allowable speed	min^{-1}	180		90		60		50	
Mass	kg	0.36		0.36		0.36		0.36	
Allowable thrust load	N	15		15		15		15	
Allowable radial load (*)1	N	20		20		20		20	

*) Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.
 *1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb-in}^2$



Size	Motor dimensions	□60mm			
	Motor+gear length	92mm		92mm	
Set part number	Single shaft	FSF781S-CX30	FPF781S-CX30	FSF781S-CX36	FPF781S-CX36
	Double shaft	FSF781D-CX30	FPF781D-CX30	FSF781D-CX36	FPF781D-CX36
Allowable torque	N·m	4		4	
Rotor inertia	$\times 10^{-4} \text{kgm}^2$ (*)2	0.275		0.275	
Basic step angle		0.024		0.02	
Gear ratio		1 : 30		1 : 36	
Backlash	DEG	0.17		0.17	
Allowable speed	min^{-1}	60		50	
Mass	kg	0.97		0.97	
Allowable thrust load	N	30		30	
Allowable radial load (*)1	N	100		100	

*) Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.
 *1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb-in}^2$



To 17 page

Specifications

Low-Backlash Gear Model

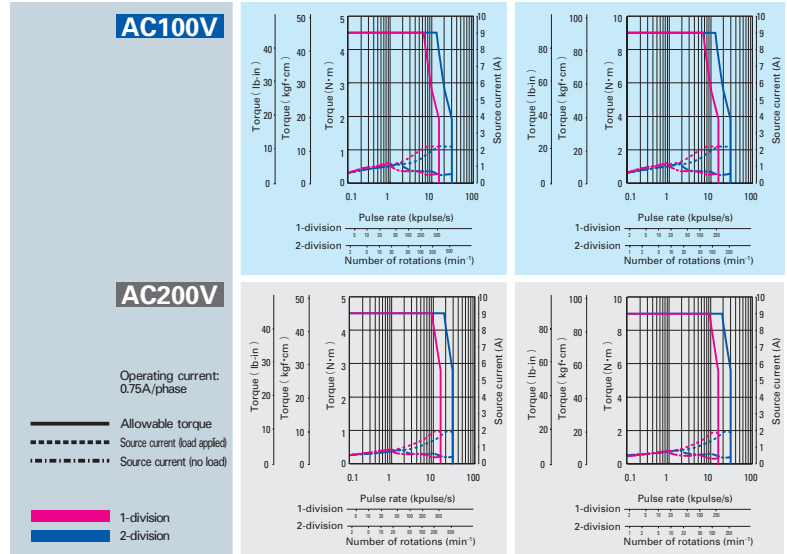
F-series driver +
F-series motor with low-backlash gear

Motor dimensions

∅86
(∅3.39)

Size	Motor dimensions Motor+gear length	∅86mm			
		127.3mm		127.3mm	
Set part number	Single shaft	FSF851S-CX3.6	FPF851S-CX3.6	FSF851S-CX7.2	FPF851S-CX7.2
	Double shaft	FSF851D-CX3.6	FPF851D-CX3.6	FSF851D-CX7.2	FPF851D-CX7.2
Allowable torque	N·m	4.5		9	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (^{*2})	1.45		1.45	
Basic step angle		0.2		0.1	
Gear ratio		1 : 3.6		1 : 7.2	
Backlash	DEG	0.4		0.25	
Allowable speed	min^{-1}	500		250	
Mass	kg	2.7		2.7	
Allowable thrust load	N	60		60	
Allowable radial load (^{*1})	N	300		300	

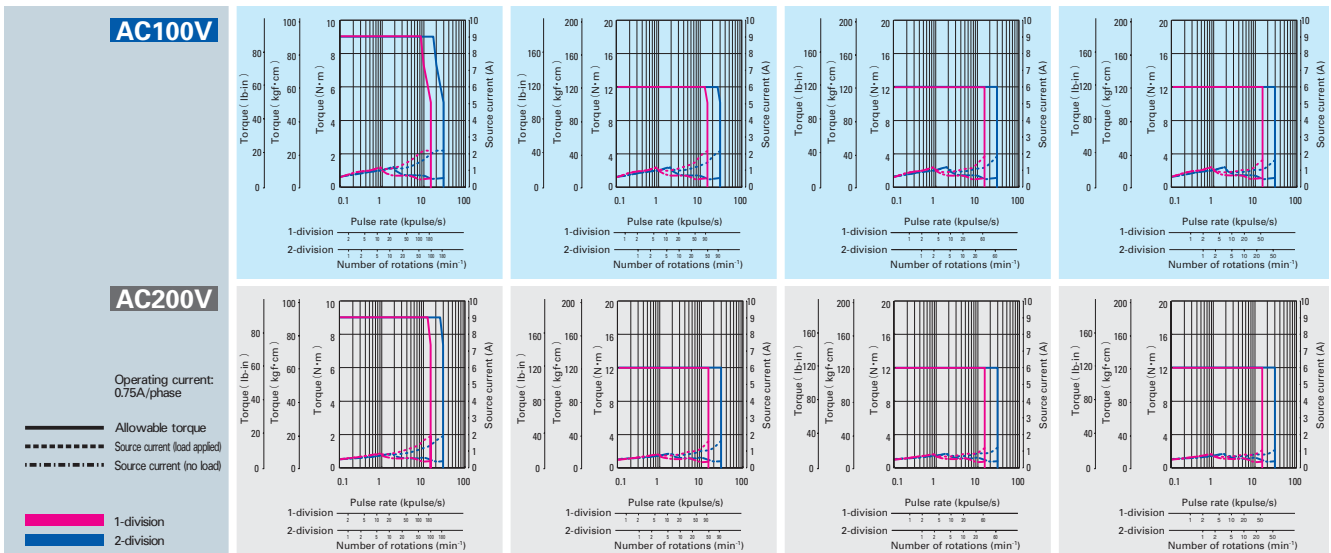
^{*1} Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.
^{*2} $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Size	Motor dimensions Motor+gear length	∅86mm							
		127.3mm		127.3mm		127.3mm		127.3mm	
Set part number	Single shaft	FSF851S-CX10	FPF851S-CX10	FSF851S-CX20	FPF851S-CX20	FSF851S-CX30	FPF851S-CX30	FSF851S-CX36	FPF851S-CX36
	Double shaft	FSF851D-CX10	FPF851D-CX10	FSF851D-CX20	FPF851D-CX20	FSF851D-CX30	FPF851D-CX30	FSF851D-CX36	FPF851D-CX36
Allowable torque	N·m	9		12		12		12	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (^{*2})	1.45		1.45		1.45		1.45	
Basic step angle		0.072		0.036		0.024		0.02	
Gear ratio		1 : 10		1 : 20		1 : 30		1 : 36	
Backlash	DEG	0.25		0.17		0.17		0.15	
Allowable speed	min^{-1}	180		90		60		50	
Mass	kg	2.7		2.7		2.7		2.7	
Allowable thrust load	N	60		60		60		60	
Allowable radial load (^{*1})	N	300		300		300		300	

^{*1} Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.

^{*2} $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Spur Gear Model

F-series driver +
F-series motor with spur gear

Motor dimensions

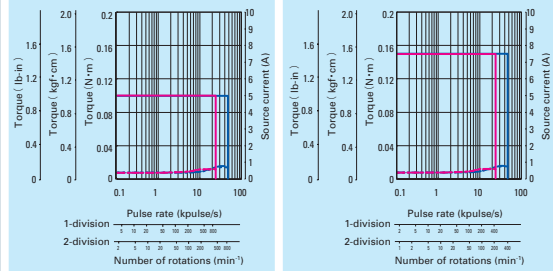
□28
(□1.10)



Size	Motor dimensions Motor+gear length	□28mm			
		60.3mm		60.3mm	
Set part number	Single shaft Double shaft	FSF351S-GX3.6 FSF351D-GX3.6	FPF351S-GX3.6 FPF351D-GX3.6	FSF351S-GX7.2 FSF351D-GX7.2	FPF351S-GX7.2 FPF351D-GX7.2
Allowable torque	N·m	0.1		0.15	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (*2)	0.009		0.009	
Basic step angle		0.2		0.1	
Gear ratio		1 : 3.6		1 : 7.2	
Backlash	DEG	2		2	
Allowable speed	min^{-1}	800		400	
Mass	kg	0.17		0.17	
Allowable thrust load	N	10		10	
Allowable radial load (*1)	N	15		15	

*1) Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.
*2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$

AC100V

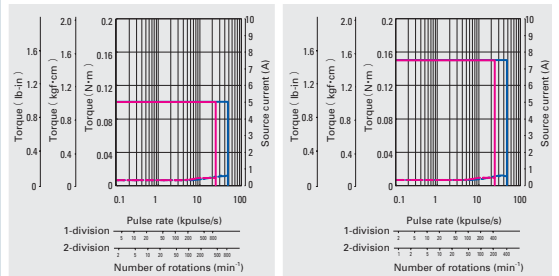


AC200V

Operating current:
0.75A/phase

— Allowable torque
- - - Source current (load applied)
· · · Source current (no load)

■ 1-division
■ 2-division

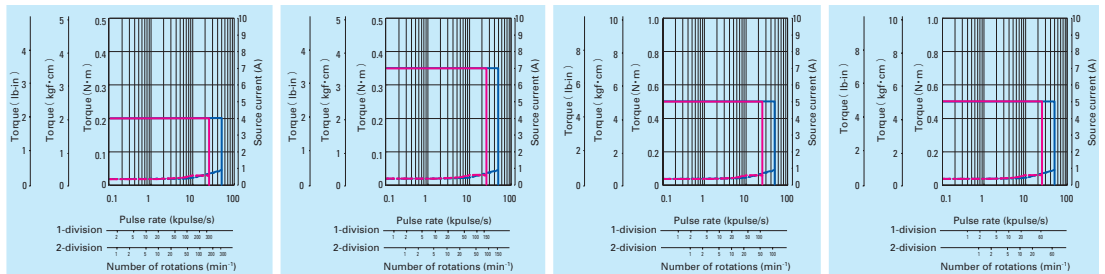


Size	Motor dimensions Motor+gear length	□28mm							
		60.3mm		60.3mm		60.3mm		60.3mm	
Set part number	Single shaft Double shaft	FSF351S-GX10 FSF351D-GX10	FPF351S-GX10 FPF351D-GX10	FSF351S-GX20 FSF351D-GX20	FPF351S-GX20 FPF351D-GX20	FSF351S-GX30 FSF351D-GX30	FPF351S-GX30 FPF351D-GX30	FSF351S-GX50 FSF351D-GX50	FPF351S-GX50 FPF351D-GX50
Allowable torque	N·m	0.2		0.35		0.5		0.5	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (*2)	0.009		0.009		0.009		0.009	
Basic step angle		0.072		0.036		0.024		0.0144	
Gear ratio		1 : 10		1 : 20		1 : 30		1 : 50	
Backlash	DEG	2		1.5		1.5		1.5	
Allowable speed	min^{-1}	300		150		100		60	
Mass	kg	0.17		0.17		0.17		0.17	
Allowable thrust load	N	10		10		10		10	
Allowable radial load (*1)	N	15		15		15		15	

*1) Directions of motor rotation and gear output shaft are the same for models with reduction ratio 1:3.6 and 1:7.2, opposite for reduction ratio 1:10, 1:20, 1:30, and 1:36.

*2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$

AC100V

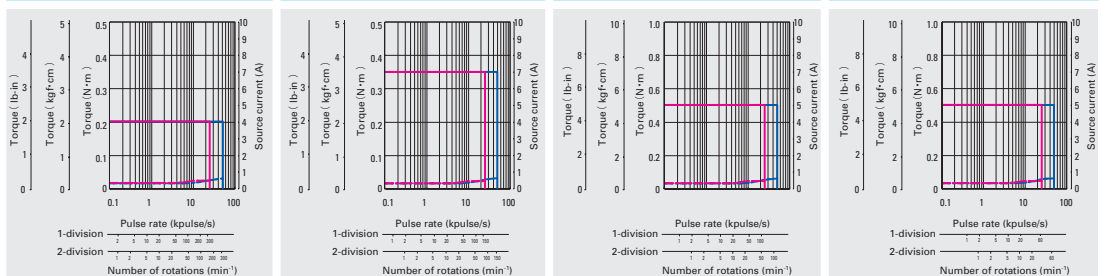


AC200V

Operating current:
0.75A/phase

— Allowable torque
- - - Source current (load applied)
· · · Source current (no load)

■ 1-division
■ 2-division



Characteristic
System Configuration
Type Code Convention
Specifications
Common Specifications
Dimensions
Driver

Specifications

Harmonic Gear Model

F-series driver +
F-series motor with harmonic gear

Motor dimensions

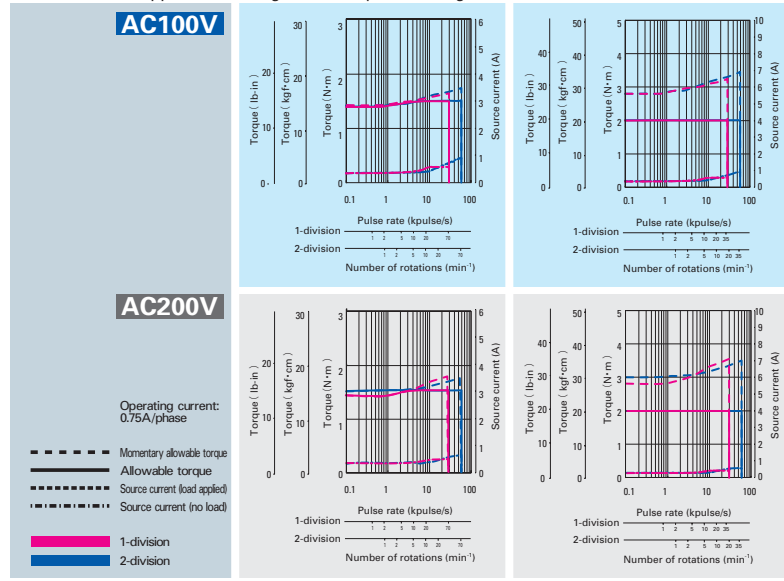


Size	Motor dimensions	□28mm			
	Motor+ gear length	69.5mm		69.5mm	
Set part number	Single shaft	FSF351S-HX50	FPF351S-HX50	FSF351S-HX100	FPF351S-HX100
	Double shaft	FSF351D-HX50	FPF351D-HX50	FSF351D-HX100	FPF351D-HX100
Allowable torque	N·m	1.5		2	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (F2)	0.012		0.012	
Basic step angle		0.0144		0.0072	
Gear ratio		1 : 50		1 : 100	
Lost motion	minute	0.4 to 3 ($\pm 0.06\text{N}\cdot\text{m}$)		0.4 to 3 ($\pm 0.08\text{N}\cdot\text{m}$)	
Allowable speed	min^{-1}	70		35	
Mass	kg	0.22		0.22	
Allowable thrust load	N	100		100	
Allowable radial load (F1)	N	160		160	

*) Directions of gear output shaft are the opposite.

*1) When load is applied at 1/3 length from output shaft edge.

*2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$

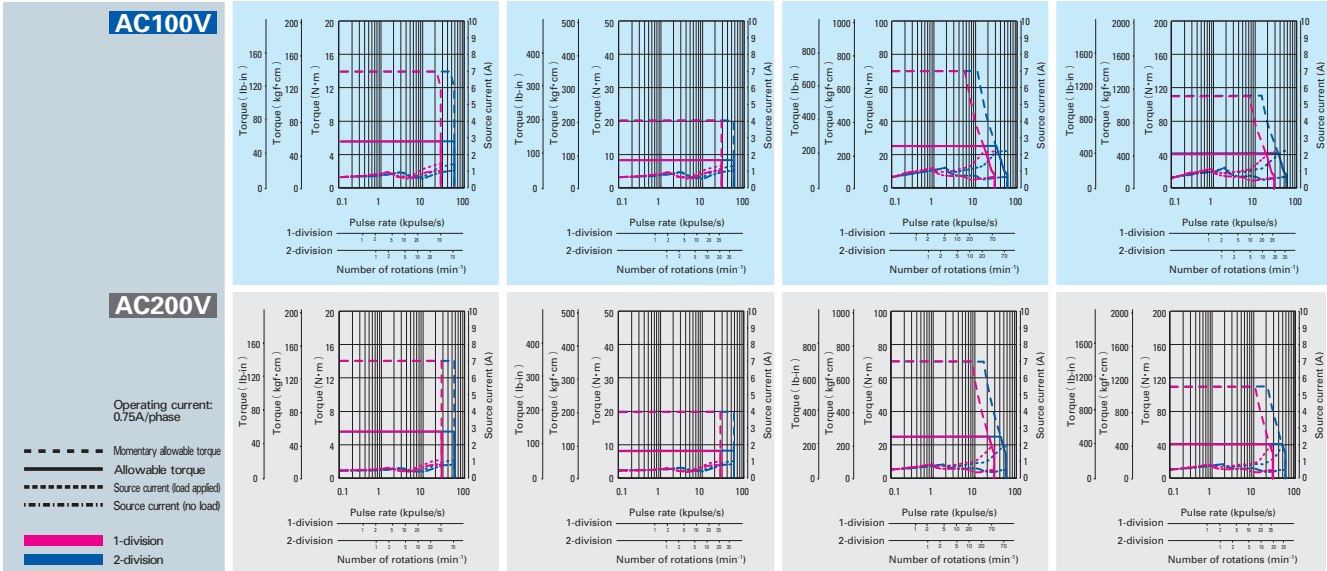


Size	Motor dimensions	□60mm				∅86mm			
	Motor+ gear length	113.5mm		113.5mm		144.15mm		144.15mm	
Set part number	Single shaft	FSF781S-HX50	FPF781S-HX50	FSF781S-HX100	FPF781S-HX100	FSF851S-HX50	FPF851S-HX50	FSF851S-HX100	FPF851S-HX100
	Double shaft	FSF781D-HX50	FPF781D-HX50	FSF781D-HX100	FPF781D-HX100	FSF851D-HX50	FPF851D-HX50	FSF851D-HX100	FPF851D-HX100
Allowable torque	N·m	5.5		8		25		41	
Rotor inertia	$\times 10^{-4} \text{kg}\cdot\text{m}^2$ (F2)	0.31		0.31		1.65		1.65	
Basic step angle		0.0144		0.0072		0.0144		0.0072	
Gear ratio		1 : 50		1 : 100		1 : 50		1 : 100	
Lost motion	minute	0.4 to 3 ($\pm 0.28\text{N}\cdot\text{m}$)		0.4 to 3 ($\pm 0.4\text{N}\cdot\text{m}$)		0.4 to 3 ($\pm 1\text{N}\cdot\text{m}$)		0.4 to 3 ($\pm 1.2\text{N}\cdot\text{m}$)	
Allowable speed	min^{-1}	70		35		70		35	
Mass	kg	1.2		1.2		3.3		3.3	
Allowable thrust load	N	400		400		1400		1400	
Allowable radial load (F1)	N	360		360		1380		1380	

*) Directions of gear output shaft are the opposite.

*1) When load is applied at 1/3 length from output shaft edge.

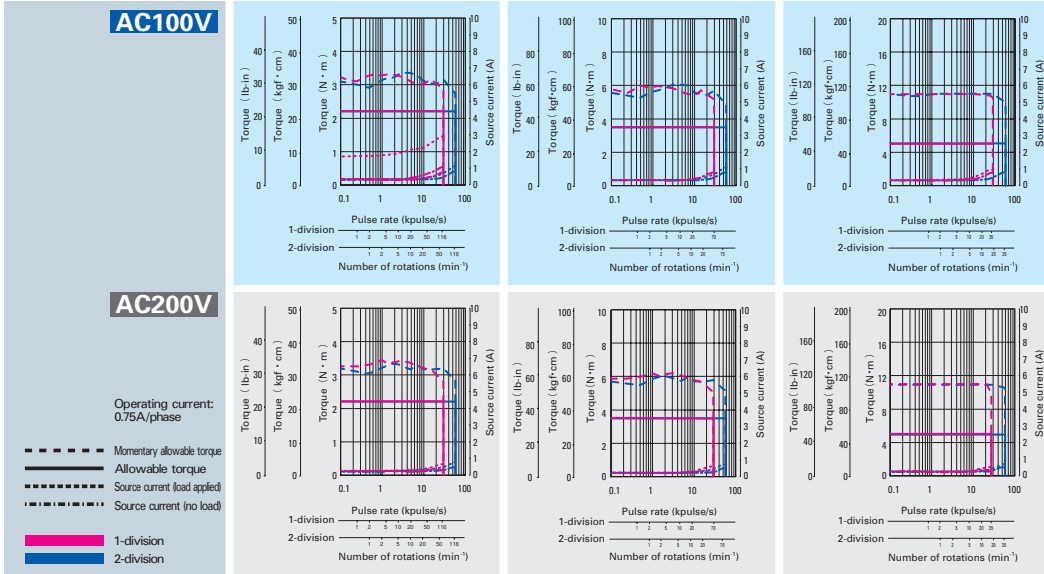
*2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Size	Motor dimensions	□42mm					
	Motor+gear length	73.5 mm		73.5 mm		73.5 mm	
Set part number	Single shaft	FSF551S-HX30	FPF551S-HX30	FSF551S-HX50	FPF551S-HX50	FSF551S-HX100	FPF551S-HX100
	Double shaft	FSF551D-HX30	FPF551D-HX30	FSF551D-HX50	FPF551D-HX50	FSF551D-HX100	FPF551D-HX100
Allowable torque	N·m	2.2		3.5		5	
Rotor inertia	$\times 10^{-4} \text{kg} \cdot \text{m}^2 (\text{I}^2)$	0.042		0.042		0.042	
Basic step angle		0.024		0.0144		0.0072	
Gear ratio		1:30		1:50		1:100	
Lost motion	minute	0.4 to 1.5 ($\pm 0.16 \text{N} \cdot \text{m}$) *reference		0.4 to 1.5 ($\pm 0.16 \text{N} \cdot \text{m}$) *reference		0.4 to 1.5 ($\pm 0.2 \text{N} \cdot \text{m}$) *reference	
Hysteresis loss	minute	3.6		2.4		2.4	
Allowable speed	min^{-1}	116		70		35	
Mass	kg	0.42		0.42		0.42	
Allowable thrust load	N	1150		1150		1150	
Allowable radial load (*1)	N	275		275		275	

*1) Directions of gear output shaft are the opposite.

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb} \cdot \text{in}^2$



Characteristic

System Configuration

Type Code Convention

Specifications

Common Specifications

Dimensions

Driver

Specifications

Electromagnetic brake Model

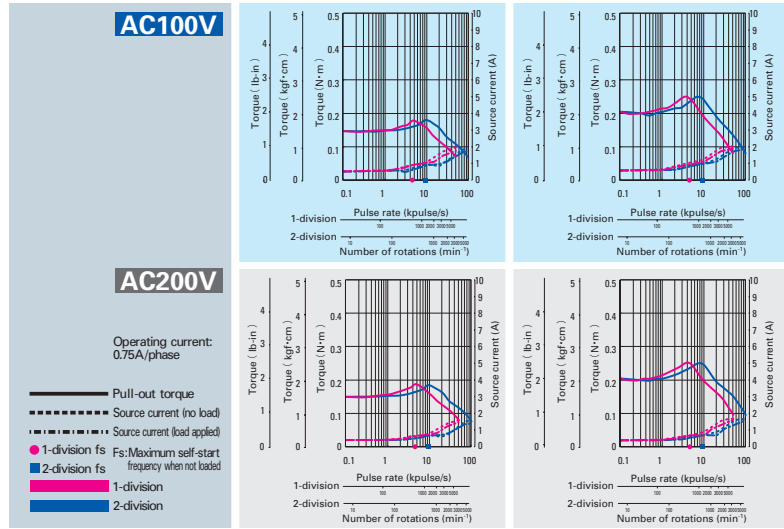
F-series driver +
F-series motor with electromagnetic brake

Motor dimensions



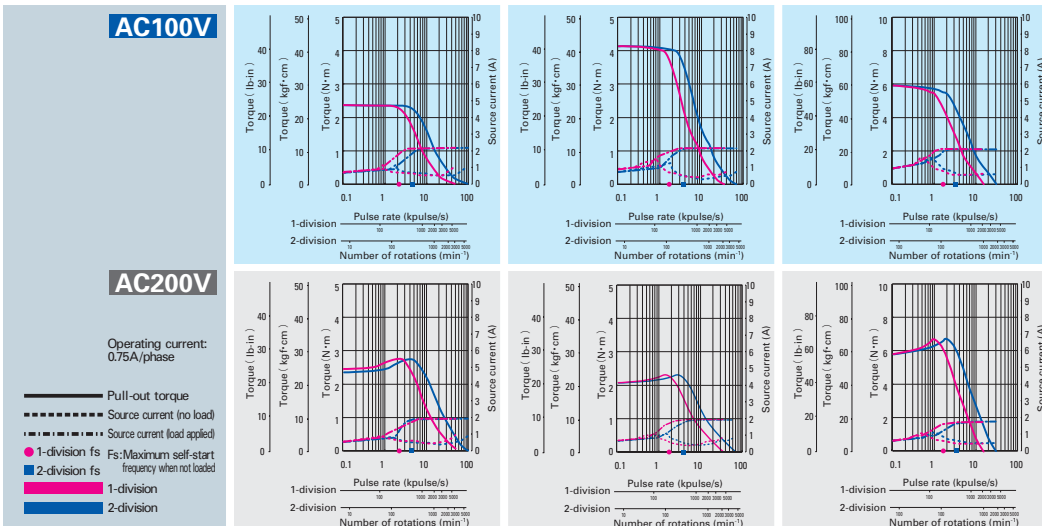
Size	Motor dimensions Motor+gear length	φ42mm			
		64.5mm		70.5mm	
Set part number	Single shaft	FSF551S-XB	FPF551S-XB	FSF552S-XB	FPF552S-XB
Holding torque	N·m	0.13		0.18	
Rotor inertia	$\times 10^{-4} \text{kgm}^2 (\text{I}^2)$	0.045		0.068	
Mass	kg	0.38		0.43	
Allowable thrust load	N	10		10	
Allowable radial load (*1)	N	35		35	
Brake type		No excitation actuating type		No excitation actuating type	
Electromagnetic brake	Power supply input	DC24V±5%		DC24V±5%	
	Excitation current	A		0.08	
Electromagnetic brake	Power consumption	W		2	
	Static friction torque	N·m		0.22	
Electromagnetic brake	Brake operating time	ms		30	
	Brake release time	ms		20	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



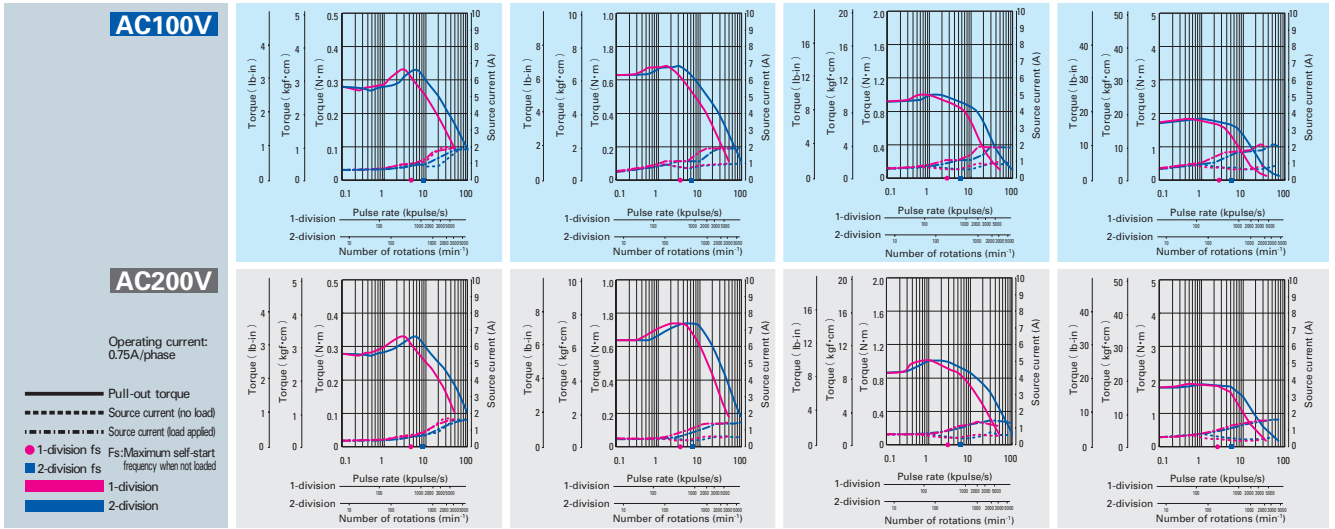
Size	Motor dimensions Motor+gear length	φ86mm					
		116.7mm		146.8mm		180.4mm	
Set part number	Single shaft	FSF851S-XB	FPF851S-XB	FSF852S-XB	FPF852S-XB	FSF853S-XB	FPF853S-XB
Holding torque	N·m	2.06		4.02		6.17	
Rotor inertia	$\times 10^{-4} \text{kgm}^2 (\text{I}^2)$	2.24		3.69		5.19	
Mass	kg	3.5		4.5		5.5	
Allowable thrust load	N	60		60		60	
Allowable radial load (*1)	N	220		220		220	
Brake type		No excitation actuating type		No excitation actuating type		No excitation actuating type	
Electromagnetic brake	Power supply input	DC24V±5%		DC24V±5%		DC24V±5%	
	Excitation current	A		0.42		0.42	
Electromagnetic brake	Power consumption	W		10		10	
	Static friction torque	N·m		4		4	
Electromagnetic brake	Brake operating time	ms		50		50	
	Brake release time	ms		20		20	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Size	Motor dimensions Motor+gear length	□42mm		□60mm					
		79.5mm		85.8mm		94.5mm		126.7mm	
Set part number	Single shaft	FSF554S-XB	FPF554S-XB	FSF781S-XB	FPF781S-XB	FSF782S-XB	FPF782S-XB	FSF783S-XB	FPF783S-XB
Holding torque	N·m	0.26		0.6	0.93			1.79	
Rotor inertia	$\times 10^{-4} \text{kgm}^2$ (*2)	0.08		0.43		0.56		1	
Mass	kg	0.52		0.94		1.12		1.7	
Allowable thrust load	N	10		20		20		20	
Allowable radial load (*1)	N	35		80		80		80	
Brake type		No excitation actuating type		No excitation actuating type		No excitation actuating type		No excitation actuating type	
Electromagnetic brake	Power supply input	DC24V±5%		DC24V±5%		DC24V±5%		DC24V±5%	
	Excitation current	0.08		0.25		0.25		0.25	
	Power consumption	2		6		6		6	
	Static friction torque	0.22		0.8		0.8		0.8	
	Brake operating time	30		30		30		30	
	Brake release time	20		20		20		20	

*1) When load is applied at 1/3 length from output shaft edge. *2) $\times 10^{-4} \text{lb}\cdot\text{in}^2$



Characteristic
System Configuration
Type Code Convention
Specifications
Common Specifications
Dimensions
Driver

Common Specifications

■ F-series driver

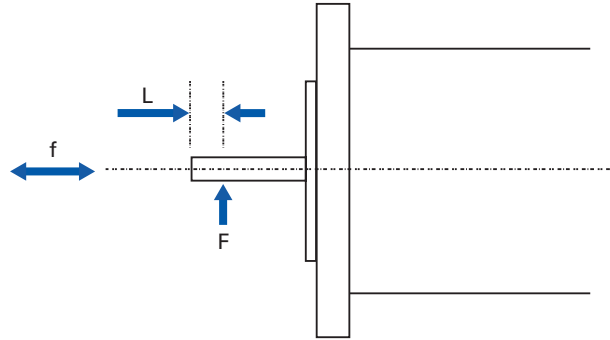
Type code		FS1W075P	FP1W075P
Power supply		Single phase AC100V to 230V +10, -15% 50/60/Hz	
Source current		4A	
Basic specifications	Environment	Protection class	Class I
		Operation environment	Installation category (over-voltage category): II, pollution degree: 2
		Applied standards	EN50178, UL508C
		Ambient operation temperature	0 to 50°C
		Storage temperature	- 20 to + 70°C
		Ambient operation humidity	35 to 85%RH (no condensation)
		Storage humidity	10 to 90%RH (no condensation)
		Operation altitude	1000 m (3280 feet) or less above sea level
		Vibration resistance	Tested under the following conditions; 4.9m/s ² , frequency range 10 to 55Hz, direction along X, Y and Z axes, for 2 hours each
		Impact resistance	Not influenced at NDS-C-0110 standard section 3.2.2 division "C".
		Withstand voltage	Not influenced when 1500V AC is applied between power input terminal and cabinet for one minute.
		Insulation resistance	10M ohm MIN. when measured with 500V DC megohmmeter between input terminal and cabinet.
Mass		0.8kg(1.77 lbs)	
Functions	Protection functions	Driver overheating, main circuit power supply error, and over-current	
	LED indication	Power monitor, phase origin monitor, pulse monitor, alarm	
3ZC	Input signal	Photo-coupler input system; input resistance: 220 Ω ; input-signal "H" level: 4.0-5.5V; input-signal "L" level: 0-0.5V	
	Output signal	Photo-coupler input system; input resistance: 220 Ω ; input-signal "H" level: 4.0-5.5V; input-signal "L" level: 0-0.5V	

■ F-series motor/M-series motor

Stepping motor type	F-series motor	M-series motor
Motor Type	103F35 ○○ /103F55 ○○ /103F785 ○ /103F858 ○ /103F8958 ○	103M55 ○○ /103M785 ○ /103M858 ○ /103M8958 ○
Type	—————	S1 (continuous operation)
Insulation class	Class B (+130°C)	Class B (+130°C) [UL class A (+105°C)]
Operation altitude	1000 m (3280 feet) or less above sea level	
Withstand voltage	□28 : AC1000V 50/60Hz for 1 minute □42 and □60, φ 86 and φ 106 : AC1500V 50/60Hz for 1 minute	
Insulation resistance	100Mohm MIN. against DC500V	
Protection grade	IP40	
Vibration resistance	Amplitude of 1.52mm (0.06inch)(P-P) at frequency range 10 to 500Hz for 15 minutes sweep time along X, Y, and Z axes for 12 times.	
Impact resistance	490m/s ² of acceleration for 11 ms with half-sine wave applying three times for X, Y, and Z axes each, 18 times in total.	
Ambient operation temperature	-10 to +50°C (0 to +40°C for harmonic gear model)	
Ambient operation humidity	90% MAX. at less than 40°C , 57% MAX. at less than 50°C , 35% MAX. at 60°C (no condensation)	

※ The ○ symbol in the motor model number indicates the length of the motor.

■ Allowable radial/thrust load



System type	Motor dimensions mm(inch)	Set type code	L	F	f
			Distance from end of shaft :mm(inch)	Radial load (N)	Thrust load (N)
Standard model	□ 28mm	FSF35 ○△	5	34	3
	□ 42mm	FSF55 ○△	6.7	35	10
	□ 60mm	FSF78 ○△	8	80	20
	φ 86mm	FSF85 ○△	12.3	220	60
	φ 106mm	FSF89 ○△	11.7	360	100
CE/UL model	□ 42mm	FSM55 ○△	5	35	10
	□ 60mm	FSM78 ○△	6.7	80	20
	φ 86mm	FSM85 ○△	8	220	60
	φ 106mm	FSM89 ○△	12.3	360	100
Low-backlash gear model	□ 42mm	FSF551 △ -CX3.6	6.7	20	15
		FSF551 △ -CX7.2			
		FSF551 △ -CX10			
		FSF551 △ -CX20			
		FSF551 △ -CX30			
	□ 60mm	FSF781 △ -CX3.6	10.7	100	30
		FSF781 △ -CX7.2			
		FSF781 △ -CX10			
		FSF781 △ -CX20			
		FSF781 △ -CX30			
	φ 86mm	FSF781 △ -CX36			
		FSF851 △ -CX3.6	10.7	300	60
		FSF851 △ -CX7.2			
		FSF851 △ -CX10			
		FSF851 △ -CX20			
FSF851 △ -CX30					
Spur gear model	□ 28mm	FSF351 △ -GX3.6	6.7	15	10
		FSF351 △ -GX7.2			
		FSF351 △ -GX10			
		FSF351 △ -GX20			
		FSF351 △ -GX30			
FSF351 △ -GX50					
	□ 28mm	FSF351 △ -HX50	7.7	160	100
		FSF351 △ -HX100			
	□ 42mm	FSF551 △ -HX30	8.3	275	1150
		FSF551 △ -HX50			
□ 60mm	FSF551 △ -HX100	9.3	360	400	
	FSF781 △ -HX50				
φ 86mm	FSF781 △ -HX100	13.3	1380	1400	
	FSF851 △ -HX50				
FSF851 △ -HX100					
	□ 42mm	FSF551 △ -XB	6.7	35	10
FSF552 △ -XB					
FSF554 △ -XB					
□ 60mm	FSF781 △ -XB	8	80	20	
	FSF782 △ -XB				
	FSF783 △ -XB				
φ 86mm	FSF851 △ -XB	12.3	220	60	
	FSF852 △ -XB				
	FSF853 △ -XB				

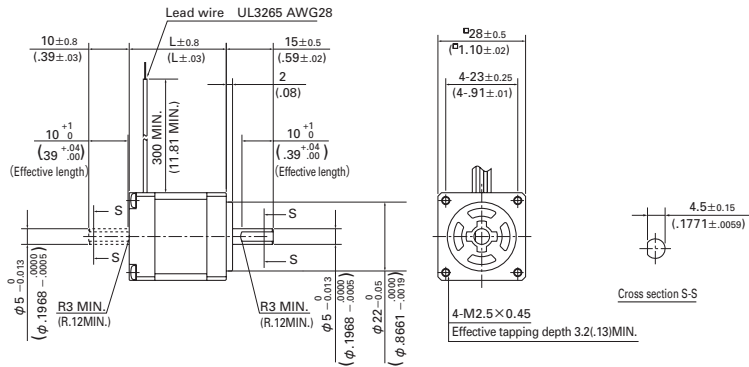
※ "○" and "△" indicate motor length and motor shaft specification.

Characteristic
System Configuration
Type Code Convention
Specifications
Common Specifications
Dimensions
Driver

Dimensions: mm (inch)

Standard model / CE/UL model

□28mm (□ 1.10inch)



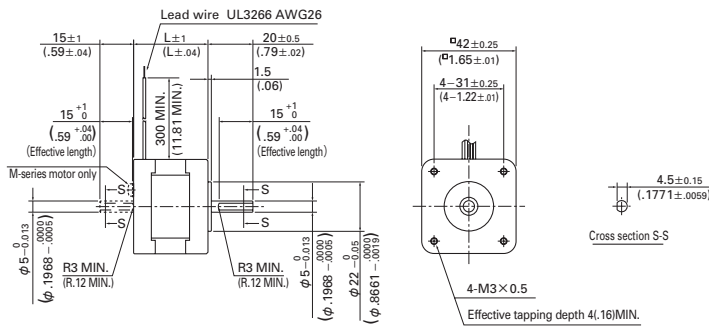
Model type	Motor type code	Motor length:L mm(inch)	Set type code
Standard model	103F3505-70 △ 1	31(1.22)	FSF351 △
Standard model	103F3515-70 △ 1	50.5(1.99)	FSF356 △

**" △" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

□42mm (□ 1.65inch)



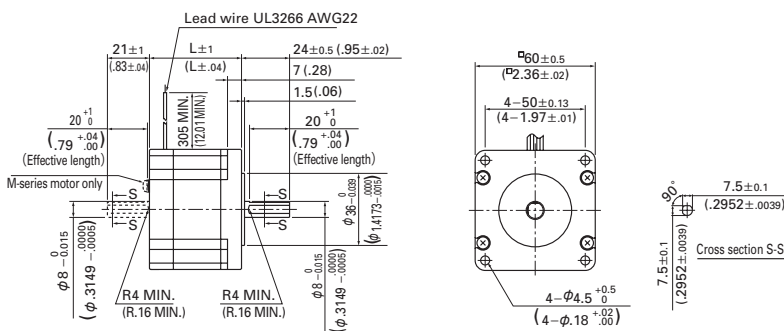
Model type	Motor type code	Motor length:L mm(inch)	Set type code
Standard model	103F5505-70 △ 1	34(1.34)	FSF551 △
CE/UL model	103M5505-70 △ 1	34(1.34)	FSM551 △
Standard model	103F5508-70 △ 1	40(1.57)	FSF352 △
CE/UL model	103M5508-70 △ 1	40(1.57)	FSM352 △
Standard model	103F5510-70 △ 1	49(1.93)	FSF354 △
CE/UL model	103M5510-70 △ 1	49(1.93)	FSM354 △

**" △" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

□60mm (□ 2.36inch)



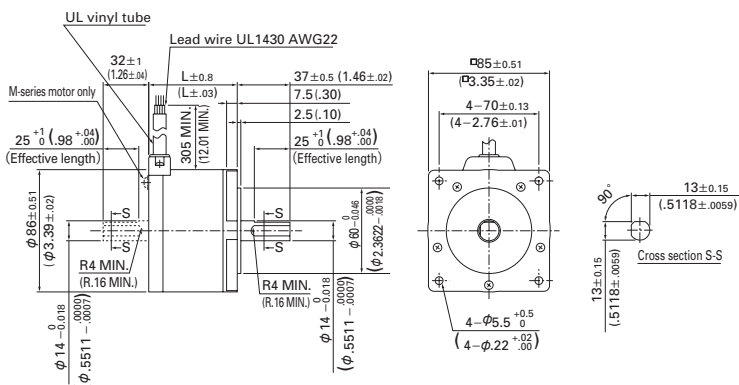
Model type	Motor type code	Motor length:L mm(inch)	Set type code
Standard model	103F7851-70 △ 1	46.5(1.83)	FSF781 △
CE/UL model	103M7851-70 △ 1	46.5(1.83)	FSM781 △
Standard model	103F7852-70 △ 1	55(2.17)	FSF782 △
CE/UL model	103M7852-70 △ 1	55(2.17)	FSM782 △
Standard model	103F7853-70 △ 1	87.5(3.44)	FSF783 △
CE/UL model	103M7853-70 △ 1	87.5(3.44)	FSM783 △

**" △" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

φ86mm (φ 3.39inch)



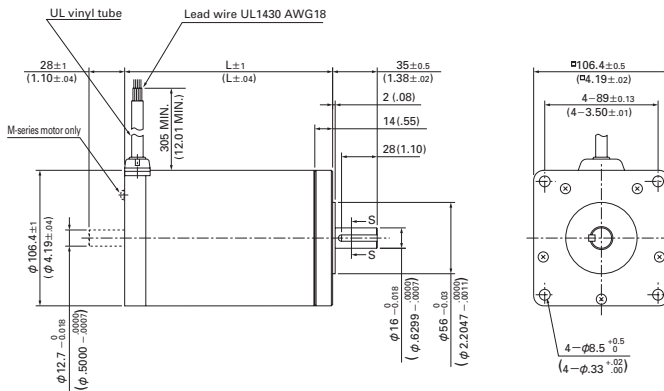
Model type	Motor type code	Motor length:L mm(inch)	Set type code
Standard model	103F8581-70 △ 1	62.15(2.45)	FSF851 △
CE/UL model	103M8581-70 △ 1	62.15(2.45)	FSM851 △
Standard model	103F8582-70 △ 1	92.2(3.63)	FSF852 △
CE/UL model	103M8582-70 △ 1	92.2(3.63)	FSM852 △
Standard model	103F8583-70 △ 1	125.85(4.95)	FSF853 △
CE/UL model	103M8583-70 △ 1	125.85(4.95)	FSM853 △

**" △" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

φ106mm (φ4.17inch)



Model type	Motor type code	Motor length:L mm(inch)	Set type code
Standard model	103F89582-70 △ 1	163.3(6.43)	FSF892 △
CE/UL model	103M89582-70 △ 1	163.3(6.43)	FSM892 △
Standard model	103F89583-70 △ 1	221.3(8.71)	FSF893 △
CE/UL model	103M89583-70 △ 1	221.3(8.71)	FSM893 △

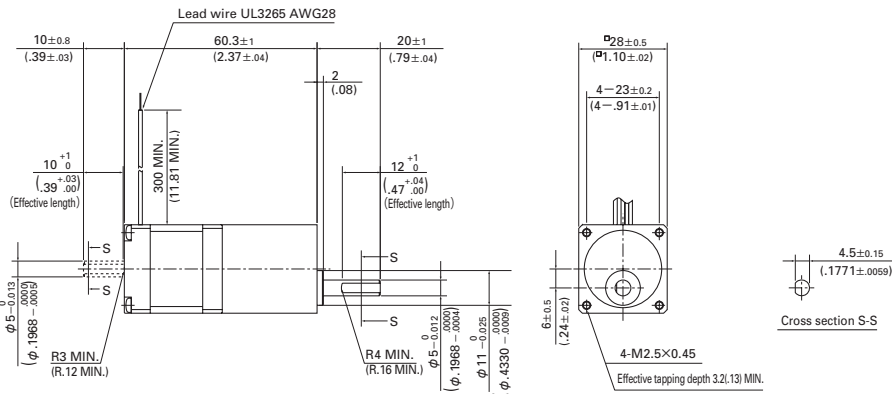
※ "△" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

Spur gear model

□28mm (□1.10inch)



Motor type code	Set type code
103F3505-70GXA △	FSF351 △-GX3.6
103F3505-70GXB △	FSF351 △-GX7.2
103F3505-70GXE △	FSF351 △-GX10
103F3505-70GXG △	FSF351 △-GX20
103F3505-70GXJ △	FSF351 △-GX30
103F3505-70GXL △	FSF351 △-GX50

※ "△" indicates motor shaft specification.

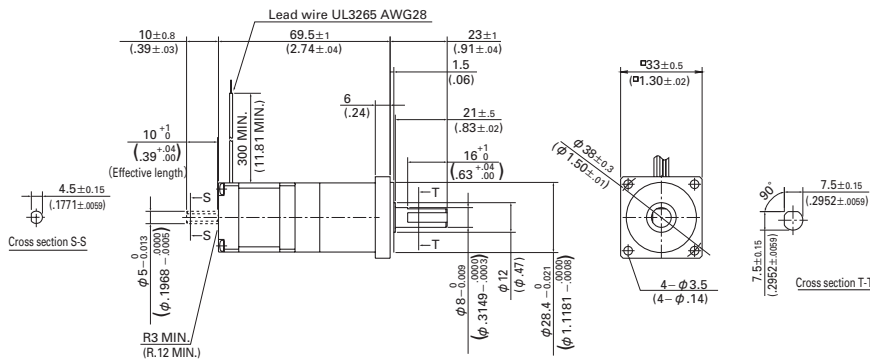
△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

Characteristic
System Configuration
Type Code Convention
Specifications
Common Specifications
Dimensions
Driver

Harmonic gear model

□28mm (□1.10inch)



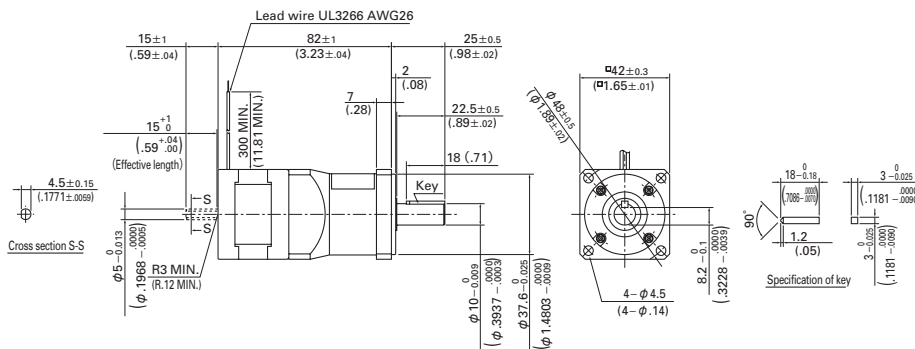
Motor type code	Set type code
103F3505-70HXL △	FSF351 △ -HX50
103F3505-70HXM △	FSF351 △ -HX100

※ "△" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

□42mm (□1.65inch)



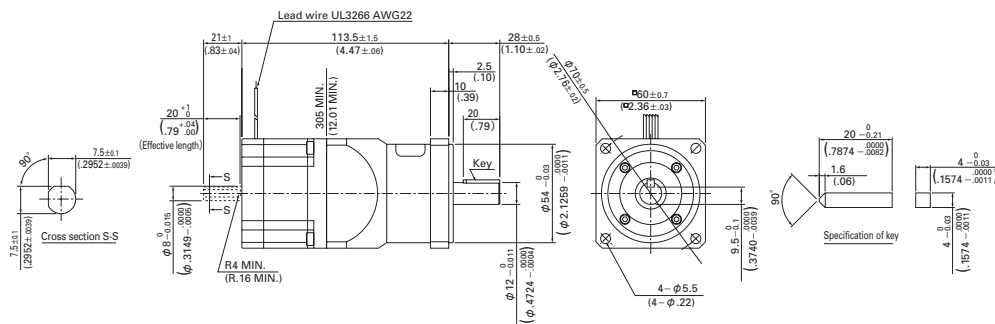
Motor type code	Set type code
103F5505-70HXJ △	FSF551 △ -HX30
103F5505-70HXL △	FSF551 △ -HX50
103F5505-70HXM △	FSF551 △ -HX100

※ "△" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	5	S
Double shaft	2	D

□60mm (□2.36inch)



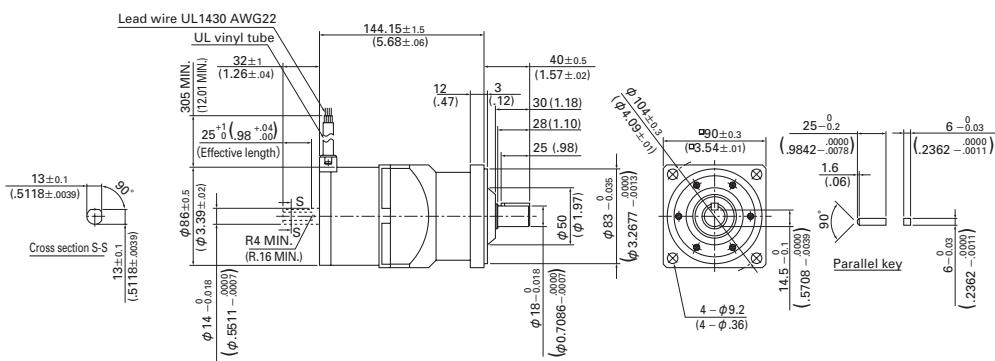
Motor type code	Set type code
103F7851-70HXL △	FSF781 △ -HX50
103F7851-70HXM △	FSF781 △ -HX100

※ "△" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

φ86mm (φ3.39inch)



Motor type code	Set type code
103F8581-70HXL △	FSF851 △ -HX50
103F8581-70HXL △	FSF851 △ -HX100

※ "△" indicates motor shaft specification.

△ : Motor shaft specification code

Motor shaft spec	Motor type code	Set type code
Single shaft	4	S
Double shaft	1	D

Characteristic

System Configuration

Type Code Convention

Specifications

Common Specifications

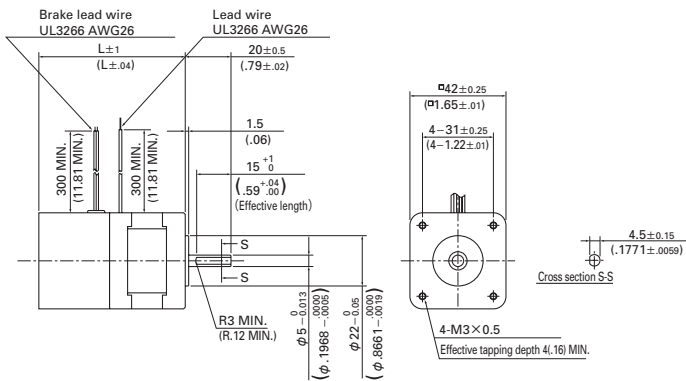
Dimensions

Driver

Dimensions: mm (inch)

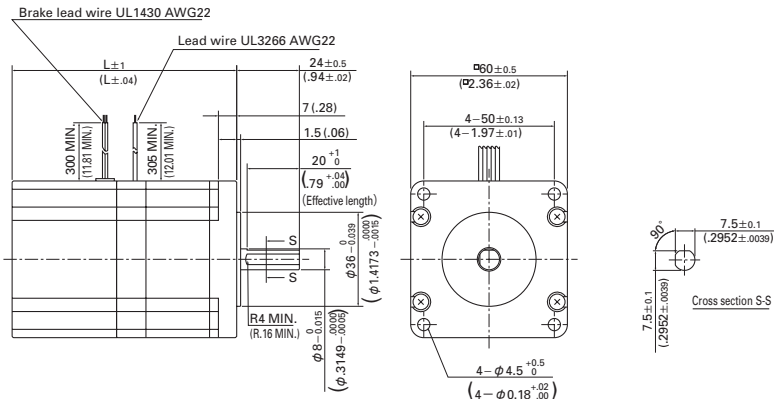
Electromagnetic brake model

□ 42mm (□ 1.65inch)



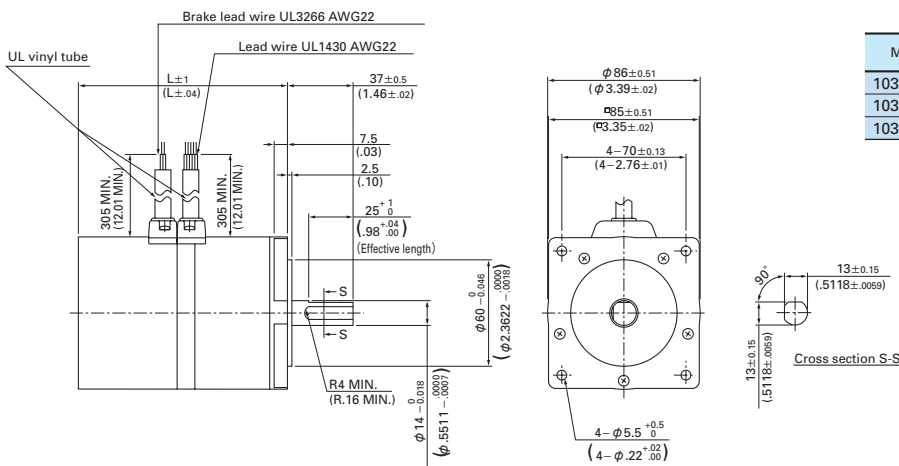
Motor type code	Motor + brake length :L mm(inch)	Set type code
103F5505-70XB41	64.5(2.54)	FSF551S-XB
103F5508-70XB41	70.5(2.78)	FSF552S-XB
103F5510-70XB41	79.5(3.13)	FSF554S-XB

□ 60mm (□ 2.36inch)



Motor type code	Motor + brake length :L mm(inch)	Set type code
103F7851-70XB41	85.8(3.38)	FSF781S-XB
103F7852-70XB41	94.5(3.72)	FSF782S-XB
103F7853-70XB41	126.7(4.99)	FSF783S-XB

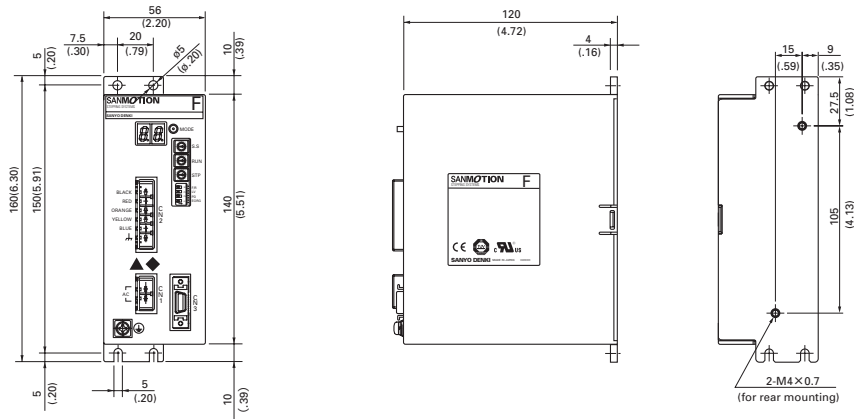
φ86mm (φ3.39inch)



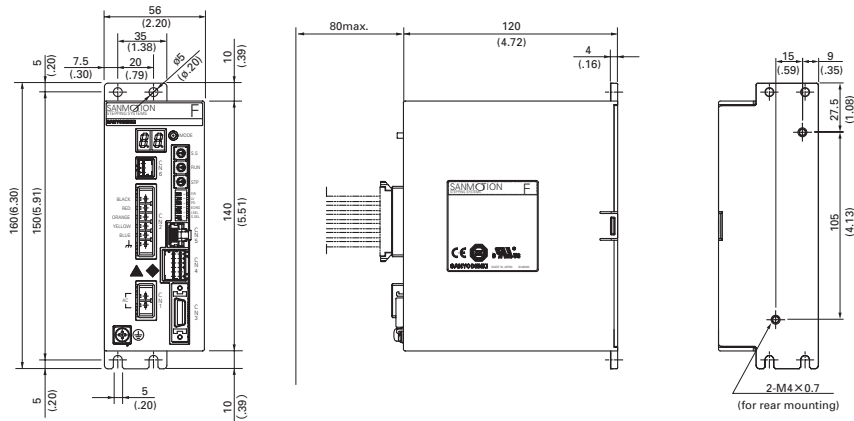
Motor type code	Motor + brake length :L mm(inch)	Set type code
103F8581-70XB41	116.7(4.59)	FSF851S-XB
103F8582-70XB41	146.8(5.78)	FSF852S-XB
103F8583-70XB41	180.4(7.10)	FSF853S-XB

F-series driver (CE/TÜV/UL)

FStype



FPtype



Characteristic

System Configuration

Type Code Convention

Specifications

Common Specifications

Dimensions

Driver

■ Safety standards

F-series driver

UL	Acquired standards		File No.	Standard part
		UL	UL for Canada	E179775
CE (TÜV)	Directives	Category	Name	Standard part
	Low-voltage directives	—	—	EN50178
		EMC directives	Emission	Terminal disturbance voltage
	Electromagnetic radiation disturbance			EN5011-A
	Immunity		ESD(Electrostatic discharge)	EN61000-4-2
			RS(Radio-frequency amplitude modulated electromagnetic field)	EN61000-4-3
			Fast transients	EN61000-4-4
			Surges	EN61000-4-6
CS(Radio-frequency common mode)	EN61000-4-5			
Voltage dips, Voltage interruptions	EN61000-4-11			

M-series motor

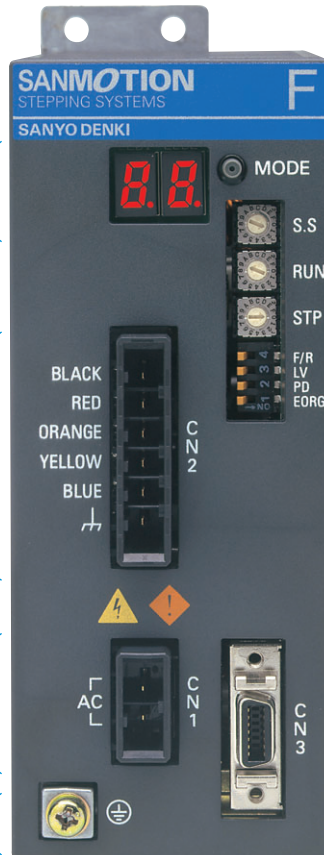
UL	Acquired standards		File No.
		UL	UL for Canada
CE	Standard category		Standard part
	Low-voltage directives		EN-60034-1
			IEC34-5 (EN-60034-5)

- EMC characteristics may vary depending on the configuration of the users' control panel, which contains the driver or stepping motor, or the arrangement and wiring of other electrical devices.
- Validation test of F-series driver has been performed for low-voltage EMC directives at TÜV (TÜV product service) for self-declaration of CE marking.

Driver part name

2-digit LED indication

	Indication	Description
Status	88	Internal power is established.
	88	Excitation phase is origin status at power on.
	88	Command pulse is under status at input.
Alarm	01	Over-current.
	02	Overheat.
	03	Low voltage power.
	04	Over-voltage power.
	05-08	Hardware fault



Display switch

Alarm history of 10 previous alarms can be displayed on 2-digit LED.

- ① Step angle selection switch
- ② Current selection switch
- ③ 0-speed current adjustment switch
- ④ Function selection DIP switch

Motor interface connector

Power connector

Earth

⑤ Input/output signal interface connector

① Step angle selection switch

Basic step angle divisor (up to 250 divisions).

Indication	0	1	2	3	4	5	6	7
Number of divisions	1	2	2.5	4	5	8	10	20
Indication	8	9	A	B	C	D	E	F
Number of divisions	25	40	50	80	100	125	200	250

Initial configuration of factory shipment is set to 1 (Half steps).

② Operation current selection switch

Motor current during operation can be selected from 100 to 25%.

Indication	0	1	2	3	4	5	6	7
Motor current (%)	100 (Rated value)	95	90	85	80	75	70	65
Indication	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial configuration of factory shipment is set to 0 (rated value).

③ Current adjustment at operation halt switch

Motor current at 0-speed can be selected from 100 to 25%.

Indication	0	1	2	3	4	5	6	7
Motor current (%)	100 (Rated value)	95	90	85	80	75	70	65
Indication	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial configuration of factory shipment is set to A (50% of rated value).
Driver and motor should be operated at around 50% of rated value to reduce heat.

4 Function selection DIP switch

Selects an appropriate function for specification.

	OFF	ON	
F/R	<input type="checkbox"/>	<input type="checkbox"/>	OFF Input method select
LV	<input type="checkbox"/>	<input type="checkbox"/>	OFF Low-vibration mode select
PD	<input type="checkbox"/>	<input type="checkbox"/>	OFF Power down select
EORG	<input type="checkbox"/>	<input type="checkbox"/>	OFF Excitation select

Input method select (F/R)

Selects input pulse type.

F/R	Input pulse type
ON	1 input (Pulse&direction)
OFF	2 input (CW, CCW)

Power down select (PD)

Selects current for power down signal input.

PD	Motor current
ON	Current by rotary switch STP (power low)
OFF	0A (power off)

Low-vibration mode select (LV)

Provides low-vibration, smooth operation even if resolution is rough (1-division, 2-division, etc)

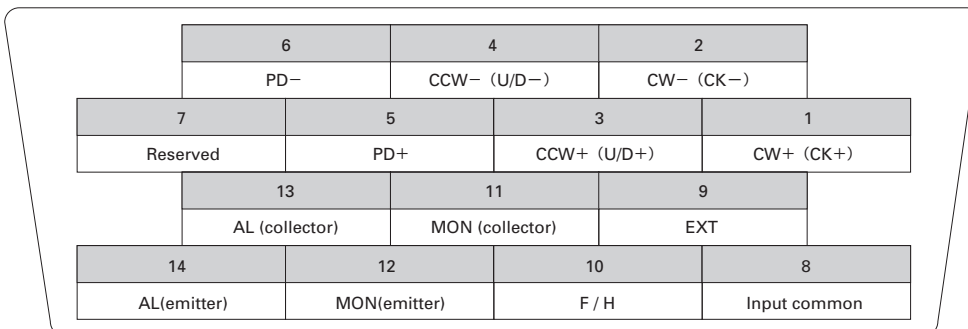
LV	Operation
ON	Auto-micro function
OFF	Micro-step

Excitation select (EORG)

EORG	Original excitation phase
ON	Excitation phase at power shut off
OFF	Phase origin

5 Input/output signal interface connector

Input signal connector is used for interface with upper level controller, etc.
Driver side connector is 10214-52A2JL.(Sumitomo 3M)



Terminal arrangement of CN3 connector

Driver part name (Positioning-function-included type)

2-digit LED indication

	Indication	Description
Status	88	Internal power is established.
	88	Excitation phase is origin status at power on.
	88	Command pulse is under status at input.
Alarm	01	Over-current.
	02	Overheat.
	03	Low voltage power.
	04	Over-voltage power.
	05-08	Hardware fault



Display switch

Alarm history of 10 previous alarms can be displayed on 2-digit LED.

- 1 Step angle selection switch
- 2 Current selection switch
- 3 0-speed current adjustment switch
- 4 Function selection DIP switch

Brake connector

Motor interface connector

Power connector

Earth

Serial (RS-485)

Encoder

- 5 Input/output signal interface connector

1 Step angle selection switch

Basic step angle divisor (up to 250 divisions).

Indication	0	1	2	3	4	5	6	7
Number of divisions	1	2	2.5	4	5	8	10	20
Indication	8	9	A	B	C	D	E	F
Number of divisions	25	40	50	80	100	125	200	250

Initial configuration of factory shipment is set to 1 (Half steps).

2 Operation current selection switch

Motor current during operation can be selected from 100 to 25%.

Indication	0	1	2	3	4	5	6	7
Motor current (%)	100 (Rated value)	95	90	85	80	75	70	65
Indication	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial configuration of factory shipment is set to 0 (rated value).

3 Current adjustment at operation halt switch

Motor current at 0-speed can be selected from 100 to 25%.

Indication	0	1	2	3	4	5	6	7
Motor current (%)	100 (Rated value)	95	90	85	80	75	70	65
Indication	8	9	A	B	C	D	E	F
Motor current (%)	60	55	50	45	40	35	30	25

Initial configuration of factory shipment is set to A (50% of rated value).
Driver and motor should be operated at around 50% of rated value to reduce heat.

4 Function selection DIP switch

Selects an appropriate function for specification.

	OFF	ON	
F/R	<input type="checkbox"/>	<input type="checkbox"/>	OFF Input method select
LV	<input type="checkbox"/>	<input type="checkbox"/>	OFF Low-vibration mode select
PD	<input type="checkbox"/>	<input type="checkbox"/>	OFF Power down select
EORG	<input type="checkbox"/>	<input type="checkbox"/>	OFF Excitation select
I.SEL	<input type="checkbox"/>	<input type="checkbox"/>	OFF
S.SEL	<input type="checkbox"/>	<input type="checkbox"/>	OFF

Power down select (PD)

Selects current for power down signal input.

PD	Motor current
ON	Current by rotary switch STP (power low)
OFF	0A (power off)

Excitation select (EORG)

EORG	Original excitation phase
ON	Excitation phase at power shut off
OFF	Phase origin

Input method select (F/R)

Selects input pulse type.

F/R	Input pulse type
ON	1 input (Pulse&direction)
OFF	2 input (CW, CCW)

Low-vibration mode select (LV)

Provides low-vibration, smooth operation even if resolution is rough (1-division, 2-division, etc)

LV	Operation
ON	Auto-micro function
OFF	Micro-step

(I.SEL)

I.SEL	
ON	Selects S.SEL-setting operation mode
OFF	Pulse-train I/F mode

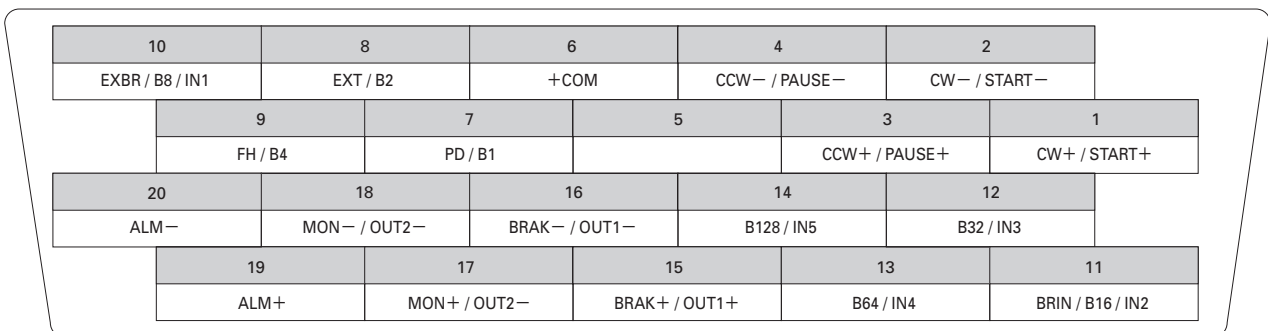
(S.SEL)

S.SEL	
ON	Serial I/F mode
OFF	Program mode

※ Function descriptions for switches ①~④ apply to pulse-train I/F mode. See the user's manual for settings in serial-I/F and program-operation modes.

5 Input signal interface connector

Input signal connector is used for interface with upper level controller, etc.
Driver side connector is 10220-52A2JL(Sumitomo3M).



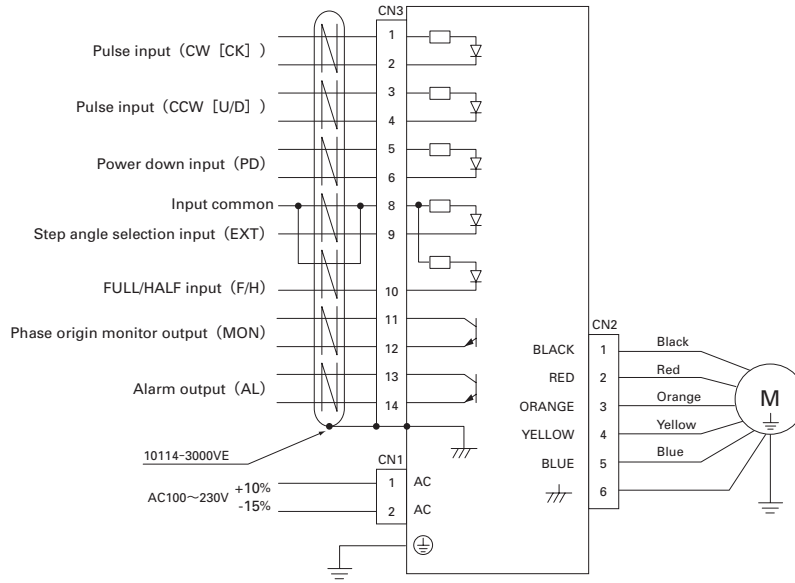
Terminal arrangement of CN3 connector

External Wiring Diagram to P35

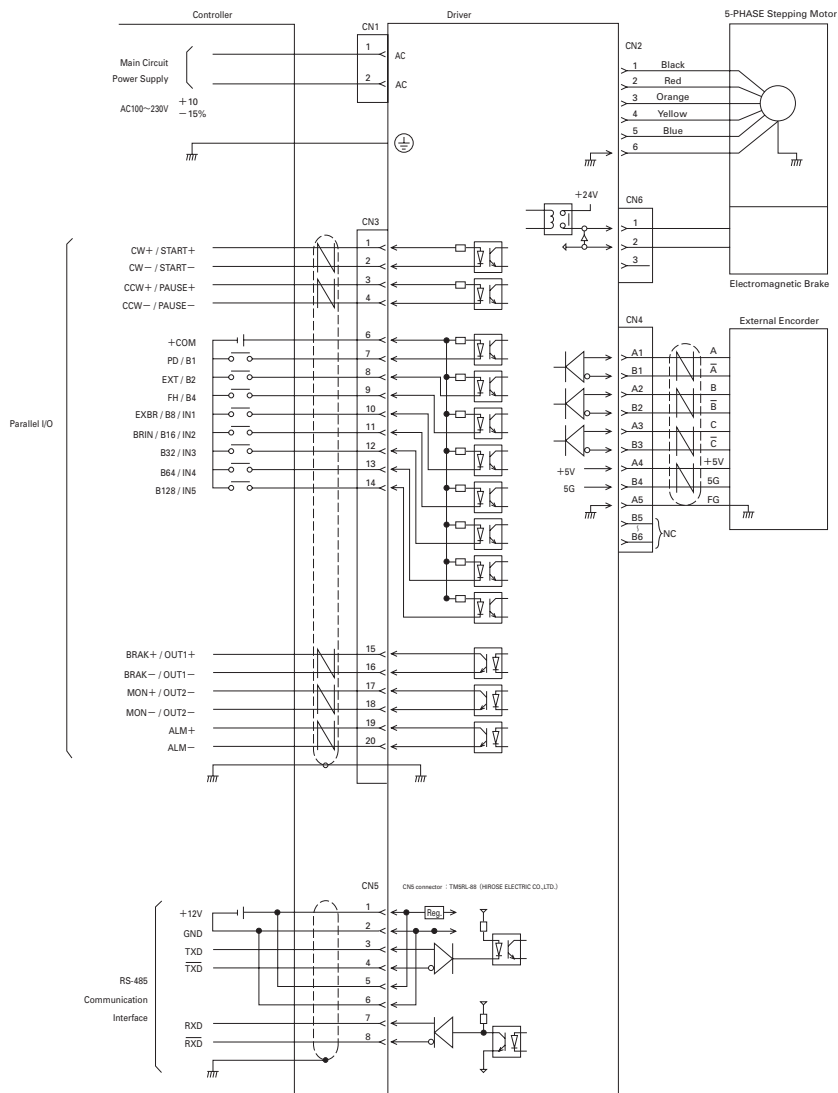
Characteristic
 System Configuration
 Type Code Convention
 Specifications
 Common Specifications
 Dimensions
 Driver

External Wiring Diagram

FStype

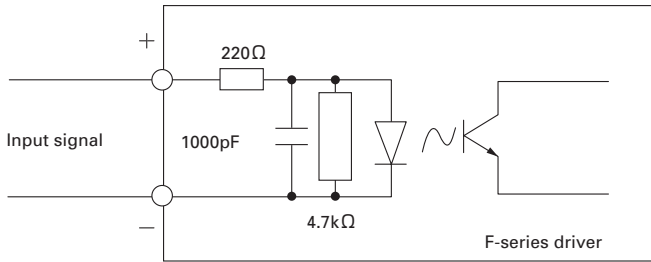


FPtype



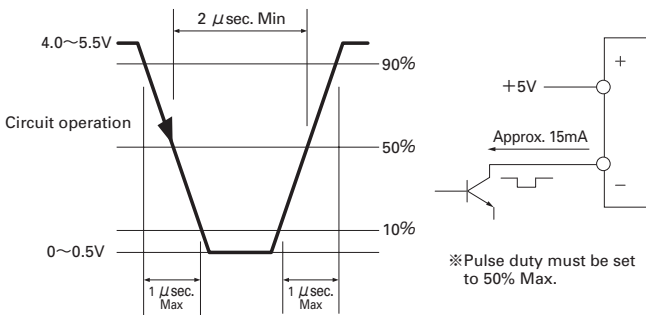
I/O Signal Standard

Input circuit configuration of CW(CK), CCW(U/D)

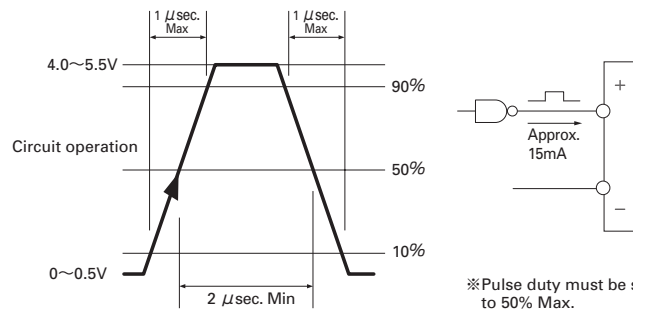


Input signal specification

<Negative logic>

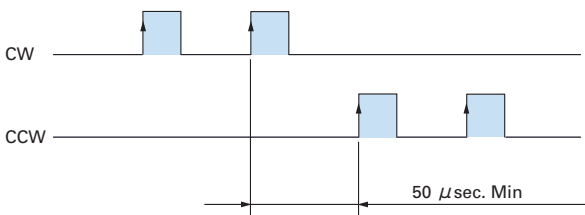


<Positive logic>



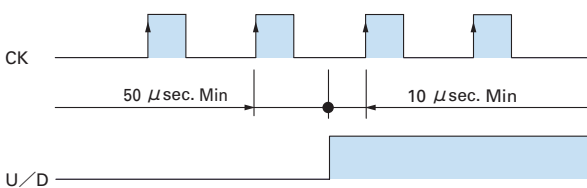
Timing of command pulse

- 2 input type (CW, CCW)



- Shaded area indicates internal photo coupler "ON". Internal circuit (motor) starts operating at leading edge of the photo coupler "ON".
- To apply pulse to CW, set CCW side internal photo coupler to "OFF".
- To apply pulse to CCW, set CW side internal photo coupler to "OFF".

- 1 input type (CK, U/D)



- Shaded area indicates internal photo coupler "ON". Internal circuit (motor) starts operating at leading edge of CK side photo coupler "ON".
- Switching of U/D input signal must be done while CK side internal photo coupler is "OFF".

Characteristic

System Configuration

Type Code Convention

Specifications

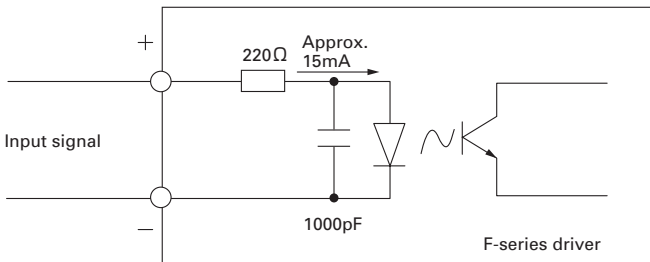
Common Specifications

Dimensions

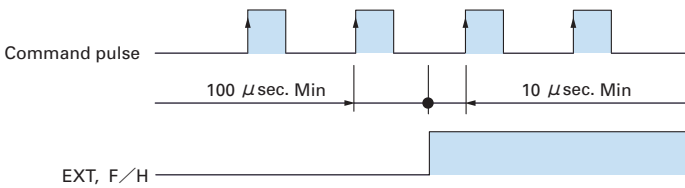
Driver

I/O Signal Standard

Input circuit configuration of PD, EXT, F/H

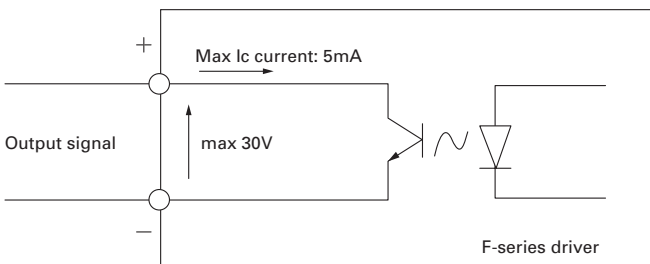


Timing of command pulse, step angle selection, and FULL/HALF selection input signal

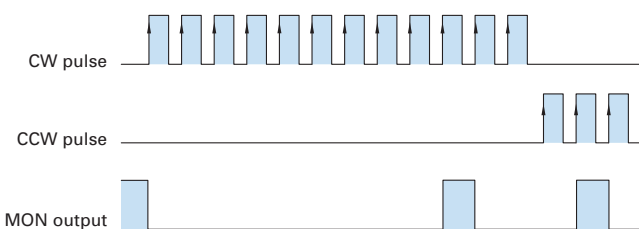


- Shaded area indicates internal photo coupler "ON".
- EXT input signal
EXT photo coupler "ON" enables a function by external F/H input signal. EXT photo coupler "OFF" enables the setting of a number of micro steps by main unit's rotary switch S.S.
- F/H input signal
F/H photo coupler "ON" sets HALF step (2-division) operation. F/H photo coupler "OFF" sets FULL step (1-division) operation.

Output signal configuration of MON, AL



MON output



- Photo coupler at phase origin of motor excitation (status at power on) is set to "ON". (setting when number of divisions is 1)
- Output from MON is set to on at every 7.2 degrees of motor output shaft from phase origin.

Serial Interface

1. Communication system Conforms to RS-485

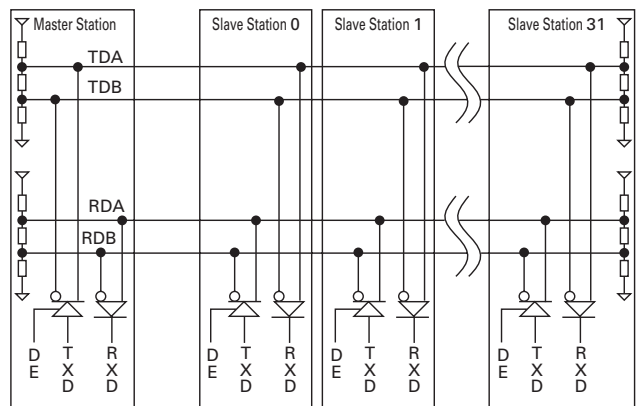
Circuit system: start-stop, synchronous, full-duplex communications (polling by master station)

Data: 8 data bits, 1 stop bit, even parity

Baud rate: select from 9,600/19,200/38,400 bps

Connections: Up to 31 slave stations may be connected with addresses set from 0 to 63.

2. Network



Inquiry Check Sheet

Please provide the following information when placing an order or making an inquiry.
Also feel free to include any questions that require our attention.

Company Name: _____
 Department: _____
 Telephone : _____
 Fax: _____
 1) Application: _____
 2) Name of Machinery: _____
 3) Number of Units: _____

Date: _____
 To contact us:
 Phone: +81(03) 3917-5151
 Fax: +81(03) 3917-0643

Item	Contents																																																																																																
①	Name of target equipment Equipment name, category (transport, processing, test, other)																																																																																																
②	Name of servo axis Axis name, axial mechanism (horizontal/vertical), brake mechanism (yes/no)																																																																																																
③	Current condition of above axis Manufacturer Name () Series Name () Motor Capacity () Hydraulic, Mechanical, or New System ()																																																																																																
④	Positioning accuracy ± mm / ± μm																																																																																																
⑤	Operation pattern <div style="text-align: center;"> <p>Acceleration α: _____ G * _____ [m/s²] Feeding Speed V: _____ [m/s] Moving Distance D: _____ [m/s] Reference formula: [1G=9.8,m/s²], 1(m/s²)\approx0.1G $[\alpha(m/s^2)=V(m/sec) \div t1(sec)]$ $[D(m)=V(m/sec) \times (t1+t2)(sec)]$</p> </div>																																																																																																
⑥	Mechanism Ball-screw/screw-rotation type (horizontal), ball-screw/nut-rotation type (horizontal), rack and pinion (horizontal), belt/chain (horizontal), rotary table, roll feed, instability																																																																																																
⑦	<table style="width: 100%; border-collapse: collapse;"> <tr> <td>WT (table mass)</td><td>kg</td> <td>WL (work mass)</td><td>kg</td> <td>WA (mass of other drive parts)</td><td>kg</td> </tr> <tr> <td>WR (rack mass)</td><td>kg</td> <td>WB (belt/chain mass)</td><td>kg</td> <td>WC (counterbalance mass)</td><td>kg</td> </tr> <tr> <td>Fa (external force in axial direction)</td><td>N</td> <td>Fb (ball-screw preload)</td><td>N</td> <td>T (roll pushing force)</td><td>N</td> </tr> <tr> <td>Dr1 (drive-side roll diameter)</td><td>mm</td> <td>Dr2 (follower-side roll diameter)</td><td>mm</td> <td></td><td></td> </tr> <tr> <td>Lr1 (drive-side roll length)</td><td>mm</td> <td>Lr2 (follower-side roll length)</td><td>mm</td> <td>G (reduction ratio)</td><td></td> </tr> <tr> <td>JG (speed-reducer inertia)</td><td>kg·m²</td> <td>JC (coupling inertia)</td><td>kg·m²</td> <td></td><td></td> </tr> <tr> <td>JN (nut inertia)</td><td>kg·m²</td> <td>JO (other motor-axis conversion inertia)</td><td>kg·m²</td> <td></td><td></td> </tr> <tr> <td>Db (ball-screw diameter)</td><td>mm</td> <td>Lb (ball-screw axial length)</td><td>mm</td> <td>Pb (ball-screw lead)</td><td>mm</td> </tr> <tr> <td>Dp (pinion/pulley diameter)</td><td>mm</td> <td>Lp (pinion axial length)</td><td>mm</td> <td>Tp (pulley thickness)</td><td>mm</td> </tr> <tr> <td>Dt (table diameter)</td><td>mm</td> <td>Dh (table-support diameter)</td><td>mm</td> <td>LW (load shift from axis)</td><td>mm</td> </tr> <tr> <td>Ds (table shaft diameter)</td><td>mm</td> <td>Ls (table shaft length)</td><td>mm</td> <td></td><td></td> </tr> <tr> <td colspan="2">ρ (specific gravity of ball-screw/pinion/pulley/table-shaft material)</td> <td></td> <td>kg/cm³</td> <td></td> <td></td> </tr> <tr> <td colspan="2">μ(friction coefficient between sheet and sliding-surface/support-section/roll)</td> <td></td> <td></td> <td>P1 (specific gravity of roll-1 material)</td> <td>kg/cm³</td> </tr> <tr> <td colspan="2">ρ2 (specific gravity of roll-2 material)</td> <td>kg/cm³</td> <td></td> <td>κ(internal friction coefficient of preload nut)</td> <td></td> </tr> <tr> <td colspan="2">η(mechanical efficiency)</td> <td></td> <td></td> <td>JL (load inertia of motor-axis conversion)</td> <td>kg·m²</td> </tr> <tr> <td colspan="2">TF (friction torque of motor axis conversion)</td> <td>N·m</td> <td></td> <td>TU (imbalance torque of motor axis conversion)</td> <td>N·m</td> </tr> </table>	WT (table mass)	kg	WL (work mass)	kg	WA (mass of other drive parts)	kg	WR (rack mass)	kg	WB (belt/chain mass)	kg	WC (counterbalance mass)	kg	Fa (external force in axial direction)	N	Fb (ball-screw preload)	N	T (roll pushing force)	N	Dr1 (drive-side roll diameter)	mm	Dr2 (follower-side roll diameter)	mm			Lr1 (drive-side roll length)	mm	Lr2 (follower-side roll length)	mm	G (reduction ratio)		JG (speed-reducer inertia)	kg·m ²	JC (coupling inertia)	kg·m ²			JN (nut inertia)	kg·m ²	JO (other motor-axis conversion inertia)	kg·m ²			Db (ball-screw diameter)	mm	Lb (ball-screw axial length)	mm	Pb (ball-screw lead)	mm	Dp (pinion/pulley diameter)	mm	Lp (pinion axial length)	mm	Tp (pulley thickness)	mm	Dt (table diameter)	mm	Dh (table-support diameter)	mm	LW (load shift from axis)	mm	Ds (table shaft diameter)	mm	Ls (table shaft length)	mm			ρ (specific gravity of ball-screw/pinion/pulley/table-shaft material)			kg/cm ³			μ (friction coefficient between sheet and sliding-surface/support-section/roll)				P1 (specific gravity of roll-1 material)	kg/cm ³	ρ 2 (specific gravity of roll-2 material)		kg/cm ³		κ (internal friction coefficient of preload nut)		η (mechanical efficiency)				JL (load inertia of motor-axis conversion)	kg·m ²	TF (friction torque of motor axis conversion)		N·m		TU (imbalance torque of motor axis conversion)	N·m
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⑧	Speed reducer Customer-provided (/); Sanyo standard (planet/spur/no-backlash-planet:: /); other (/)																																																																																																
⑨	Sensor type Sensor type specified (yes / no) Yes: (incremental , optical absolute , optical absolute [resolver absolute with incremental function]) Resolution ()																																																																																																
⑩	Input format Position , speed, torque, communications (SERCOS / CAN / DeviceNet) other ()																																																																																																
⑪	Upper-level equipment (controller) Sequencer , laptop , customer-developed product , Sanyo-provided , other ()																																																																																																
⑫	Usage environment and other requirements Cutting , clean-room use , anti-dust measures , other ()																																																																																																
⑬	Estimated production Single product: () units/month () units/year																																																																																																
⑭	Development schedule Prototype period: ()Year ()Month Production period: ()Year ()Month																																																																																																
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Characteristic System Configuration Type Code Convention Specifications Common Specifications Dimensions Driver

■ Precautions For Adoption

Cautions

Failure to follow the precautions on the right may cause moderate injury and property damage, or in some circumstances, could lead to a serious accident.

Always follow all listed precautions.

Cautions

- Read the accompanying Instruction Manual carefully prior to using the product.
- If applying to medical devices and other equipment affecting people's lives, please contact us beforehand and take appropriate safety measures.
- If applying to equipment that can have significant effects on society and the general public, please contact us beforehand.
- Do not use this product in an environment where vibration is present, such as in a moving vehicle or shipping vessel.
- Do not perform any retrofitting, re-engineering, or modification to this equipment.
- The drivers presented in this catalog are meant to be used for general industrial applications. If using for special applications related to aviation and space, nuclear power, electric power, submarine repeaters, etc., please contact us beforehand.

* For any question or inquiry regarding the above, contact our Sales Department.

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