Installation and Wiring for SV-X3 Series Servo Motor

Hardware Instruction

Manual Number	MQ075B065A01EN
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Thank you for purchasing this product.
This manual mainly describes the safety use, installation and wiring for SV-X3 series servo motor.

For more details, please refer to <SV-X3 Series Servo Drive Instruction Manual>.
Confirm the following items when unpacking:

Number	Name		Quantity
1	Servo motor		1
2	Accessories	Flat key	1
		4pin terminal	1
		2pin terminal (For motor with brake)	1
3	Installation and Wiring for SV-X3 Series Servo Motor Hardware Instruction		1
4	Certificate of Approval		1

◎Check if there are some damage to the products during transportation.
◎Any questions, please contact the HCFA Corporation.

Safety precautions

Please pay attention to the flowing safety precautions anywhere and any time during acceptance inspection, installation, wiring, operation and maintenance.

■ In this manual, the safety precautions are ranked as "DANGER" and "CAUTION"

⚠DANGER	Indicates that incorrect handling may result in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may result in medium or slight personal injury or physical damage.

Indicates " Prohibitions" (Indicates what must not be done.)

Indicates " Forced" .(Indicates what must be done.)

⚠DANGER		
Installing and wiring		
⊘	Do not connect the motor to the commercial power.	To prevent fire or malfunction.
	Do not place the combustibles around the servo motor and drive.	To prevent fire.
❗	Be sure to protect the drives through the case, and leave specified clearances between the case or other equipment and the drive.	To prevent electric shock, fire or malfunction.
	Install it at the place free from excessive dust and dirt, water and oil mist	To prevent electric shock, fire , malfunction or damage
	Install the equipment to incombustibles, such as metal.	To prevent fire.
	Any person who is involved in wiring and inspection should be fully competent to do the work.	To prevent electric shock.
	FG terminal of motor and drive must be grounded.	To prevent electric shock.
	Perform the wiring correctly after cut off the breaker.	To prevent electric shock, injury, malfunction or damage
	Have the insulation processing when connecting cables.	To prevent electric shock, fire or malfunction.
Operation and running		
⊘	During operation, never touch the internal parts of the drive.	To prevent burns or electric shock.
	The cables should not be damaged, stressed loaded, or pinched.	To prevent electric shock, malfunction or damage.
	During operation, never touch the rotating parts of the servo motor.	To prevent injury.
	Do not install the equipment under the conditions with water, corrosive and flammable gas.	To prevent fire.
⊘	Do not use it at the location with great vibration and shock.	To prevent electric shock, injury or fire.
	Do not use the servo motor with its cable soaked in oil or water.	To prevent electric shock, malfunction or damage
	Operate the switches and wiring with dry hand.	To prevent electric shock, injury or fire.
	Do not touch the keyway directly when using the motor with shaft-end keyway.	To prevent injury.
	Do not touch the motor and drive heat sink, as they are very hot.	To prevent burns or parts damaged.
	Do not drive the motor by external drive.	To prevent fire.
Other safety instructions		
❗	Confirm the equipment's safety after the earthquake happens.	To prevent electric shock, injury or fire.
	Installing and setting correctly to prevent the fire and personal injury when earthquake happens.	To prevent injury, electric shock, fire, malfunction or damage.
	Provide an external emergency stop circuit to ensure that operation can be stopped and power switched off immediately.	To prevent injury, electric shock, fire, malfunction or damage.
❗	Before wiring or inspection, turn off the power and wait for 5 minutes or more.	To prevent electric shock.

⚠CAUTION		
Installing and wiring		
❗	Please follow the specified combination of the motor and drive.	To prevent fire or malfunction.
	Do not touch the terminals of connector directly.	To prevent electric shock or malfunction.
❗	Do not block intake and prevent the foreign matters from entering into the motor and drive.	To prevent electric shock or fire.
	Fix the motor and have the test run away from the mechanical system. After confirming the operation,the motor can be securely mounted to mechanical system.	To prevent injury.
	The servo motor must be installed in the specified direction.	To prevent injury or malfunction.
	Install the equipment correctly in accordance with its weight and rated output.	To prevent injury or malfunction.
Operation and running		
⊘	Do not climb or stand on servo equipment. Do not put heavy objects on equipment.	To prevent electric shock, injury, fault or damage.
	The parameter settings must not be changed excessively. Operation will be instable.	To prevent injury.
	When power is restored after an instantaneous power failure, keep away from the machine because the machine may be restarted suddenly(design the machine so that it is secured against hazard if restarted).	To prevent injury.
	Keep it away from the direct sunlight.	To prevent malfunction.
	Do not put strong impact on the motor, drive and motor shaft.	To prevent malfunction.
	The electromagnetic brake on the servo motor is designed to hold the servo motor shaft and should not be used for ordinary braking.	To prevent injury or malfunction.
❗	Do not install or operate a faulty servo motor or drive.	To prevent injury, electric shock or fire
	Check the power specification.	To prevent fault.
	The electromagnetic brake may not hold the servo motor shaft. To ensure safety, install a stopper on the machine side.	To prevent injury.
	A sudden restart is made if an alarm is reset with the run signal on.	To prevent injury.
	Connect the relay for emergency stop and for brake in series.	To prevent injury or malfunction.
Transportation and storage		
⊘	Do not subject the equipment to the place with rain, waterdrop, poisonous gases or liquids.	To prevent malfunction.
	Do not carry the servo motor by the cables, shaft or encoder during transportation.	To prevent injury or malfunction.
	Do not drop or dump the motor during transportation and installation.	To prevent injury or malfunction.
❗	Store the unit in a place in accordance with the instruction manual.	To prevent malfunction.
	If store it for a long time, Consult HCFA.	To prevent malfunction.
Other safety instructions		
❗	Please dispose the battery according to your local laws and regulations.	
	When disposing of the product, handle it as industrial waste.	
Maintenance and inspection		
⊘	Do not disassemble and/or repair the equipment on customer side.	To prevent malfunction.
	Do not turn on or switch off the main power frequently.	To prevent malfunction.
	Do not touch the servo drive heat sink, regenerative resistor, servo motor etc. Their temperatures may be high while power is on or for some time after power-off.	To prevent burns or electric shock.
❗	When the drive become faulty, switch off the control circuit and main power.	To prevent fire.
	If the servo motor is to be stored for a long time, switch off the power.	To prevent misoperation and injury.

About maintenance and inspection

< Warranty period>

- The term of warranty for the product is 18 months from the date of manufacture. It's exceptional to brake motors as they are warranted when acceleration/deceleration times is not beyond the specified service life.

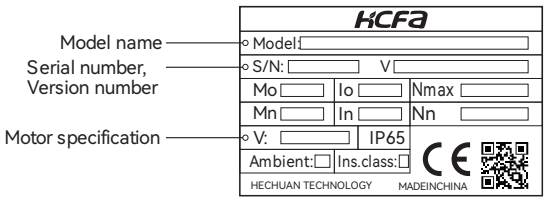
< Warranty coverage >

- This warranty applies only when the condition, method, environment, etc. of use are in compliance with the terms and conditions and instructions that are stated in the instruction manual and user manual for the Product.
  However, even during warranty period, the repair cost will be charged on customer in the following cases.
  1) A failure caused by improper storing or handling, repair and modification.
  2) A failure caused by the parts which have dropped down or damaged during transportation
  3) A failure caused when the products have been used beyond the product specification
  4) A failure caused by external factors such as inevitable accidents, including but not limited to fire, earthquake, lightning stroke, windstorm disaster, flood, salt damage, abnormal fluctuation of voltage and other natural disaster.
  5) A failure caused by the intrusion of water, oil, metal and other foreign matters.
- The warranty coverage is only for the product itself. We assume no responsibilities for any losses of opportunity and/or profit incurred by you due to a failure of the Product.

1.Product introduction and model selection

Introduction for motor nameplate

Servo motor nameplate



Model name identification

SV-X3 MM005A — B 2 L N ＊＊

Series name

Rated output/Rotor inertia	
Type	Output/Rotor inertia
MM005A	50W/Middle inertia
MM010A	100W/Middle inertia
MA020A	200W/Low inertia
MH020A	200W/High inertia
MA040A	400W/Low inertia
MH040A	400W/High inertia
MA075A	750W/Low inertia
MH075A	750W/High inertia
MM100A	1kW/Middle inertia
MH100A	1kW/High inertia
MM150A	1.5kW/Middle inertia
MH150A	1.5kW/High inertia
MM200A	2kW/Middle inertia

Voltage specification	
Type	Voltage
2	DC280 ~ 325V (AC200 ~ 230V)

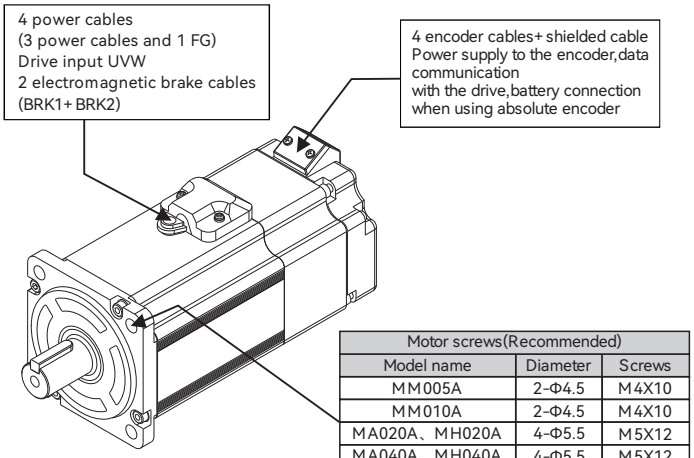
Encoder	
Type	Specification
N	Incremental 17bit
A	Absolute 17bit

Holding brake	
Type	Shaft-end shape/Oil seal
K	Keyway shaft/Without oil seal
L	Keyway shaft/With oil seal

Control NO.(N/A)

Holding brake	
Type	Brake
N	No brake
B	24V brake

Motor parts name



Motor screws(Recommended)		
Model name	Diameter	Screws
MM005A	2-Φ4.5	M4X10
MM010A	2-Φ4.5	M4X10
MA020A、MH020A	4-Φ5.5	M5X12
MA040A、MH040A	4-Φ5.5	M5X12
MA075A、MH075A	4-Φ6.6	M5X16
MM100A、MH100A	4-Φ9	M8X18
MM150A、MH150A	4-Φ9	M8X18
MM200A	4-Φ9	M8X18

Model name of servo drive and motor

Capacity	Motor model SV-X3□□□□□-*2**		Motor size (Flange installation size)	Drive model	Drive size
50W	Middle inertia	MM005A	40	SV-X3DA005A-D	Frame A
100W	Middle inertia	MM010A		SV-X3DA010A-D	
200W	Low inertia	MA020A	60	SV-X3DA020A-D	
	High inertia	MH020A			
400W	Low inertia	MA040A		SV-X3DA040A-D	
	High inertia	MH040A			
750W	Low inertia	MA075A	80	SV-X3DA075A-D	
	High inertia	MH075A			
1kW	Middle inertia	MM100A	130	SV-X3DA100A-A	Frame B
	High inertia	MH100A			
1.5kW	Middle inertia	MM150A		SV-X3DA150A-A	
	High inertia	MH150A			
2kW	Middle inertia	MM200A		SV-X3DA200A-A	

2. Motor specification

Specification

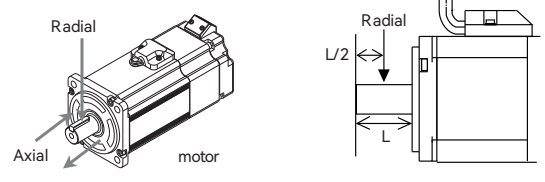
AC200V ~ 230V									
Items			Units	Specification					
Voltage			V	DC280V					
Model Name (SV-X3□□□□□-****)			—	MM005A Middle inertia	MM010A Middle inertia	MA020A Low inertia	MH020A High inertia	MA040A Low inertia	MH040A High inertia
Flange installation size			mm	□40	□40	□60			
Mass		Without brake	kg	0.4	0.5	0.9	1.0	1.3	1.5
		With brake		0.6	0.8	1.4	1.5	1.8	2.0
Basic specification	Rated output		W	50	100	200		400	
	Rated torque		N·m	0.16	0.32	0.64		1.27	
	Instantaneous max. torque		N·m	0.56	1.12	1.91		3.82	
	Rated current		Arms	0.6	0.9	1.7		2.7	
	Instantaneous max. current		Arms	2.1	3.2	5.1		8.1	
	Rated speed		r /min	3000		3000			
	Max. speed		r /min	6000		5000			
	Torque constant		N · m/Arms	0.25	0.36	0.417		0.498	
	Induced voltage constant of each phase		mV/(r/min)	8.8	12.5	14.5		17.4	
	Rated power change rate	Without brake	kW/s	5.6	13.6	23.9	9.3	58.7	23.5
		With brake		4.7	12.3	19.5	8.6	51.9	22.4
	Mechanical time constant	Without brake	ms	2.60	1.69	1.12	2.87	0.67	1.66
		With brake		3.06	1.87	1.37	3.12	0.75	1.75
	Electrical time constant		ms	0.64	0.76	1.99		2.47	
	Motor rotor inertia	Without brake	× 10kg·m²	0.045	0.074	0.17	0.43	0.28	0.70
		With brake		0.053	0.082	0.21	0.47	0.31	0.74
	Permissible load	Radial load	N	Refer to " Output shaft permissible load" .					
		Axial load	N						
	Encoder			17 bit serial communication (EIA422)					
Brake specification	Usage			Holding. (Note: Not for braking)					
	Power supply		—	SELV power and the power of reinforced insulation is need for dangerous voltage.					
	Rated voltage		V	DC24V± 10%					
	Rated current		A	0.25		0.3			
	Static friction torque		N·m	0.16or more	0.32or more	1.27or more			
	Absorption time		ms	35or less		50or less			
	Release time		ms	20or less		15or less			
	Release voltage		V	DC1Vor more					

AC200V ~ 230V									
Items			Units	Specification					
Voltage			V	DC280V					
Model Name (SV-X3□□□□□-****)			—	MA075A Low inertia	MH075A High inertia	MM100A Middle inertia	MH100A High inertia	MM150A Middle inertia	MH150A High inertia	MM200A Middle inertia
Flange installation size			mm	□80		□130				
Mass		Without brake	kg	2.5	2.7	5.6	7.6	7.0	9.0	8.4
		With brake		3.3	3.5	7.0	9.0	8.4	10.4	9.8
Basic specification	Rated output		W	750		1000		1500		2000
	Rated torque		N·m	2.39		4.77		7.16		9.55
	Instantaneous max. torque		N·m	7.1		14.3		21.5		28.6
	Rated current		Arms	4.3		5.6		9.9		12.2
	Instantaneous max. current		Arms	12.9		16.8		30		36.6
	Rated speed		r /min	3000		2000				
	Max. speed		r /min	4500		3000				
	Torque constant		N · m/Arms	0.61		0.88		0.81		0.85
	Induced voltage constant of each phase		mV/(r/min)	21.33		30.9		28.4		29.6
	Rated power change rate	Without brake	kW/s	64.1	35.9	50.0	9.2	76.9	13.8	104.9
		With brake		52.8	32.1	36.5	8.6	61.4	13.3	87.9
	Mechanical time constant	Without brake	ms	0.53	0.94	0.76	4.17	0.60	3.32	0.58
		With brake		0.64	1.06	1.05	4.43	0.75	3.46	0.69
	Electrical time constant		ms	4.3		10.1		12.2		8.2
	Motor rotor inertia	Without brake	× 10kg·m²	0.89	1.62	4.56	24.9	6.67	37.12	8.70
		With brake		1.08	1.81	6.24	26.4	8.35	38.65	10.38
	Permissible load	Radial load	N	Refer to " Output shaft permissible load" .						
		Axial load	N							
	Encoder			17 bit serial communication (EIA422)						
Brake specification	Usage			Holding. (Note: Not for braking)						
	Power supply		—	SELV power and the power of reinforced insulation is need for dangerous voltage.						
	Rated voltage		V	DC24V± 10%						
	Rated current		A	0.4		1.0				
	Static friction torque		N·m	2.39 or more		9.55 or more				
	Absorption time		ms	70		120				
	Release time		ms	20		30				
	Release voltage		V	DC1V or more						

Ambient conditions and safety precautions

Ambient conditions	
Rated time	Continuous
Ambient temperature for use	0 ~ 40(Without condensation)
Ambient humidity for use	20 ~ 85(Without condensation)
Ambient temperature for storage	-20 ~ 65 (Without condensation), Highest temperature guaranteed: 80 degrees, 72hours
Ambient humidity for storage	20 ~ 85(Without condensation)
Atmosphere for use/storage	Indoors(Not subject to rainwater or direct sunlight); free from corrosive gas, flammable gas, flammables, grinding fluid, oil mist, or dust
Insulation class	Class B
Insulation resistance	1000 VDC megger 5MΩ or more
Dielectric strength	1500VAC for 1 minute
Altitude	1000m or less above sea level
Vibration class	V15 (JEC2121)
Vibration resistance	49m/s² (5G)
Impact resistance	98m/s² (10G)
Protective class	IP65(Excluding shaft penetrating section and connectors)
Points to note	· Grounding is mandatory. Class I · "Over voltage category II " · " Pollution degree2" · Brake cable has polarity. Red: connecting with +24V; Black: connecting with GND.

Output shaft permissible load



Permissible load	Unit	50W	100W	200W	400W	750W	1kW	1.5kW	2kW
Radial load	N	68	68	245	245	392	490	490	490
Axial load	N	58	58	98	98	147	196	196	196