HCFA

Installation and Wiring for SV-X2/X6 Series Servo Motor (180-flange)

Hardware Instruction

Manual Number	MQ400P059A01EN
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http://www.hcfa.com.cn

Thank you for purchasing this product.
This manual mainly describes the safety use, installation and wiring for SV- X2/ X6 series servo motor (180-flange).
For more details, please refer to < SV- X2/ X6 Series Servo Motor User Manual>.

Confirm the following items when unpacking:

Number	Name		Quantity
1	Servo motor		1
2	Accessories	Flat key	1
		Extension cable for 4PIN connector	1
		Extension cable for 10PIN connector	1
		Extension cable for 2PIN connector (for servo motor with brake)	1
3	Installation and Wiring for SV-X2/X6 Series Servo Motor Hardware Instructior		1
4	Certificate of Quality		1

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

Safety precautions(Read carefully before use)

Please pay attention to the following 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.
About maintenance and inspection		
!	As there's dangerous and high-voltage parts inside the drive, before wiring or inspection, turn off the power and wait for 5 minutes or more. Moreover, do not disassemble the drive.	To prevent electric shock.

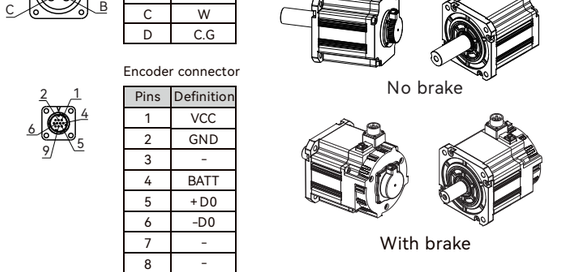
CAUTION		
Installing and wiring		
!	Please follow the specified combination of the motor and drive.	To prevent fire or malfunction.
!	Do not touch the terminals of connector directly.	To prevent electric shock or malfunction.
!	Do not block intake and prevent the foreign matters from entering into the 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.
!	If you want to store it for a long time, follow the instruction manual.	To prevent malfunction.
!	Store the unit in a place in accordance with the instruction manual.	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

Motor nameplate



Model name identification

SV-X2 MM 400A — N 4 L N ✲✲

X2/X6 Series

Inertia specifications

Symbol	Specifications
MA	Low inertia
MM	Middle inertia
MH	High inertia
MG	Low-speed and high-torque
MQ	Flat type

Voltage specifications

Symbol	Voltage
4	DC280 ~ 325V (AC200 ~ 230V)

Brake specifications

Symbol	Brake
N	No brake
B	24V brake
X	7V brake(ultrathin)

Encoder specifications

Symbol	Specifications
N	Incremental 17bit
A	Absolute 17bit

Customized version

Power specifications

Symbol	200A	300A	400A	500A	750A
Specifications	2KW	3KW	4KW	5KW	7.5KW

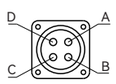
Symbol	290A	440A	550A
Specifications	2.9KW	4.4KW	5.5KW

Shaft-end specifications

Symbol	Shaft-end/oil seal
L	Lead-wire/with oil seal
K	Lead-wire/no oil seal
C	Connector/with oil seal
D	Connector/no oil seal

Wiring description for servo motor

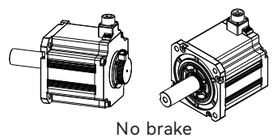
Power connector



Pins	Definition
A	U
B	V
C	W
D	C.G

Encoder connector

Pins	Definition
1	VCC
2	GND
3	-
4	BATT
5	+D0
6	-D0
7	-
8	-
9	BAT-
10	-



No brake

With brake

Combination of the drive and the motor

Capacity	Servo motor SV-X6□□□□□-**** SV-X2□□□□□-****		Servo drive	Motor flange (mm)
2kW	High inertia	MH200A	SV-X6FA3001T-A	□180
3kW	Middle inertia	MM300A		
4kW	Middle inertia	MM400A	SV-X6FA5001T-A	
5kW	Middle inertia	MM500A		
7.5kW	Middle inertia	MM750A	SV-X6FA7502T-A	
2.9kW	Low-speed & high-torque	MG290A	SV-X6FA3001T-A	
4.4kW	Low-speed & high-torque	MG440A	SV-X6FA5001T-A	
5.5kW	Low-speed & high-torque	MG550A	SV-X6FA7502T-A	

2. Product specifications

Motor specifications

Items			Unit	Specifications				
Voltage			V	AC380V				
Model name (SV-X2/X6□□□□□-****)			—	MH200A High inertia	MM300A Middle inertia	MM400A Middle inertia	MM500A Middle inertia	MM750A Middle inertia
Flange installation size			mm	□180				
Mass		Without brake	kg	12.7	14.3	16.5	19.4	25
		With brake		17.4	19	21.2	28.5	29.7
Common specifications		Rated output	W	2	3	4	5	7.5
		Rated torque	N·m	9.55	14.3	19.1	23.9	47.8
		Max. instantaneous torque	N·m	28.6	42.9	57.3	71.6	119
		Rated current	Arms	5.8	8.7	11.5	13.5	21.8
		Max. instantaneous current	Arms	19	30	38	45	75
		Rated speed	r /min	2000	2000	2000	2000	1500
		Max. speed	r /min	3000				2500
		Torque constant	N · m/Arms	1.83	1.8	1.82	2.04	2.5
		Phase inductive voltage constant	mV/(r/min)	63.9	62.9	63.5	71.3	87.2
		Rated power change rate	Without brake	kW/s	29	47	66.7	85.6	230.1
			With brake		20.4	32.3	53.6	70.7	200.1
		Mechanical time constant	Without brake	ms	1.58	1.33	1.24	1.07	0.84
			With brake		2.38	1.8	1.59	1.3	0.97
		Electrical time constant	ms	17.18	18.17	18.43	20.53	19.22
		Motor rotor Inertia	Without brake	× 10^{-4}kg m^2	31.4	43.5	54.7	66.7	99.3
			With brake		44.6	63.2	68	80.8	114.2
		Permissible load	Radial load	N	1470				2058
			Axial load		490				980
		Encoder		17/20bit serial communication (EIA422)					
Brake specifications		Usage		Holding(Note: not for braking)					
		Power supply	—	SELV power, reinforced insulation for dangerous voltage.					
		Rated voltage	V	DC24V± 10%					
		Rated current	A	A					
		Static friction torque	N·m	74Nm or more					
		Absorption time	ms	S					
		Release time	ms	S					
		Release voltage	V	DC0.5V or more					

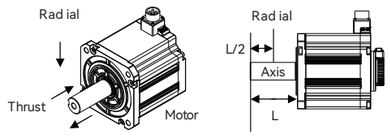
Items			Unit	Specifications		
Voltage			V	AC380V		
Model name (SV-X2/X6□□□□□-****)			—	MG290A High inertia	MG440A High inertia	MG550A High inertia
Flange installation size			mm	□180		
Mass		Without brake	kg	16	19.4	23.9
		With brake		20.7	24.1	28.5
Common specifications	Rated output		W	2.9	4.4	5.5
	Rated torque		N·m	18.6	28	35
	Max. instantaneous torque		N·m	45.1	71.1	87.6
	Rated current		Arms	10	15.7	19.5
	Max. instantaneous current		Arms	33.5	52	66
	Rated speed		r /min	1500		
	Max. speed		r /min	3000		
	Torque constant		N · m/Arms	2.01	2.13	1.98
	Phase inductive voltage constant		mV/(r/min)	70.2	74.2	69.6
	Rated power change rate	Without brake	kW/s	73.3	114.3	134
		With brake		55.5	93.7	115
	Mechanical time constant	Without brake	ms	1.28	1.16	1.04
		With brake		1.7	1.41	1.22
	Electrical time constant		ms	195	18.3	20.1
	Motor rotor Inertia	Without brake	$\times 10^{-4}$kg·m^2	47.2	68.6	91.4
		With brake		62.3	83.7	106.5
	Permissible load	Radial load	N	1470	1470	1764
		Axial load		490	490	588
	Encoder			17/20bit serial communication (EIA422)		
Brake specifications	Usage			Holding(Note: not for braking)		
	Power supply		—	SELV power, reinforced insulation for dangerous voltage.		
	Rated voltage		V	DC24V±10%		
	Rated current		A	A		
	Static friction torque		N·m	74Nm or more		
	Absorption time		ms	S		
	Release time		ms	S		
	Release voltage		V	DC0.5V or more		

Note: ※indicates the highest speed for X2 series motor.

Ambient conditions and safety precautions for servo motor

Ambient conditions	Rated time	Continuous
	Ambient temperature for use	0~40°C(Without condensation)
	Ambient humidity for use	20~85%RH(Without condensation)
	Ambient temperature for storage	-20~65°C(Highest temperature guaranteed: 80 degrees, 72hours)
	Ambient humidity for storage	20~85%RH (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	1500 VAC for 1 minute
	Altitude	1000m or less above sea level
	Vibration class	V 15(JEC2121)
	Vibration resistance	49 m/s^2 (5G)
	Impact resistance	98 m/s^2 (10G)
	Protective class	IP65
Points to note		Grounding is mandatory. Class I applicable.
		Over voltage category II applicable
		Pollution degree 2 applicable
		Brake cables have polarity. Red: connected with +24V. Black: connected with GND

Output shaft permissible load



Permissible load	Unit	2KW	3KW	4KW	5KW	7.5KW	2.9KW	4.4KW	5.5KW
Permissible radial load	N	1470				2058	1470		1764
Permissible axial load	N	490				980	490		588

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