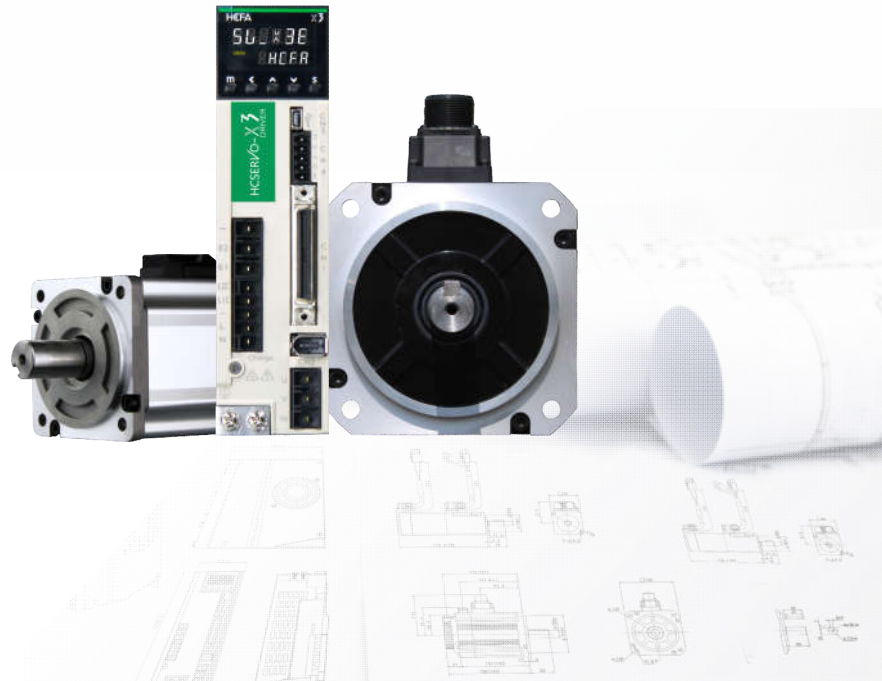




# SERVO

SV series servo provides the best solution for all the fields of manufacturing, which requires automation, high-speed, high-precision and convenience.



## HCSV-X3 Servo Drives

The servo drives take up the least space.

Max. 4Mpps positioning command resolution of I/O pulse are provided.

High liquid crystal display and Single-phase/three-phase 200VAC power input.



### Model name identification

SV-X3E A 075 A - A 2 - 00 000

① Product series	③ Power specifications	④ Voltage specifications	⑤ Control power	⑥ Products updates no.	⑦ Hardware customized mark																																																				
② Product types	<table border="1"> <thead> <tr> <th>Symbol</th> <th>Types</th> </tr> </thead> <tbody> <tr><td>005</td><td>50W</td></tr> <tr><td>010</td><td>100W</td></tr> <tr><td>020</td><td>200W</td></tr> <tr><td>040</td><td>400W</td></tr> <tr><td>075</td><td>750W</td></tr> <tr><td>100</td><td>1000W</td></tr> <tr><td>150</td><td>1500W</td></tr> <tr><td>200</td><td>2000W</td></tr> <tr><td>250</td><td>2500W</td></tr> </tbody> </table>	Symbol	Types	005	50W	010	100W	020	200W	040	400W	075	750W	100	1000W	150	1500W	200	2000W	250	2500W	<table border="1"> <thead> <tr> <th>Symbol</th> <th>Types</th> </tr> </thead> <tbody> <tr><td>A</td><td>AC220V</td></tr> <tr><td>T</td><td>AC380V</td></tr> <tr><td>B</td><td>AC110V</td></tr> <tr><td>L</td><td>DC48V</td></tr> <tr><td>M</td><td>DC24V</td></tr> </tbody> </table>	Symbol	Types	A	AC220V	T	AC380V	B	AC110V	L	DC48V	M	DC24V	<table border="1"> <thead> <tr> <th>Symbol</th> <th>Types</th> </tr> </thead> <tbody> <tr><td>A</td><td>AC power</td></tr> <tr><td>D</td><td>24V power</td></tr> </tbody> </table>	Symbol	Types	A	AC power	D	24V power	<table border="1"> <thead> <tr> <th>Symbol</th> <th>Types</th> </tr> </thead> <tbody> <tr><td>00</td><td>N/A</td></tr> <tr><td>AO</td><td>Analog output</td></tr> <tr><td>PG</td><td>Encoder card</td></tr> <tr><td>Q</td><td>Full-closed</td></tr> </tbody> </table>	Symbol	Types	00	N/A	AO	Analog output	PG	Encoder card	Q	Full-closed	<table border="1"> <thead> <tr> <th>Symbol</th> <th>Types</th> </tr> </thead> <tbody> <tr><td>000</td><td>N/A</td></tr> </tbody> </table>	Symbol	Types	000	N/A
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Examples			
X3EA075A-A2	X3E series standard type	X2EA075A-A	X2E series standard type
X3EB075A-A2	X3E series EtherCAT type	X2EN075A-A	X2E series CANOpen type
X3EN075A-A2	X3E series CANOpen type	X2EN075A-A-SD018	X2E series CAN bus dedicated type 18
X3EA075A-A2-PG005	X3E series gantry synchronization type		
X3EA075A-A2-AO000	X3E series analog output type		



X2E



X3E



X3T



X6

Size & Weight	005	010	020	040	075	100
	50W	100W	200W	400W	750W	1kW
W	42	42	42	42	52	52
H	165	165	165	165	165	165
D	151	151	151	151	151	151
KG	1.7	1.7	1.8	1.8	2.1	2.2
<b>Input power</b>	Single-phase 200~240V±10%50/60Hz					
Frame A	Single-phase 200~240V±10%50/60Hz					
Frame B	Three-phase 200~240V±10%50/60Hz					
Control circuit power	Single-phase 200~240V±10%50/60Hz					
Control method	Three-phase PWM inverting sine-wave					
Main circuit power	Three-phase PWM inverting sine-wave					
Control power	Three-phase PWM inverting sine-wave					
Rated current	Three-phase PWM inverting sine-wave					
<b>Encoder feedback</b>	Single-turn absolute 17-bit (multi-turn absolute with battery)					
<b>Temperature</b>	0~55°C (Note 5, Note 6)					
Ambient temperature for use	0~55°C (Note 5, Note 6)					
Ambient temperature for storage	-20~65°C					
<b>Humidity</b>	20~85%RH or less (Without condensation)					
Ambient humidity for use	20~85%RH or less (Without condensation)					
Ambient humidity for storage	20~85%RH or less (Without condensation)					
Atmosphere for use & storage	Indoors (Not subject to direct sunlight); free from corrosive gas, flammable gas, oil mist, or dust					
Altitude	1000m or less above sea level					
Vibration	5.8m/s <sup>2</sup> (0.6G) or less, 10~60Hz (No continuous operation allowed at frequency of resonance)					
Dielectric strength	1 minute at 1500 VAC across the primary and FG					
<b>Digital signal</b>	8 inputs (24VDC, photo-coupler insulation) Switch by control mode					
Input	8 inputs (24VDC, photo-coupler insulation) Switch by control mode					
Output	5 outputs (24VDC, photo-coupler insulation, open-collector output) Switch by control mode					
<b>Pulse signal</b>	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)					
Input	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)					
Output	4 outputs (A/B/Z-phase RS-422 differential, Z-phase open collector output)					
Analog signal input	2 inputs (±10V) Switch by control mode					
Communication function	Connection with PC (with "Servostudio" software) Host controller remote communication (1: n)					
Regeneration function	External regenerative resistor possible (Note 2)					
Dynamic brake	Not built-in					
Control mode	7 control modes: Position control, speed control, torque control, position/speed control, position/torque control, speed/torque control, full-closed control (optional part needed)					
<b>Position control mode</b>	Servo ON, alarm reset, deviation counter clear, positive/negative direction over-travel, internal command selection, homing start etc.					
Digital input	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.					
Digital output	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.					
<b>Operation mode</b>	Point table, communication, manual pulse input					
<b>Pulse output</b>	Point table, communication, manual pulse input					
Output pulse form	A-Phase, B-Phase: Differential output Z-Phase: Differential output or open collector output					
Division ratio	Arbitrary frequency division					
Output pulse	Encoder pulse or position Pulse instruction (can be set)					
Output pulse frequency	Encoder pulse or position Pulse instruction (can be set)					

Size & Weight	005	010	020	040	075	100	150	200	
	50W	100W	200W	400W	750W	1kW	1.5kW	2kW	
W	42	42	42	49	49	84	84	84	
H	160	160	160	160	160	160	160	160	
D	130	130	130	130	130	130	130	130	
KG	0.7	0.7	0.7	0.8	0.8	1.6	1.6	1.6	
<b>Input power</b>	Single-phase 200~240V±10%50/60Hz								
Frame A	Single-phase 200~240V±10%50/60Hz								
Frame B	Three-phase 200~240V±10%50/60Hz								
Control circuit power	Single-phase 200~240V±10%50/60Hz								
Control method	Three-phase PWM inverting sine-wave								
Main circuit power	Three-phase PWM inverting sine-wave								
Control power	Three-phase PWM inverting sine-wave								
Rated current	Three-phase PWM inverting sine-wave								
<b>Encoder feedback</b>	Single-turn absolute 17-bit (multi-turn absolute with battery)								
<b>Temperature</b>	0~55°C (Note 5, Note 6)								
Ambient temperature for use	0~55°C (Note 5, Note 6)								
Ambient temperature for storage	-20~65°C								
<b>Humidity</b>	20~85%RH or less (Without condensation)								
Ambient humidity for use	20~85%RH or less (Without condensation)								
Ambient humidity for storage	20~85%RH or less (Without condensation)								
Atmosphere for use & storage	Indoors (Not subject to direct sunlight); free from corrosive gas, flammable gas, oil mist, or dust								
Altitude	1000m or less above sea level								
Vibration	5.8m/s <sup>2</sup> (0.6G) or less, 10~60Hz (No continuous operation allowed at frequency of resonance)								
Dielectric strength	1 minute at 1500 VAC across the primary and FG								
<b>Digital signal</b>	9 inputs (24VDC, photo-coupler insulation) Switch by control mode								
Input	9 inputs (24VDC, photo-coupler insulation) Switch by control mode								
Output	9 outputs (24VDC, photo-coupler insulation, open-collector output) Switch by control mode								
<b>Pulse signal</b>	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)								
Input	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)								
Output	4 outputs (A/B/Z-phase RS-422 differential, Z-phase open collector output)								
Analog signal input	2 inputs (±10V) Switch by control mode								
Communication function	Connection with PC (with "Servostudio" software) Host controller remote communication (1: n)								
Regeneration function	External regenerative resistor possible (Note 2)								
Dynamic brake	Not built-in								
Control mode	7 control modes: Position control, speed control, torque control, position/speed control, position/torque control, speed/torque control, full-closed control (optional part needed)								
<b>Position control mode</b>	Servo ON, alarm reset, deviation counter clear, positive/negative direction over-travel, internal command selection, homing start etc.								
Digital input	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.								
Digital output	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.								
<b>Operation mode</b>	Point table, communication, manual pulse input								
<b>Pulse output</b>	Point table, communication, manual pulse input								
Output pulse form	A-Phase, B-Phase: Differential output Z-Phase: Differential output or open collector output								
Division ratio	Arbitrary frequency division								
Output pulse	Encoder pulse or position Pulse instruction (can be set)								
Output pulse frequency	Encoder pulse or position Pulse instruction (can be set)								

Size & Weight	005	010	020	040	075	100	150	200	
	50W	100W	200W	400W	750W	1kW	1.5kW	2kW	
W	42	42	42	49	49	84	84	84	
H	160	160	160	160	160	160	160	160	
D	130	130	130	130	130	130	135	135	
KG	0.7	0.7	0.7	0.8	0.8	1.6	1.6	1.6	
<b>Input power</b>	Single-phase 200~240V±10%50/60Hz								
Frame A	Single-phase 200~240V±10%50/60Hz								
Frame B	Three-phase 200~240V±10%50/60Hz								
Control circuit power	Single-phase 200~240V±10%50/60Hz								
Control method	Three-phase PWM inverting sine-wave								
Main circuit power	Three-phase PWM inverting sine-wave								
Control power	Three-phase PWM inverting sine-wave								
Rated current	Three-phase PWM inverting sine-wave								
<b>Encoder feedback</b>	Single-turn absolute 17-bit (multi-turn absolute encoder with battery)								
<b>Temperature</b>	0~55°C (Note 5, Note 6)								
Ambient temperature for use	0~55°C (Note 5, Note 6)								
Ambient temperature for storage	-20~65°C								
<b>Humidity</b>	20~85%RH or less (Without condensation)								
Ambient humidity for use	20~85%RH or less (Without condensation)								
Ambient humidity for storage	20~85%RH or less (Without condensation)								
Atmosphere for use & storage	Indoors (Not subject to direct sunlight); free from corrosive gas, flammable gas, oil mist, or dust								
Altitude	1000m or less above sea level								
Vibration	5.8m/s <sup>2</sup> (0.6G) or less, 10~60Hz (No continuous operation allowed at frequency of resonance)								
Dielectric strength	1 minute at 1500 VAC across the primary and FG								
<b>Digital signal</b>	10 inputs (photo-coupler insulation); Select inputs function based on parameters								
Input	10 inputs (photo-coupler insulation); Select inputs function based on parameters								
Output	6 outputs (photo-coupler insulation); Select outputs function based on parameters								
<b>Pulse signal</b>	2 inputs (photo-coupler open-collector input, differential input)								
Input	2 inputs (photo-coupler open-collector input, differential input)								
Output	4 outputs (3 differential outputs A/B/Z, 1 open-collector output)								
Analog signal input	3 inputs (1 16bit A/D input and 2 12bit A/D inputs)								
Communication function	USB: PC communication RS422: Host communication (1: 1) RS485: Remote communication (multi-station)								
Regeneration function	External regenerative resistor possible (Note 2)								
Dynamic brake	Not built-in								
Control mode	7 control modes: Position control, speed control, torque control, position/speed control, position/torque control, speed/torque control, full-closed control (optional part needed)								
<b>Position control mode</b>	Servo ON, alarm reset, deviation counter clear, positive/negative direction over-travel, internal command selection, homing start etc.								
Digital input	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.								
Digital output	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.								
<b>Operation mode</b>	Point table, communication, manual pulse input								
<b>Pulse output</b>	Point table, communication, manual pulse input								
Output pulse form	Differential output								
Division ratio	1~65535								
Output pulse	Encoder position pulse feedback								
Output pulse frequency	4Mpps (after 4 multiplication)								

Size & Weight	005	010	020	040	075	100	150	200	
	50W	100W	200W	400W	750W	1kW	1.5kW	2kW	
W	35	35	35	35	42	42	70	70	
H	165	165	165	165	165	165	165	165	
D	160	160	160	160	160	160	160	160	
KG	0.7	0.7	0.7	0.7	1.0	1.0	1.6	1.6	
<b>Input power</b>	Single-phase 200~240V±10%50/60Hz								
Frame A	Single-phase 200~240V±10%50/60Hz								
Frame B	Three-phase 200~240V±10%50/60Hz								
Control circuit power	Single-phase 200~240V±10%50/60Hz								
Control method	Three-phase PWM inverting sine-wave								
Main circuit power	Three-phase PWM inverting sine-wave								
Control power	Three-phase PWM inverting sine-wave								
Rated current	Three-phase PWM inverting sine-wave								
<b>Encoder feedback</b>	Single-turn absolute 17-bit (multi-turn absolute with battery)								
<b>Temperature</b>	0~55°C (Note 5, Note 6)								
Ambient temperature for use	0~55°C (Note 5, Note 6)								
Ambient temperature for storage	-20~65°C								
<b>Humidity</b>	20~85%RH or less (Without condensation)								
Ambient humidity for use	20~85%RH or less (Without condensation)								
Ambient humidity for storage	20~85%RH or less (Without condensation)								
Atmosphere for use & storage	Indoors (Not subject to direct sunlight); free from corrosive gas, flammable gas, oil mist, or dust								
Altitude	1000m or less above sea level								
Vibration	5.8m/s <sup>2</sup> (0.6G) or less, 10~60Hz (No continuous operation allowed at frequency of resonance)								
Dielectric strength	1 minute at 1500 VAC across the primary and FG								
<b>Digital signal</b>	9 inputs (24VDC, photo-coupler insulation) Switch by control mode								
Input	9 inputs (24VDC, photo-coupler insulation) Switch by control mode								
Output	9 outputs (24VDC, photo-coupler insulation, open-collector output) Switch by control mode								
<b>Pulse signal</b>	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)								
Input	2 inputs (photo-coupler insulation, RS-422 differential, open-collector)								
Output	4 outputs (A/B/Z-phase RS-422 differential, Z-phase open collector output)								
Analog signal input	2 inputs (±10V) Switch by control mode								
Communication function	Remote communication (1: n)								
Regeneration function	External regenerative resistor possible (Note 2)								
Dynamic brake	Not built-in								
Control mode	7 control modes: Position control, speed control, torque control, position/speed control, position/torque control, speed/torque control, full-closed control (optional part needed)								
<b>Position control mode</b>	Servo ON, alarm reset, deviation counter clear, positive/negative direction over-travel, internal command selection, homing start etc.								
Digital input	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.								
Digital output	Alarm state, servo ready, brake release, torque in-limit output, position proximity, homing complete, position reached, motor rotation output, zero-speed output, etc.								
<b>Operation mode</b>	Point table, communication, manual pulse input								
<b>Pulse output</b>	Point table, communication, manual pulse input								
Output pulse form	A-Phase, B-Phase: Differential output Z-Phase: Differential output or open collector output								
Division ratio	Arbitrary frequency division								
Output pulse	Encoder pulse or position Pulse instruction (can be set)								
Output pulse frequency	Encoder pulse or position Pulse instruction (can be set)								



X2E



X3E



X3T



X6

<b>Pulse input</b>	Differential input: Up to 2Mpps, pulse width larger than 0.25us; Open-collector input: Up to 200Kpps, pulse width larger than 2.5us	
<b>Input pulse type</b>	Differential input; open-collector	
<b>Input pulse form</b>	Pulse+ direction, orthogonal phase difference (A-Phase + B-Phase), CW+CCW	
<b>Electronic gear</b>	A/B A: 1~1073741824 B: 1~1073741824, Encoder resolution/10000000 < A/B < Encoder resolution/2.5	
<b>Smoothing</b>	Smoothing filter, FIR filter	
<b>Instantaneous speed observer</b>		
<b>Speed control</b>	<b>Internal position control mode</b>	
<b>Digital input</b>	Servo ON, alarm reset, speed instruction negation, zero-speed clamp, internal speed control, external forward/reverse torque limit, emergency stop etc.	Servo ON, alarm reset, torque instruction negation, zero-speed clamp
<b>Digital output</b>	Alarm state, servo ready, brake off, speed reached, torque in-limit, speed in-limit, zero-speed output, emergency stop etc.	Alarm state, servo ready, brake off, torque in-limit output, speed in-limit output, emergency stop
<b>Output pulse type</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector	
<b>Analog input</b>		
<b>Speed input</b>	Input voltage -10V to +10V (Maximum speed at ±10V)	
<b>Smoothing</b>	Smoothing filter, FIR filter	
<b>Torque limit source</b>	1) Internal torque limit by P03.09, P03.10 2) External torque limit by P03.11, P03.12 enabled by P_CL/N_CL signals 3) TLMTF i.e. AI1 or AI2 as external forward/reverse torque limit 4) TLMTF as forward limit; TLMTN as reverse limit	
<b>Torque feedforward</b>	1) Internal torque feedforward 2) TFFD, AI1 or AI2	
<b>Internal speed instruction</b>	0 to 16-segment speed can be selected by DI terminal combination.	
<b>Torque control</b>		
<b>Digital input signals</b>	Servo ON, alarm reset, reverse torque instruction, zero-speed clamp	
<b>Digital output signals</b>	Alarm status, servo ready, brake release, torque limit, speed limit output	
<b>Torque input</b>	(default before shipment and the range can be set by function codes)	
<b>Output pulse signal</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector	
<b>Speed limit</b>	Positive/ negative speed limit P03.27, P03.28	
<b>Common</b>		
<b>Speed monitoring</b>	Provided	
<b>Vibration control</b>	Provided	
<b>Auto-tuning</b>	Provided	
<b>Encoder output division and multiplication</b>	Provided	
<b>Adjustment/function setting</b>	Adjust by Servostudio software of SV-X2E	
<b>Protective functions</b>	Overvoltage, power supply error, overcurrent, overheat, overload, encoder error, overspeed, excessive position deviation, parameter error	
<b>Self-adaptive notch filter</b>	Provided	
<b>Internal position planning function</b>	Provided	

<b>Pulse input</b>	Differential input: Up to 2Mpps, pulse width larger than 0.25us; Open-collector input: Up to 200Kpps, pulse width larger than 2.5us	
<b>Input pulse type</b>	Differential input; open-collector	
<b>Input pulse form</b>	Pulse+ direction, orthogonal phase difference (A-Phase + B-Phase), CW+CCW	
<b>Electronic gear</b>	A/B A: 1~1073741824 B: 1~1073741824, Encoder resolution/10000000 < A/B < Encoder resolution/2.5	
<b>Smoothing</b>	Smoothing filter, FIR filter	
<b>Instantaneous speed observer</b>		
<b>Speed control</b>		
<b>Digital input</b>	Servo ON, alarm reset, speed instruction negation, zero-speed clamp, internal speed control, external forward/reverse torque limit, emergency stop etc.	
<b>Digital output</b>	Alarm state, servo ready, brake off, speed reached, torque in-limit output, speed in-limit output, speed coincidence, motor rotation output, zero-speed signal output etc.	
<b>Output pulse type</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector	
<b>Analog input</b>		
<b>Speed input</b>	Input voltage -10V to +10V (Maximum speed at ±10V)	
<b>Smoothing</b>	Smoothing filter, FIR filter	
<b>Torque limit source</b>	1) Internal torque limit by P03.09, P03.10 2) External torque limit by P03.11, P03.12 enabled by P_CL/N_CL signals 3) TLMTF i.e. AI1 or AI2 as external forward/reverse torque limit 4) TLMTF as forward limit; TLMTN as reverse limit	
<b>Torque feedforward</b>	1) Internal torque feedforward 2) TFFD, AI1 or AI2	
<b>Internal speed instruction</b>	0 to 16-segment speed can be selected by DI terminal combination.	
<b>Torque control</b>		
<b>Digital input signals</b>	Servo ON, alarm reset, speed instruction negation, zero-speed clamp	
<b>Digital output signals</b>	Alarm state, servo ready, brake off, speed reached, torque in-limit, speed in-limit, zero-speed output, emergency stop etc.	
<b>Torque input</b>	DC±10V/rated torque (default before shipment and the range can be set by function codes)	
<b>Output pulse signal</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector	
<b>Speed limit</b>	1) Positive/ negative speed limit P03.27, P03.28 2) SPL i.e. AI input	
<b>Common</b>		
<b>Speed monitoring</b>	Provided	
<b>Vibration control</b>	Provided	
<b>Auto-tuning</b>	Provided	
<b>Encoder output division and multiplication</b>	Provided	
<b>Adjustment/function setting</b>	Adjust by Servostudio software of SV-X3E	
<b>Protective functions</b>	Overvoltage, power supply error, overcurrent, overheat, overload, encoder error, overspeed, excessive position deviation, parameter error	
<b>Self-adaptive notch filter</b>	Provided	
<b>Internal position planning function</b>	Provided	

<b>Pulse input</b>	Differential input: 4Mpps Open-collector: 500Kpps
<b>Input pulse type</b>	Differential input; positive/negative direction, A/B-phase, instruction/direction can be selected by parameters
<b>Input pulse form</b>	Pulse+ direction, orthogonal phase difference (A-Phase + B-Phase), CW+CCW
<b>Electronic gear</b>	1/1000 to 1000
<b>Smoothing</b>	Primary delay filter or FIR filter
<b>Instantaneous speed observer</b>	Provided
<b>Speed control</b>	
<b>Digital input</b>	Zero-speed clamp, torque instruction sign input, control mode switchover
<b>Digital output</b>	Speed coincidence output, speed limit output
<b>Output pulse type</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector
<b>Analog input</b>	
<b>Speed input</b>	Input voltage -10V to 10V; 6V corresponds to rated speed (by default)
<b>Smoothing</b>	
<b>Torque limit source</b>	Provided
<b>Torque feedforward</b>	Input torque feedforward based on analog voltage
<b>Internal speed instruction</b>	Internal 8-segment speed can be switched by control input
<b>Torque control</b>	
<b>Digital input signals</b>	Zero-speed clamp, torque instruction sign input, control mode switchover
<b>Digital output signals</b>	Speed coincidence output, speed limit output
<b>Torque input</b>	Input torque instruction based on analog voltage; Input voltage: -10V to 10V
<b>Output pulse signal</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector
<b>Speed limit</b>	Speed limit value can be set based on the parameters.
<b>Common</b>	
<b>Speed monitoring</b>	Provided
<b>Vibration control</b>	Provided
<b>Auto-tuning</b>	Provided
<b>Encoder output division and multiplication</b>	Provided
<b>Adjustment/function setting</b>	Adjust by Servostudio software of SV-X3E
<b>Protective functions</b>	Hardware error: Overvoltage, undervoltage, overspeed, , overload, overheat, overcurrent, encoder error. Software error: Excessive position deviation, instruction pulse frequency division, EEPROM error
<b>Self-adaptive notch filter</b>	Provided
<b>Internal position planning function</b>	Provided

<b>Pulse input</b>	Differential input: Up to 2Mpps, pulse width larger than 0.25us; Open-collector input: Up to 200Kpps, pulse width larger than 2.5us
<b>Input pulse type</b>	Differential input; open-collector
<b>Input pulse form</b>	Pulse+ direction, orthogonal phase difference (A-Phase + B-Phase), CW+CCW
<b>Electronic gear</b>	A/B A: 1~1073741824 B: 1~1073741824, Encoder resolution/10000000 < A/B < Encoder resolution/2.5
<b>Smoothing</b>	Smoothing filter, FIR filter
<b>Instantaneous speed observer</b>	
<b>Speed control</b>	
<b>Digital input</b>	Servo ON, alarm reset, speed instruction negation, zero-speed clamp, internal speed control, external forward/reverse torque limit, emergency stop etc.
<b>Digital output</b>	Alarm state, servo ready, brake off, speed reached, torque in-limit output, speed in-limit output, speed coincidence, motor rotation output, zero-speed signal output etc.
<b>Output pulse type</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector
<b>Analog input</b>	
<b>Speed input</b>	Input voltage -10V to +10V (Maximum speed at ±10V)
<b>Smoothing</b>	
<b>Torque limit source</b>	1) Internal torque limit by P03.09, P03.10 2) External torque limit by P03.11, P03.12 enabled by P_CL/N_CL signals 3) TLMTF i.e. AI1 or AI2 as external forward/reverse torque limit 4) TLMTF as forward limit; TLMTN as reverse limit
<b>Torque feedforward</b>	1) Internal torque feedforward 2) TFFD, AI1 or AI2
<b>Internal speed instruction</b>	0 to 16-segment speed can be selected by DI terminal combination.
<b>Torque control</b>	
<b>Digital input signals</b>	Servo ON, alarm reset, speed instruction negation, zero-speed clamp
<b>Digital output signals</b>	Alarm state, servo ready, brake off, speed reached, torque in-limit, speed in-limit, zero-speed output, emergency stop etc.
<b>Torque input</b>	DC±10V/rated torque (default before shipment and the range can be set by function codes)
<b>Output pulse signal</b>	Encoder position pulse released in the following manner: A/B-phase orthogonal phase difference pulse and Z-phase index pulse released in RS-422 differential format, Z-phase index pulse released through open collector
<b>Speed limit</b>	1) Positive/ negative speed limit P03.27, P03.28 2) SPL i.e. AI input
<b>Common</b>	
<b>Speed monitoring</b>	Provided
<b>Vibration control</b>	Provided
<b>Auto-tuning</b>	Provided
<b>Encoder output division and multiplication</b>	Provided
<b>Adjustment/function setting</b>	Adjust by Servostudio software of SV-X3E
<b>Protective functions</b>	Overvoltage, power supply error, overcurrent, overheat, overload, encoder error, overspeed, excessive position deviation, parameter error
<b>Self-adaptive notch filter</b>	Provided
<b>Internal position planning function</b>	Provided



# X3E Series Servo Drive



**Fast speed**

Control loop cycle: 40μs  
 Speed loop band-width: 1.2KHz (one time of inertia ratio)  
 Positioning time: <=5ms  
 (Tacc=50ms, Vmax=3000r pm)

**Steady operation**

Online load parameter identification  
 Online auto gain adjustment  
 Online adaptive notch filter resonance elimination  
 Low-frequency damping control

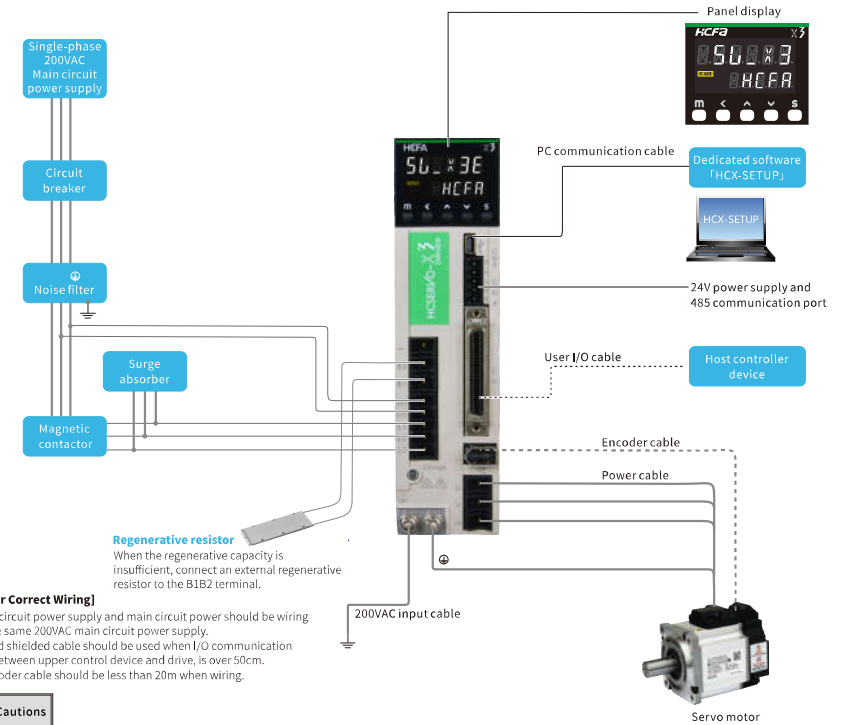
**Exact control**

Positioning accuracy in theory : +/- 1 (131072)  
 Speed control accuracy: +/- 1 RPM  
 Torque control resolution: 0.1% rated torque  
 Analog input resolution: Max.16bit, optional

**More functions**

Parameter grouping setting  
 Control mode switchover online  
 Standard 17-bit encoder, optional 20-bit  
 Two groups of gain switchover, quick response and steady STOP  
 Built-in 16-segment position control(Point table Group P08)  
 High-accuracy and high-response interrupt positioning setting(P08.86)  
 Potential energy load torque compensation(P06.10/ Z-axis Robot)  
 Built-in process control, tool turret function /E-CAM  
 I/O function customization(P04/P05)  
 Control power AC power input  
 Wide voltage input, lowest 50% (P06.36)  
 Instantaneous power failure protection(P06.24)  
 Regenerative braking and dynamic braking(DO16)  
 Absolute system voltage monitoring, under-voltage warning function(P06.48)  
 Protective functions  
 Overcurrent/overvoltage/overspeed/Input/output phase loss/encoder error  
 Protection classification, level 1-3 for warning and failure.  
 Support parameter management, monitoring and oscilloscope

Wiring Diagram for X3E Series



**[Points for Correct Wiring]**

- ※ Control circuit power supply and main circuit power should be wiring from the same 200VAC main circuit power supply.
- ※ A twisted shielded cable should be used when I/O communication cable, between upper control device and drive, is over 50cm.
- ※ The encoder cable should be less than 20m when wiring.

**⚠ Cautions**

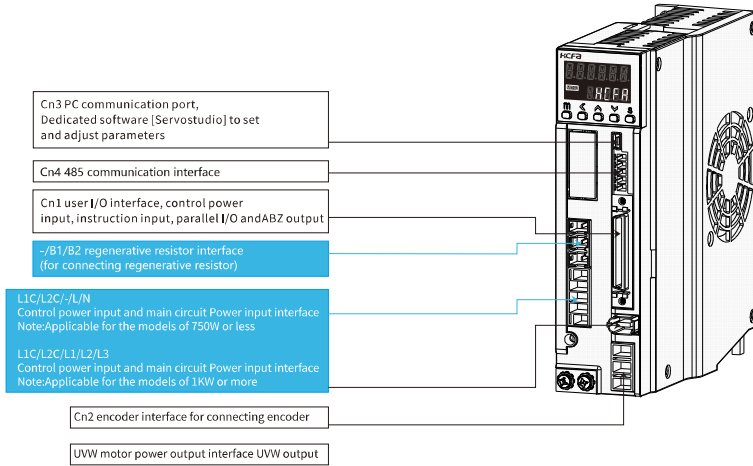
- ① Please note that there is high voltage in the solid line of wiring diagram when wiring and using.
- ② The dotted lines in the wiring diagram indicates non-dangerous voltage circuit.

Connector description for servo drive and motor

Items	
Peripheral devices	Conform to European EC Directive. Select the device which meets corresponding standards and install them in accordance with Figure 4.1.1 System Wiring diagram
Installation environment	Install the drive in environment conforming to Pollution degree 2 or 1 of IEC60664-1.
Power supply 1: 00-230VAC (main and control circuit)	This product can be used under the conditions that conform to IEC60664-1 and overvoltage category II .
Power supply 2: 24VDC • I/O power supply • Power supply for brake release	24VDC external power supply should use SELV power supply (※) and be less than 150W. This is the CE corresponding conditions. ※SELV: safety extra low voltage (Reinforced insulation is needed for safety extra low voltage, non-dangerous voltage and dangerous voltage.)
Wiring	Please use withstand voltage cables which are equivalent to AWG18/600V or AWG14/600V for motor power cable, encoder cable, AC220 input cable, FG cable and main circuit power distribution cable under multi-axis drive structure respectively when drives are less than 750W or more than 1kW.
Circuit breaker	Switch off the power supply to protect power cord when overcurrent occurs. Make sure to use the breaker between power supply and interference filter that conforms to IEC specification and UL recognition in accordance with the User manual. Please use the breaker with leakage function recommended by HCFA in order to meet EMC standards.
Noise filter	To prevent the outside interference from power cables please use the interference filter recommended by HCFA in order to meet EMC standards.
Magnetic contactor Surge absorber	Switch main power supply (ON/OFF). And use it after installing a surge absorber. Please use the surge absorber recommended by HCFA.
Interference filter for signal cable / ferrite core	Please use the interference filter recommended by HCFA in order to meet EMC standards.
Regenerative resistor	This product is not equipped with regenerative resistor. The external regenerative resistor is necessary when the internal capacitor cannot absorb more regenerative power and regenerative voltage alarm is ON. For details, refer to 1.4 Model selection of external regenerative resistor. Use a built-in thermostat and set overheat protect circuit. This product belongs to Class I and need grounding protection. Grounding should be executed for the case and cabinet that conforms to EMC. The following symbol indicates the protection grounding terminal.
Grounding	



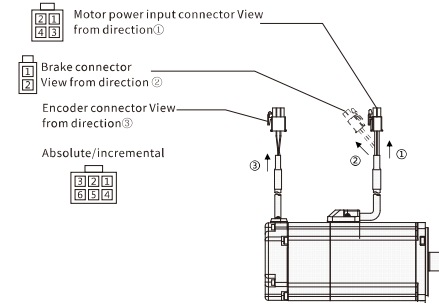
Terminal descriptions for servo drive



Terminal arrangement for the drive

Models	For 750W or less				For 1KW or more			
	Symbol	Pin No.	Signal name	Contents	Symbol	Pin No.	Signal name	Contents
Regenerative resistor	B1/B2/	2	B1	P interface of regenerative resistor	B1/B2/L1C /L2C/L1/L2 /L3	2	B1	P interface of regenerative resistor
		3	B2	N interface of regenerative resistor		3	B2	N interface of regenerative resistor
AC power input	L1C/L2C /L/N	1	L1C	AC power input	B1/B2/L1C /L2C/L1/L2 /L3	1	L1C	AC power input
		2	L2C			2	L2C	
Single-phase 200VAC input	L1C/L2C /L/N	4	Main Power 1	L				
		5	Main Power 2	N				
Three-phase 200VAC input					B1/B2/L1C /L2C/L1/L2 /L3	3	Main Power 1	L1
						4	Main Power 2	L2
						5	Main Power 3	L2 (Do not connect it when single-phase used)
Motor power output	U/V/W	1	U	Motor power U phase output	U/V/W	1	U	Motor power U phase output
		2	V	Motor power V phase output		2	V	Motor power V phase output
		3	W	Motor power W phase output		3	W	Motor power W phase output
		1	VCC	Encoder power supply 5V output		1	VCC	Encoder power supply 5V output
		2	GND	Signal grounding		2	GND	Signal grounding
		3	NC	-		3	NC	-
Encoder	CN2	4	NC	-	CN2	4	NC	-
		5	+D	Encoder signal: data input/output		5	+D	Encoder signal: data input/output
		6	-D	Encoder signal: data input/output		6	-D	Encoder signal: data input/output
		-	FG	Connect SHIELD to the connector housing		-	FG	Connect SHIELD to the connector housing
		1	VBUS	USB data		1	VBUS	USB data
		2	D-	USB data-		2	D-	USB data-
PC communication	CN3	3	D+	USB data+	CN3	3	D+	USB data+
		4	NC	-		4	NC	-
		5	GND	USB signal grounding		5	GND	USB signal grounding
Communication	CN4	3	485	485 signal from upper controller	CN4	3	485	485 signal from upper controller
		4	/485	/485 signal from upper controller		4	/485	/485 signal from upper controller
		5	SG	Communication signal grounding		5	SG	Communication signal grounding
		1	24V	24V for external fan		1	24V	24V for external fan
External fan	CN14	2	G24	GND for external fan	CN14	2	G24	GND for external fan
		3	NC	-		3	NC	-
I/O control terminal	CN1	Refer to Section 4.5 Wiring description of I/O control terminal (CN1)			CN1	Refer to Section 4.5 Wiring description of I/O control terminal (CN1)		

Motor connector and pins arrangement (750W or below)

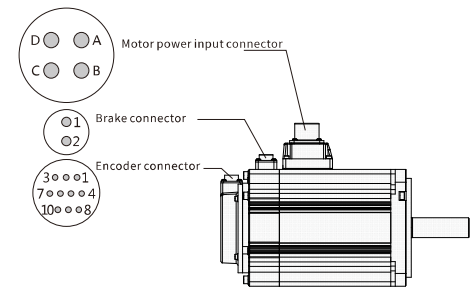


Cable list (For motor of 750W or below)

Name	Cable
Motor power input	AWG18
Brake (Note 1)	AWG22
Encoder (Incremental)	AWG24
Encoder (Absolute)	

Note 1) For motor with brake.

Motor connector and pins arrangement (1KW or above)



Cable list (for motor of 1kW or above)

Name	Cable
Motor power input	AWG15
Brake (Note 1)	AWG18
Encoder (Incremental)	AWG24
Encoder (Absolute)	

Note 1) For motor with brake.

For motor of 750W or below

Pin No.	Signal name	Contents	Wire color
<b>Motor power input</b>			
1	U	Motor power U phase	Red
2	V	Motor power V phase	White
3	W	Motor power W phase	Black
4	FG	Motor housing grounding	Green
<b>Brake※1</b>			
1	BRK+	Brake power supply 24VDC	Yellow(orange)
2	BRK-	Brake power supply GND	Blue(brown)
<b>Encoder</b>			
1	-	NC	-
2	+D	Serial communication data + data	White (red dotted)
3	-D	Serial communication data - data	White (black dotted)
4	VCC	Encoder power supply 5V	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black
<b>Encoder (Absolute)</b>			
1	BAT	External battery (※2)	Yellow(red dotted)
2	+D	Serial communication data + data	White (red dotted)
3	-D	Serial communication data - data	White (black dotted)
4	VCC	Encoder power supply 5V output	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black

※1 For motor with brake.  
 ※2 External capacitor and battery are taking GND as the reference potential.

Cable list (for motor of 1kW or more)

Pin No.	Signal name	Contents	Notes
<b>Motor power input</b>			
A	U	Motor power U phase	
B	V	Motor power V phase	
C	W	Motor power W phase	
D	FG	Motor housing grounding	
<b>Brake※1</b>			
1	BRK1	Brake power supply 24VDC	
2	BRK2	Brake power supply GND	
<b>Encoder (incremental)</b>			
1	VCC	Encoder power supply 5V output	
2	GND	Signal ground	
3	-	NC	
4	-	NC	
5	-D	Serial communication data - data	
6	-D	Serial communication data - data	
7	-	NC	
8	-	NC	
9	-	NC	
10	SHIELD	Shielded wires	
<b>Encoder (Absolute)</b>			
1	VCC	Encoder power supply 5V output	
2	GND	Signal ground	
3	CAP	External capacitor (※2)	
4	BAT	External battery (※2)	
5	+D	Serial communication +data	
6	-D	Serial communication -data	
7	IC	Internal connection (※3)	
8	IC	Internal connection (※3)	
9	GND	Signal ground	
10	SHIELD	Shielded wires	

※1 For motor with brake.  
 ※2 External capacitor and battery are taking GND as the reference potential.  
 ※3 Internal connection (IC) has been connected internally. Do not connect it with any other wires.

RS-485 communication wirings

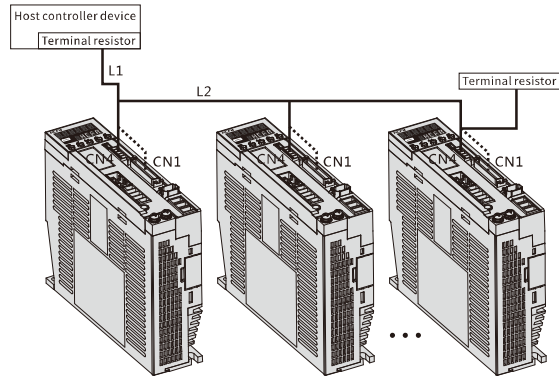
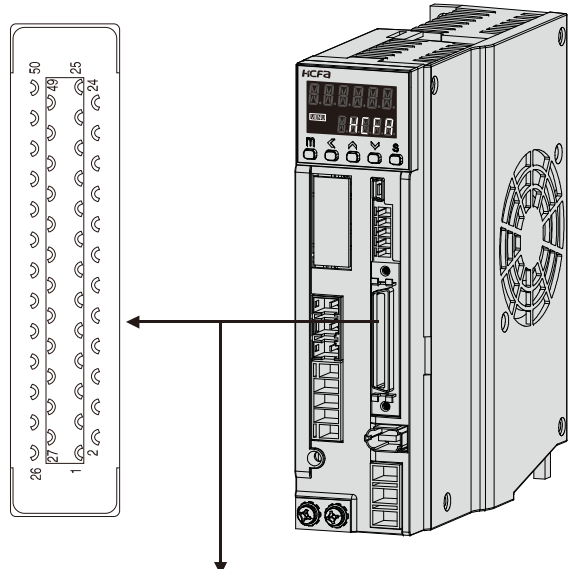


Figure 4.4.1 Multi-station connection example

L1=5m (max); cables between upper controller and servo drive should be less than 5m.  
 L2=250mm (max); cables between each servo drive should be less than 250mm.  
 Terminal resistor: Connect the terminal resistor between the Pin A & B of CN4 or Pin 43 & 44 of CN1 at the last drive and host controller (220Ω).

I/O control terminal (CN1) descriptions



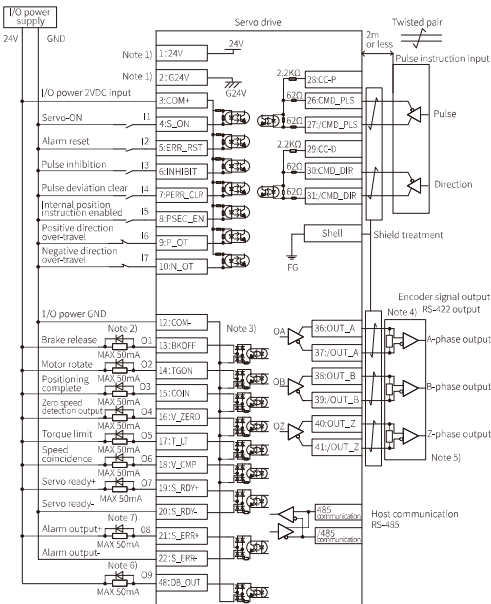
26	28	30	32	34	36	38	40	42	44	46	48	50
CMD_PLS	CC-P	CMD_DIR	A_SPEED	A_TRQ	OUT_A	OUT_B	OUT_Z	SG	/485	G24	OR	CC-0.5V
27	29	31	33	35	37	39	41	43	45	47	49	
/CMD_PLS	CC-D	/CMD_DIR	A_GND	A_GND	OUT_A	OUT_B	OUT_Z	485	SG	19	CC-P_5V	
1	3	5	7	9	11	13	15	17	19	21	23	25
VCC	COM1	I2	I4	I6	I8	O1	O3	O5	O7-	O9	O8+	
2	4	6	8	10	12	14	16	18	20	22	24	
G24	I1	I3	I5	I7	COM2	O2	O4	O6	O7-	O8-		

I/O control terminal

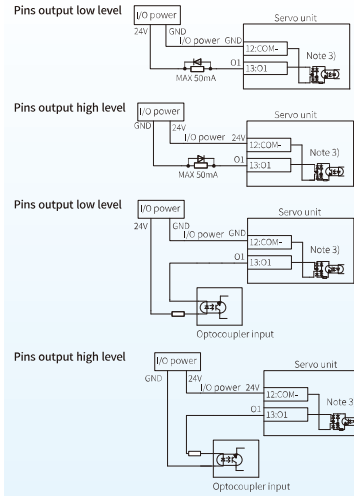
Pin No.	Signal name	Contents
1	24V	Drive power supply 24V output
2	G24V	Drive power supply GND
3	COM+	I/O power supply input
4	I1	Digital signal input
5	I2	Digital signal input
6	I3	Digital signal input
7	I4	Digital signal input
8	I5	Digital signal input
9	I6	Digital signal input
10	I7	Digital signal input
11	I8	Digital signal input
12	COM+	I/O power supply GND
13	O1	Digital signal output
14	O2	Digital signal output
15	O3	Digital signal output
16	O4	Digital signal output
17	O5	Digital signal output
18	O6	Digital signal output
19	O7+	Digital signal output+
20	O7-	Digital signal output-
21	O8+	Digital signal output+
22	O8-	Digital signal output-
23	-	
24	-	
25	-	
26	CMD_PLS	Pulse instruction input PLS+
27	/CMD_PLS	Pulse instruction input PLS-
28	CC_P	Open-collector Pulse instruction input PLS power(24V)
29	CC_D	Open-collector Pulse instruction input DIR power(24V)
30	CMD_DIR	Pulse instruction input DIR+
31	/CMD_DIR	Pulse instruction input DIR-
32	AI1	Analog input
33	GND	Analog reference GND
34	AI2	Analog input
35	GND	Analog reference GND
36	OUTA	Pulse output A
37	/OUTA	Pulse output /A
38	OUTB	Pulse output B
39	/OUTB	Pulse output /B
40	OUTZ	Pulse output Z
41	/OUTZ	Pulse output /Z
42	GND	Pulse output reference GND
43	485	RS-485 communication
44	/485	RS-485 communication
45	GND	RS-485 reference GND
46	-	
47	I9	Digital signal input
48	O9	Digital signal output
49	CC-P_5V	Open-collector Pulse instruction input PLS power (5V)
50	CC-D_5V	Open-collector Pulse instruction input DIR power (5V)

Standard wiring diagrams

Pulse instruction differential input



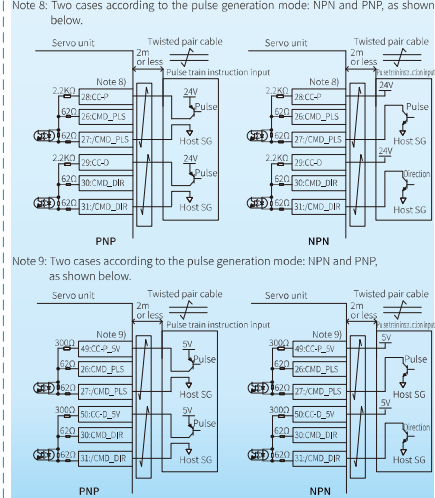
Note 1: Control power output (24V, G24V) can be used as I/O power (COM+, COM-). But the maximum output current is 150mA, and when driving the output such as relay and brake, please use external independent power.  
 Note 2: Please connect protective circuit (diode) when driving load with inductive component such as relay.  
 Note 3: Output pins can output high level or low level, based on different wiring mode. So perform the wiring according to actual needs. Make wiring as follows:



Note 4: The differential pulse output and 485 communication circuits need to connect the terminal resistor.  
 Note 5: Connect the signal ground on the host control device of output signal of the encoder. The connection of signal ground and power supply GND may cause malfunction.

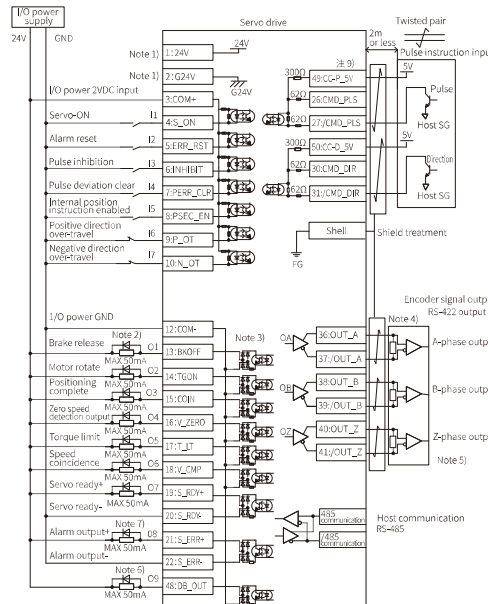
Note 6: O9 does not configure any functions by default, but can be used as the DO output and the OC output of Z-pulse. In this case, do not configure any DO function to O9 that is P04.29 is set to 0, and P04.54 is set to 1.

Note 7: The default function of O8 is the fault output, and the default output logic state is normally closed output.  
 Note 8: Two cases according to the pulse generation mode: NPN and PNP, as shown below.

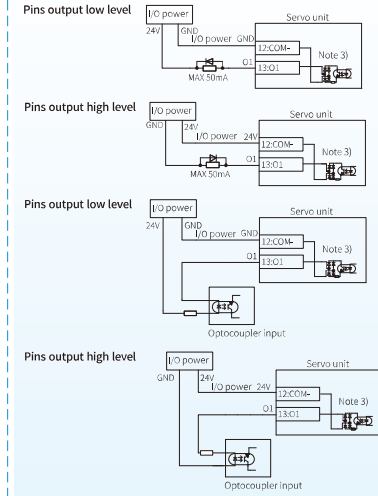


Note 9: Two cases according to the pulse generation mode: NPN and PNP, as shown below.  
 \* DI function can be flexibly configured by function codes. DI is valid by default when connected and the logic can be changed by function codes.  
 \* DO function can be flexibly configured by function codes. DO is valid by default when connected and the logic can be changed by function codes.

Pulse instruction 5V open-collector input



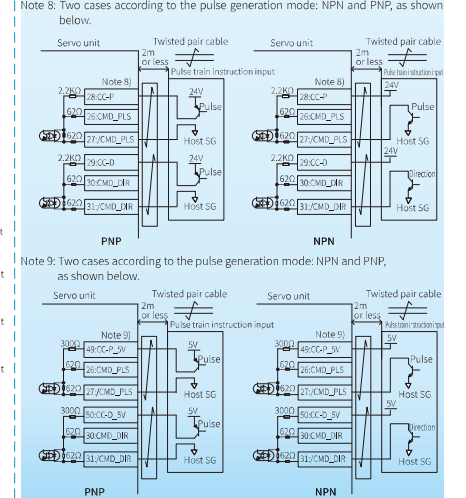
Note 1: Control power output (24V, G24V) can be used as I/O power (COM+, COM-). But the maximum output current is 150mA, and when driving the output such as relay and brake, please use external independent power.  
 Note 2: Please connect protective circuit (diode) when driving load with inductive component such as relay.  
 Note 3: Output pins can output high level or low level, based on different wiring mode. So perform the wiring according to actual needs. Make wiring as follows:



Note 4: The differential pulse output and 485 communication circuits need to connect the terminal resistor.  
 Note 5: Connect the signal ground on the host control device of output signal of the encoder. The connection of signal ground and power supply GND may cause malfunction.

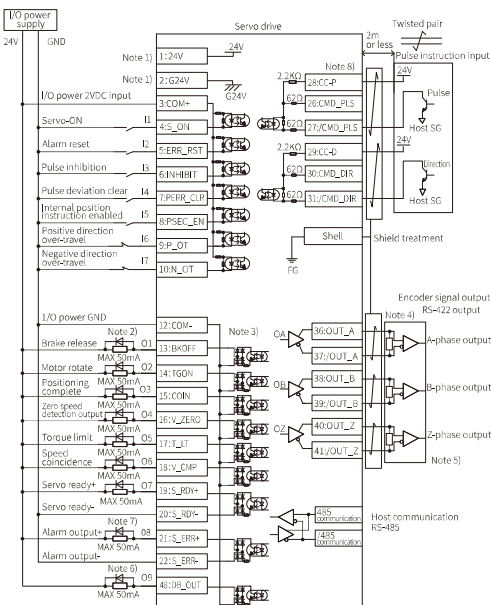
Note 6: O9 does not configure any functions by default, but can be used as the DO output and the OC output of Z-pulse. In this case, do not configure any DO function to O9 that is P04.29 is set to 0, and P04.54 is set to 1.

Note 7: The default function of O8 is the fault output, and the default output logic state is normally closed output.  
 Note 8: Two cases according to the pulse generation mode: NPN and PNP, as shown below.

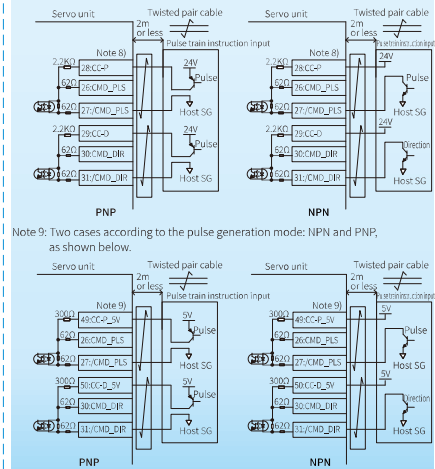


Note 9: Two cases according to the pulse generation mode: NPN and PNP, as shown below.  
 \* DI function can be flexibly configured by function codes. DI is valid by default when connected and the logic can be changed by function codes.  
 \* DO function can be flexibly configured by function codes. DO is valid by default when connected and the logic can be changed by function codes.

Pulse instruction 24V open-collector input

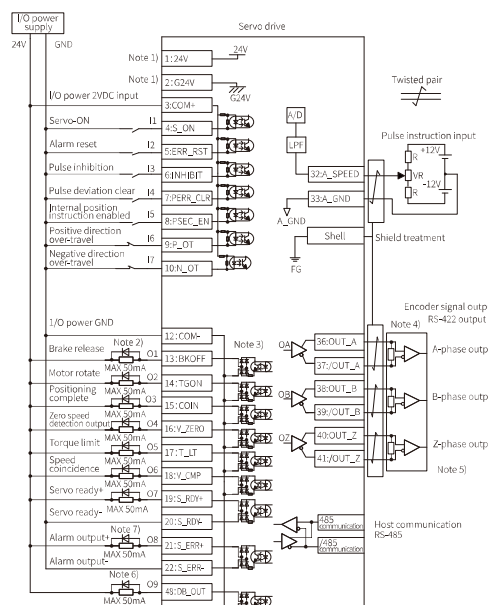


Note 8: Two cases according to the pulse generation mode: NPN and PNP, as shown below.  
 Note 9: Two cases according to the pulse generation mode: NPN and PNP, as shown below.

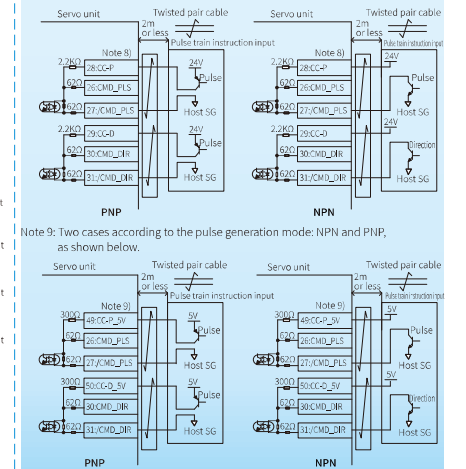


Note 9: Two cases according to the pulse generation mode: NPN and PNP, as shown below.  
 \* DI function can be flexibly configured by function codes. DI is valid by default when connected and the logic can be changed by function codes.  
 \* DO function can be flexibly configured by function codes. DO is valid by default when connected and the logic can be changed by function codes.

Analog input



Note 8: Two cases according to the pulse generation mode: NPN and PNP, as shown below.  
 Note 9: Two cases according to the pulse generation mode: NPN and PNP, as shown below.



Note 9: Two cases according to the pulse generation mode: NPN and PNP, as shown below.  
 \* DI function can be flexibly configured by function codes. DI is valid by default when connected and the logic can be changed by function codes.  
 \* DO function can be flexibly configured by function codes. DO is valid by default when connected and the logic can be changed by function codes.



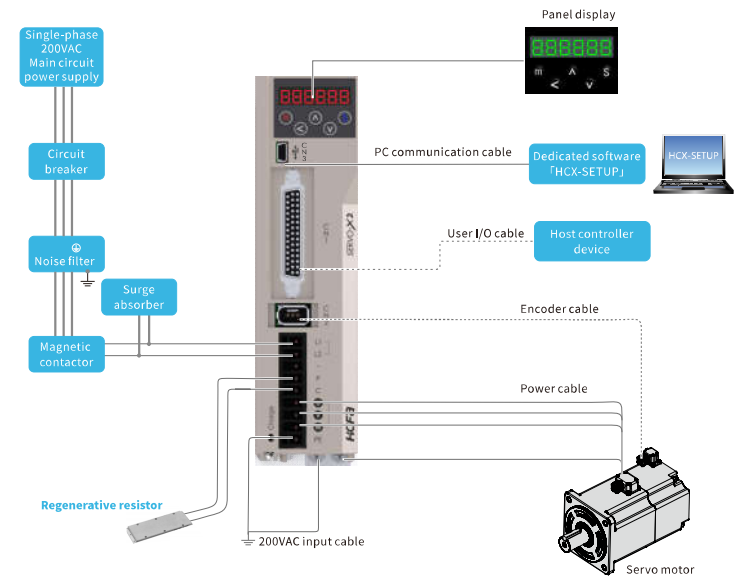
# X2E series servo drive



More functions

- Parameter grouping setting
- Control mode switchover online
- Standard 17-bit encoder, optional 20-bit
- Two groups of gain switchover, quick response and steady STOP
- Built-in 16-segment position control(Point table Group P08)
- High-accuracy and high-response interrupt positioning setting(P08.86)
- Potential energy load torque compensation(P06.10/ Z-axis Robot)
- Built-in process control, tool turret function /E-CAM
- I/O function customization(P04/P05)
- Wide voltage input, lowest 50% (P06.36)
- Instantaneous power failure protection(P06.24)
- Regenerative braking and dynamic braking(DO16)
- Absolute system voltage monitoring, under-voltage warning function(P06.48)
- Protective functions
- Overcurrent/overvoltage/overspeed/Input/output phase loss/encoder error
- Protection classification, level 1-3 for warning and failure.
- Support parameter management, monitoring and oscilloscope
- CANOpen networking, multi-axis interconnection

System wiring diagram



[Points for Correct Wiring]

- ※A twisted shielded cable should be used when I/O communication cable, between upper control device and drive, is over 50cm.
- ※The encoder cable should be less than 20m when wiring.

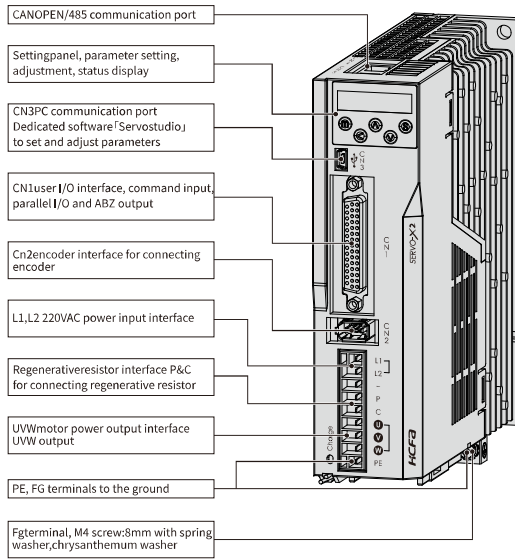
**⚠ Cautions**

- ① Please note that there is high voltage in the solid line of wiring diagram when wiring and using.
- ② The dotted lines in the wiring diagram indicates non-dangerous voltage circuit.

Connector description for servo drive and motor

Items	Items
Peripheral devices	Conform to European EC Directive. Select the device which meets corresponding standards and install them in accordance with Figure 4.1.1 System Wiring diagram
Installation environment	Install the drive in environment conforming to Pollution degree 2 or 1 of IEC60664-1.
Power supply 1: 00-230VAC (main and control circuit)	This product can be used under the conditions that conform to IEC60664-1 and overvoltage category II.
Power supply 2: 24VDC • I/O power supply • Power supply for brake release	24VDC external power supply should use SELV power supply (※) and be less than 150W. This is the CE corresponding conditions. ※SELV: safety extra low voltage (Reinforced insulation is needed for safety extra low voltage, non-dangerous voltage and dangerous voltage.)
Wiring	Please use withstand voltage cables which are equivalent to AWG18/600V or AWG14/600V for motor power cable, encoder cable, AC220 input cable, FG cable and main circuit power distribution cable under multi-axis drive structure respectively when drives are less than 750W or more than 1kW.
Circuit breaker	Switch off the power supply to protect power cord when overcurrent occurs. Make sure to use the breaker between power supply and interference filter that conforms to IEC specification and UL recognition in accordance with the User manual. Please use the breaker with leakage function recommended by HCFA in order to meet EMC standards.
Noise filter	To prevent the outside interference from power cables please use the interference filter recommended by HCFA in order to meet EMC standards.
Magnetic contactor Surge absorber	Switch main power supply (ON/OFF). And use it after installing a surge absorber. Please use the surge absorber recommended by HCFA.
Interference filter for signal cable / ferrite core	Please use the interference filter recommended by HCFA in order to meet EMC standards.
Regenerative resistor	This product is not equipped with regenerative resistor. The external regenerative resistor is necessary when the internal capacitor cannot absorb more regenerative power and regenerative voltage alarm is ON. For details, refer to 1.4 Model selection of external regenerative resistor. Use a built-in thermostat and set overheat protect circuit. This product belongs to Class I and need grounding protection. Grounding should be executed for the case and cabinet that conforms to EMC. The following symbol indicates the protection grounding terminal.
Grounding	

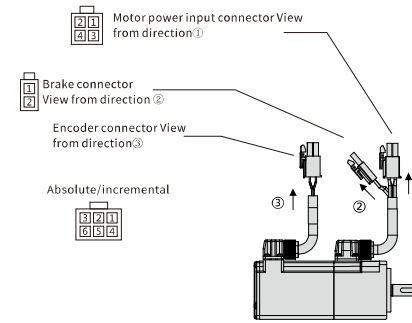
Terminal arrangement for the drive



Terminal arrangement for the drive (750W or less)

Name	Symbol	Pin No.	Signal name	Contents
Regenerative resistor	P/C	4	P	P interface of regenerative resistor
		5	C	C interface of regenerative resistor
Single-phase AC220V input	L1/L2	1	Primary-Power1	L1
		2	Primary-Power2	L2
Motor power output	U/V/W	1	U	Motor power U phase output
		2	V	Motor power V phase output
		3	W	Motor power W phase output
Encoder	CN2	1	VCC	Encoder power supply 5V output
		2	GND	Signal grounding
		3	NC	-
		4	NC	-
Encoder (Incremental)		5	+D	Encoder signal: data input/output
		6	-D	Encoder signal: data input/output
		-	FG	Connect SHIELD to the connector housing
		1	VBUS	USB data
		2	D-	USB data-
		3	D+	USB data+
Encoder (Absolute)		4	NC	-
		5	GND	USB signal grounding
		1	CANH	CAN communication port
		2	CANL	CAN communication port
		3	GND-CAN	CAN communication grounding
		4	485	Rs485 communication port
CANOPEN/485 communication part	CN4/CN5	5	/485	Rs485 communication port
		6	-	-
		7	-	-
		8	-	-
User I/O	CN1			Refer to Section 4.5 Wiring description of I/O control terminal (CN1)

Motor connector and pins arrangements(50W to 100W)

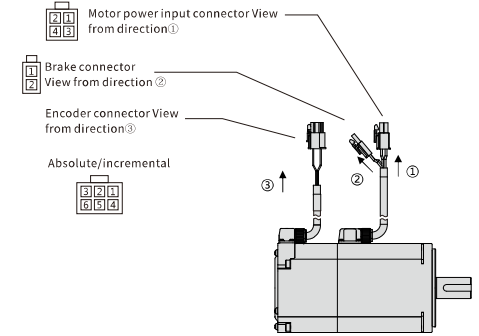


Cable list (For 50W to 100W)

Name	Cable
Motor power input	AWG21
Brake <sup>Note 1)</sup>	AWG21
Encoder (Incremental)	AWG24
Encoder (Absolute)	

Note 1) For motor with brake.

Motor connector and pins arrangements(200W to 1KW)



Cable list (For 200W to 1KW)

Name	Cable
Motor power input	AWG19
Brake <sup>Note 1)</sup>	AWG21
Encoder (Incremental)	AWG24
Encoder (Absolute)	

Note 1) For motor with brake.

For 50W to 100W

Pin No.	Signal name	Contents	Wire color
<b>Motor power input</b>			
1	U	Motor power U phase	Red
2	V	Motor power V phase	White
3	W	Motor power W phase	Black
4	FG	Motor housing grounding	Green
<b>Brake*1</b>			
1	BRK+	Brake power supply 24VDC	Yellow(orange)
2	BRK-	Brake power supply GND	Blue(brown)
<b>Encoder (Incremental)</b>			
1	-	NC	-
2	+D	Serial communication data + data	White (red dotted)
3	-D	Serial communication data - data	White (black dotted)
4	VCC	Encoder power supply 5V	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black
<b>Encoder (Absolute)</b>			
1	BAT	External battery (*2)	Yellow(red dotted)
2	+D	Serial communication data +	White (red dotted)
3	-D	Serial communication data -	White (black dotted)
4	VCC	Encoder power supply 5V output	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black

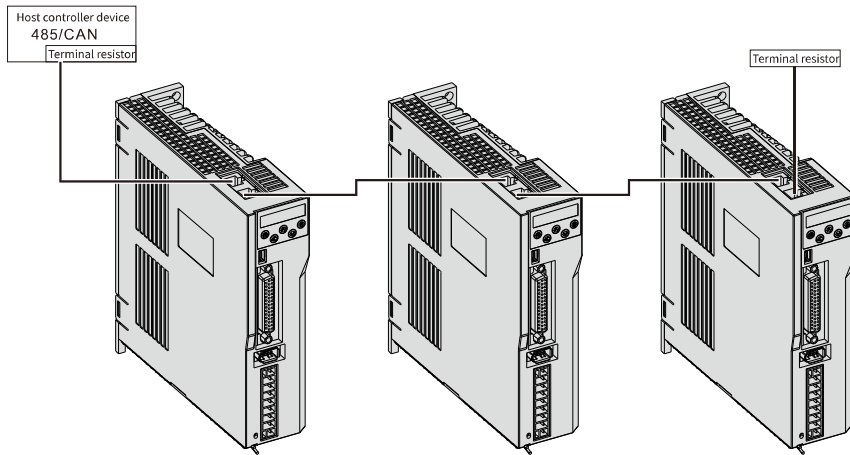
\*1 For motor with brake.  
\*2 External capacitor and battery are taking GND as the reference potential.

For 200W to 1KW

Pin No.	Signal name	Contents	Wire color
<b>Motor power input</b>			
1	U	Motor power U phase	Red
2	V	Motor power V phase	White
3	W	Motor power W phase	Black
4	FG	Motor housing grounding	Green
<b>Brake*1</b>			
1	BRK+	Brake power supply 24VDC	Yellow(orange)
2	BRK-	Brake power supply GND	Blue(brown)
<b>Encoder (Incremental)</b>			
1	-	NC	-
2	+D	Serial communication data + data	White (red dotted)
3	-D	Serial communication data - data	White (black dotted)
4	VCC	Encoder power supply 5V	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black
<b>Encoder (Absolute)</b>			
1	BAT	External battery (*2)	Yellow(red dotted)
2	+D	Serial communication data +	White (red dotted)
3	-D	Serial communication data -	White (black dotted)
4	VCC	Encoder power supply 5V output	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black

\*1 For motor with brake.  
\*2 External capacitor and battery are taking GND as the reference potential.

RS-485 communication wirings

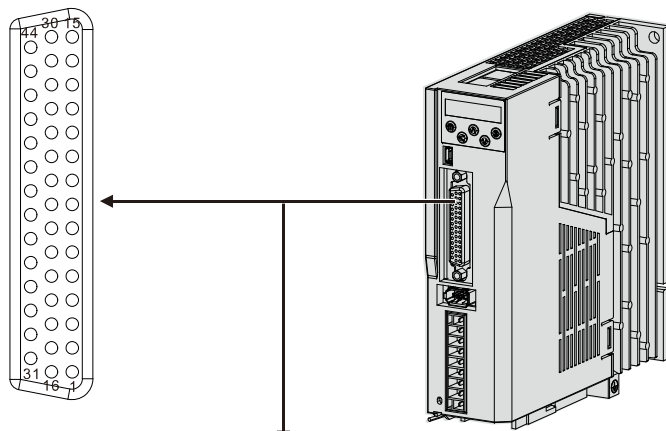


**■ Pins definition**

Pins No.	Signal name	Contents
1	CANH	CAN communication port
2	CANL	CAN communication port
3	GND-CAN	CAN communication grounding
4	485	Rs485 communication port
5	/485	
6	/	/
7	/	/
8	/	/

Pins No.	Signal name	Contents
1	O4+	Digital signal output
2	O3-	Digital signal output
3	O3+	Digital signal output
4	O2-	Digital signal output
5	O2+	Digital signal output
6	O1-	Digital signal output
7	O1+	Digital signal output
8	I4	Digital signal input
9	I1	Digital signal input
10	I2	Digital signal input
11	COM1	I/O power input
12	-	-
13	OUTZ	Pulse output Z
14	G24V	Drive power GND
15	-	-
16	-	-
17	24V	Drive power 24V output
18	-	-
19	-	-
20	-	-
21	OUTA	Pulse output A
22	/OUTA	Pulse output /A
23	/OUTB	Pulse output /B
24	/OUTZ	Pulse output /Z
25	OUTB	Pulse output B
26	O4-	Digital signal output
27	O5-	Digital signal output
28	O5+	Digital signal output
29	GND_OZ	Open-collector output GND_OZ
30	I8	Digital signal input
31	I7	Digital signal input
32	I6	Digital signal input
33	I5	Digital signal input
34	I3	Digital signal input
35	CC-P	Pulse and direction input common terminal 24V
36	-	-
37	CMD_DIR	Pulse instruction input DIR+
38	-	-
39	/CMD_DIR	Pulse instruction input DIR-
40	-	-
41	CMD_PLS	Pulse instruction input PLS+
42	-	-
43	/CMD_PLS	Pulse instruction input PLS-
44	OZOUT	Open-collector output OZOUT

I/O control terminal (CN1) descriptions



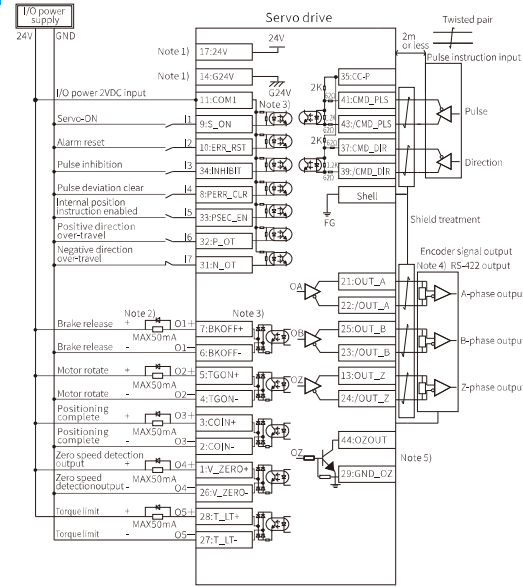
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
G24	OUTZ	COM1	I2	I1	I4	O1+	O1-	O2+	O2-	O3+	O3-	O4+		
30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
GND_OZ	O5+	O5-	O4-	OUTB	OUTZ	OUTB	OUTA	OUTA	CC_P	I3	I5	I6	I7	+24V
44	43	42	41	40	39	38	37	36	35	34	33	32	31	
OZOUT /CMD_PLS	CMD_PLS	/CMD_DIR	CMD_DIR											

Figure 4.5.1 User control terminal

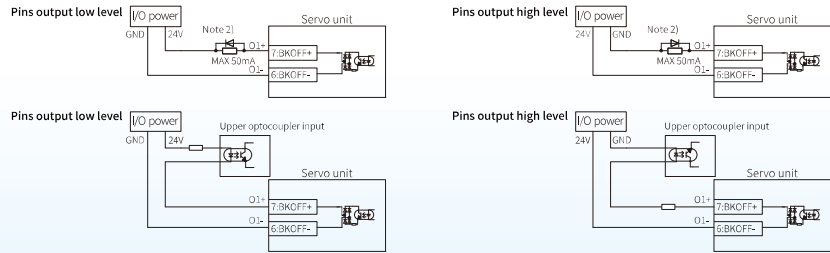


Standard wiring diagrams

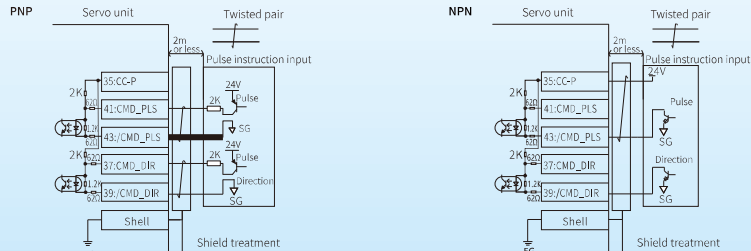
Pulse instruction differential input



Note 1: Control power output (24V, G24V) can be used as I/O power (COM+, COM-). But the maximum output current is 150mA, and when driving the output such as relay and brake, please use external independent power.  
 Note 2: Please connect protective circuit (diode) when driving load with inductive component such as relay.  
 Note 3: Output pins can output high level or low level, based on different wiring mode. So perform the wiring according to actual needs.  
 Make wiring as follows:

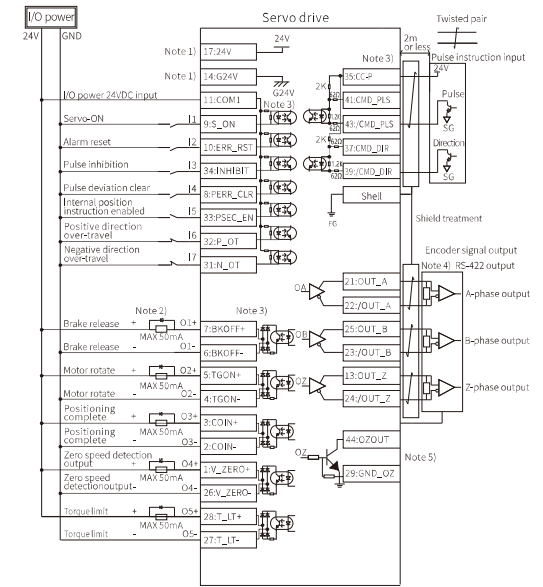


Note 4) The connecting terminal of differential pulse output signal, differential signal of 485 communication circuits and CANOPEN communication circuits need to be connected the terminal resistor.  
 Note 5) OZOUT is open-collector output and no manual configuration required.  
 Note 6) Two kinds of wiring according to the pulse generation mode: NPN and PNP, as shown below.

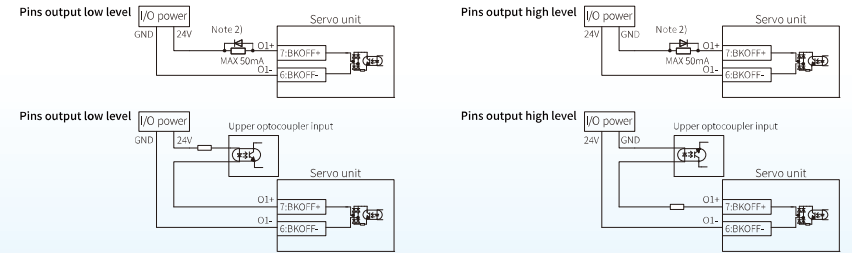


Note 7) If 5V open-collector circuit is required, be sure to connect an external 300Ω resistor.  
 ※ DI function can be flexibly configured by function codes. DI is valid by default when connected and the logic can be changed by function codes.  
 ※ DO function can be flexibly configured by function codes. DO is valid by default when connected and the logic can be changed by function codes.

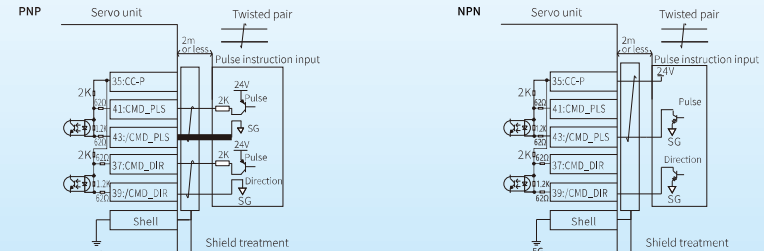
Pulse instruction 24V open-collector input



Note 1: Control power output (24V, G24V) can be used as I/O power (COM+, COM-). But the maximum output current is 150mA, and when driving the output such as relay and brake, please use external independent power.  
 Note 2: Please connect protective circuit (diode) when driving load with inductive component such as relay.  
 Note 3: Output pins can output high level or low level, based on different wiring mode. So perform the wiring according to actual needs.  
 Make wiring as follows:



Note 4) The connecting terminal of differential pulse output signal, differential signal of 485 communication circuits and CANOPEN communication circuits need to be connected the terminal resistor.  
 Note 5) OZOUT is open-collector output and no manual configuration required.  
 Note 6) Two kinds of wiring according to the pulse generation mode: NPN and PNP, as shown below.



Note 7) If 5V open-collector circuit is required, be sure to connect an external 300Ω resistor.  
 ※ DI function can be flexibly configured by function codes. DI is valid by default when connected and the logic can be changed by function codes.  
 ※ DO function can be flexibly configured by function codes. DO is valid by default when connected and the logic can be changed by function codes.

# X3T Series Servo Drive



## Network | EtherCAT

### Advancement

Advanced fuzzy control to increase the accuracy  
High response frequency 2.3KHz, twice improved than before  
20-bit encoder, shorten the positioning time  
LCD panel, full and clear display

### Intelligence

Real-time auto gain adjustment/ inertia ratio identification  
Set notch filter\*4 automatically to eliminate resonance  
Set damping filter\*4 to stop shaking  
Set wizards/device simulation/ life expectancy

### Comprehension

Full-closed control/DD& linear motor  
Online switchover of control modes/DIDO function customization  
External disturbance observing/torque feedforward/friction torque compensation  
Regenerative braking/dynamic braking/ Instantaneous power failure protection/power inrush suppression  
3 gain switchover/inertia ratio switchover/gear ratio switchover/torque limit switchover  
Temperature monitoring/test run/parameter initialization/frequency measurement/oscilloscope/warning records

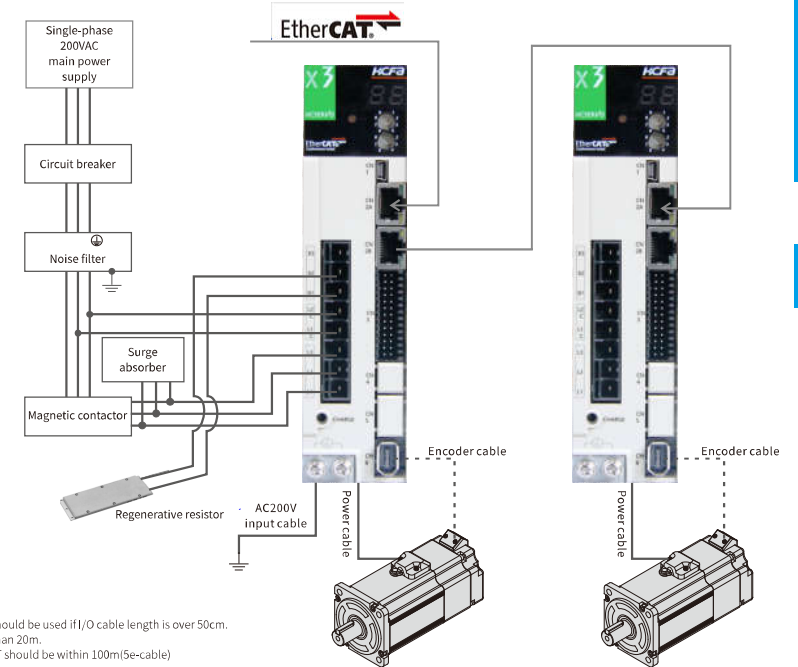
### Safety

Compliance with European safety standards  
STO interface, double circuit, no need to switch contactor  
Lower and suppress radiation noise  
High noise immunity to curb the external noise

### IoT

IoT wireless debugging  
EtherCAT interface  
EtherNET interface  
RS485 interface  
PC/tablet/mobile client

## Wiring Diagram



### [Points for Correct Wiring]

- \* A twisted-pair shielded cable should be used if I/O cable length is over 50cm.
- \* Encoder cable should be less than 20m.
- \* The distance between EtherCAT should be within 100m(5e-cable)

### ⚠ Cautions

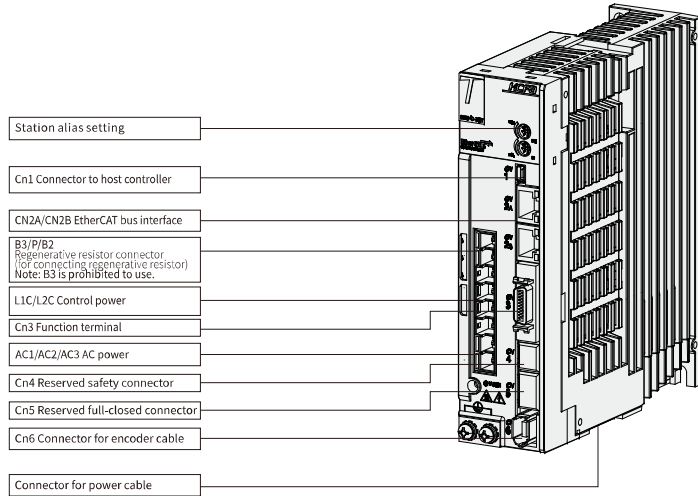
- ① Please note that there is high voltage in the solid line of wiring diagram when wiring and using.
- ② The dotted lines in the wiring diagram indicates non-dangerous voltage circuit.

## Connector description for servo drive and motor

Items	Description
Peripheral devices	Conform to European EC Directive. Select the device which meets corresponding standards and install them in accordance with Figure 4.1.1 System Wiring diagram
Installation environment	Install the drive in environment conforming to Pollution degree 2 or 1 of IEC60664-1.
Power supply 1: 200~230VAC (main circuit)	This product can be used under the conditions that conform to IEC60664-1 and overvoltage category II .
• I/O power supply • Power supply for brake release	24VDC external power supply should use SELV power supply (*) and be less than 150W. This is the CE corresponding conditions. *SELV: safety extra low voltage (Reinforced insulation is needed for safety extra low voltage, non-dangerous voltage and dangerous voltage.)
Wiring	Please use withstand voltage cables which are equivalent to AWG18/600V or AWG14/600V for motor power cable, encoder cable, AC220 input cable, FG cable and main circuit power distribution cable under multi-axis drive structure respectively when drives are less than 750W or more than 1kW.
Circuit breaker	Switch off the power supply to protect power cord when overcurrent occurs. Make sure to use the breaker between power supply and interference filter that conforms to IEC specification and UL recognition in accordance with the User manual. Please use the breaker with leakage function recommended by HCFA in order to meet EMC standards.
Noise filter	To prevent the outside interference from power cables please use the interference filter recommended by HCFA in order to meet EMC standards.
Magnetic contactor	Switch main power supply (ON/OFF). And use it after installing a surge absorber.
Surge absorber	Please use the surge absorber recommended by HCFA.
Interference filter for signal cable / ferrite core	Please use the interference filter recommended by HCFA in order to meet EMC standards.
Regenerative resistor	This product is not equipped with regenerative resistor. The external regenerative resistor is necessary when the internal capacitor cannot absorb more regenerative power and regenerative voltage alarm is ON. For details, refer to 1.4 Model selection of external regenerative resistor. Use a built-in thermostat and set overheat protect circuit.
Grounding	This product belongs to Class 1 and need grounding protection. Grounding should be executed for the case and cabinet that conforms to EMC. The following symbol indicates the protection grounding terminal.



Drive terminal descriptions



Terminal arrangement for the drive

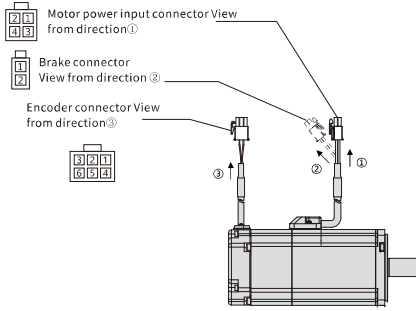
Name	Symbol	Pin No.	Signal name	Contents
Main circuit terminals	L1/L2/L3/L1C/L2C/B1/B2/B3	1	L1	Main power input terminals. For single phase inputs please connect to L1 & L3.
		2	L2	
		3	L3	
		4	L1C	Control power input terminals.
		5	L2C	
		6	B1	
		7	B2	
		8	B3	Internal regenerative resistor terminal (reserved).
Motor power terminals	U/V/W	1	U	Motor power terminals.
		2	V	
		3	W	
Encoder	CN6	1	VCC	Encoder power 5V output.
		2	GDN	Encoder signal and power grounding.
		3	-	NC
		4	-	NC
		5	D+	Encoder communication data
		6	D-	Encoder communication data
		Shell	FG	Shield grounding
Full-closed control interface (Reserved)	CN5	1	NC	E5V
		2	GND	GND
		3	EXPS+	EXPS+
		4	EXPS-	EXPS-
		5	485	A+
		6	/485	A-
		7	SG	B+
		8	24V	B-
		9	G24	Z+
		10	NC	Z-

Terminal arrangement for the drive

Name	Symbol	Pin No.	Signal name	Contents
Safety interface (Reserved)	CN4	1	-	Do not connect to these terminals.
		2	-	
		3	-	
		4	SF1+	Safety input 1.
		5	SF1-	
		6	SF2+	Safety input 2
		7	SF2-	
		8	EDM+	Safety function error monitoring output.
8	EDM-			
I/O interface	CN3	1	COM	Digital input power common terminal.
		2	I1	Digital input terminal 1.
		3	I2	Digital input terminal 2.
		4	I3	Digital input terminal 3.
		5	I4	Digital input terminal 4.
		11	I5	Digital input terminal 5.
		12	I6	Digital input terminal 6.
		13	I7	Digital input terminal 7.
		14	I8	Digital input terminal 8.
		6	BTP	Absolute encoder battery power +.
		7	BTN	Absolute encoder battery power -.
		8	GND	Analog output reference grounding.
		9	AM1	Analog output terminal 1.
		10	AM2	Analog output terminal 2.
		19	BRK-	Digital output terminal 1 (default: brake output).
		20	BRK+	
		15	SO2-	Digital output terminal 2
		16	SO2+	
		17	ALM-	Digital output terminal 3 (default: alarm output)
		18	ALM+	
ECAT interface	CN2A/CN2B	1	TX/RX+	Transmitting/receiving +
		2	TX/RX-	Transmitting/receiving -
		3	RX/TX+	Receiving/transmitting +
		4	-	Reserved
		5	-	Reserved
		6	RX/TX-	Receiving/transmitting -
		7	-	Reserved
		8	-	Reserved
		Shell	FG	Casing grounding.
		PC communication	CN1	1
2	D-			USB data -
3	D+			USB data +
4	-			Reserved
5	GND			USB signal grounding



Motor connector and pins arrangement (750W or below)



Cable list (For motor of 750W or below)

Name	Cable
Motor power input	AWG18
Brake <sup>Note 1)</sup>	AWG22
Encoder (Incremental)	AWG24
Encoder (Absolute)	

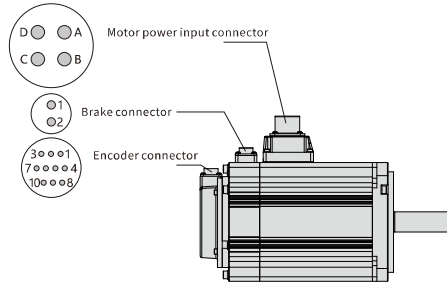
Note 1) For motor with brake.

For motor of 750W or below

Pin No.	Signal name	Contents	Wire color
<b>Motor power input</b>			
1	U	Motor power U phase	Red
2	V	Motor power V phase	White
3	W	Motor power W phase	Black
4	FG	Motor housing grounding	Green
<b>Brake※1</b>			
1	BRK+	Brake power supply 24VDC	Yellow(orange)
2	BRK-	Brake power supply GND	Blue(brown)
<b>Encoder (incremental)</b>			
1	—	NC	—
2	+D	Serial communication data +	White (red dotted)
3	-D	Serial communication data -	White (black dotted)
4	VCC	Encoder power supply 5V	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black
<b>Encoder (Absolute)</b>			
1	BAT	External battery (※2)	Yellow(fred dotted)
2	+D	Serial communication data +	White (red dotted)
3	-D	Serial communication data -	White (black dotted)
4	VCC	Encoder power supply 5V	Orange (red dotted)
5	GND	Signal ground	Orange (black dotted)
6	SHIELD	Shielded wires	Black

※1 For motor with brake.  
 ※2 External capacitor and battery are taking GND as the reference potential.

Motor connector and pins arrangement (1kW or above)



Cable list (for motor of 1kW or above)

Name	Cable
Motor power input	AWG15
Brake <sup>Note 1)</sup>	AWG18
Encoder (Incremental)	AWG24
Encoder (Absolute)	

Note 1) For motor with brake.

For motor of 1kW or more

Pin No.	Signal name	Contents	Notes
<b>Motor power input</b>			
A	U	Motor power U phase	
B	V	Motor power V phase	
C	W	Motor power W phase	
D	FG	Motor housing grounding	
<b>Brake※1</b>			
1	BRK1	Brake power supply 24VDC	
2	BRK2	Brake power supply GND	
<b>Encoder (incremental)</b>			
1	VCC	Encoder power supply 5V output	
2	GND	Signal ground	
3	—	NC	
4	—	NC	
5	+D	Serial communication data +	
6	-D	Serial communication data -	
7	—	NC	
8	—	NC	
9	—	NC	
10	SHIELD	Shielded wires	
<b>Encoder (Absolute)</b>			
1	VCC	Encoder power supply 5V output	
2	GND	Signal ground	
3	CAP	External capacitor (※2)	
4	BAT	External battery (※2)	
5	+D	Serial communication data +	
6	-D	Serial communication data -	
7	IC	Internal connection (※3)	
8	IC	Internal connection (※3)	
9	GND	Signal ground	
10	SHIELD	Shielded wires	

※1 For motor with brake.  
 ※2 External capacitor and battery are taking GND as the reference potential.  
 ※3 Internal connection (IC) has been connected internally. Do not connect it with any other wires.

# X6 series servo drive



Fast speed

Control loop cycle: 40μs  
 Speed loop band-width: 1.2KHz (one time of inertia ratio)  
 Positioning time: <math>\leq 5ms</math>  
 (T Acc=50ms, Vmax=3000r pm)

Steady operation

Online load parameter identification  
 Online auto gain adjustment  
 Online adaptive notch filter resonance elimination  
 Low-frequency damping control

Exact control

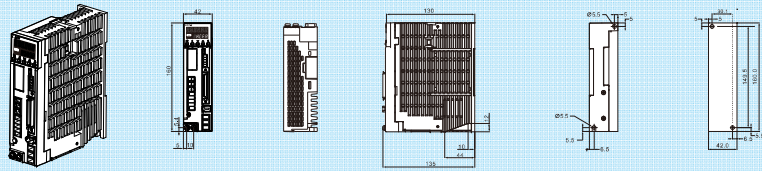
Positioning accuracy in theory : +/- 1 (131072)  
 Speed control accuracy: +/- 1 RPM  
 Torque control resolution: 0.1%\* rated torque  
 Analog input resolution: Max.16bit, optional

More functions

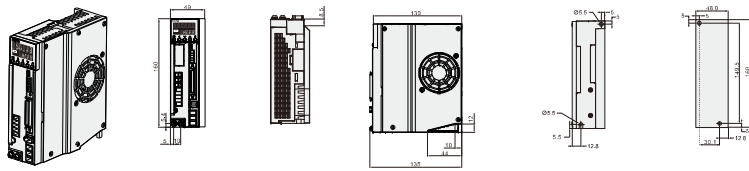
Parameter grouping setting  
 Control mode switchover online  
 Standard 17-bit encoder, optional 20-bit  
 Two groups of gain switchover, quick response and steady STOP  
 Built-in 16-segment position control(Point table Group P08)  
 High-accuracy and high-response interrupt positioning setting(P08.86)  
 Potential energy load torque compensation(P06.10/ Z-axis Robot)  
 Built-in process control, tool turret function /E-CAM  
 I/O function customization(P04/P05)  
 Control power AC power input  
 Wide voltage input, lowest 50% (P06.36)  
 Instantaneous power failure protection(P06.24)  
 Regenerative braking and dynamic braking(D016)  
 Absolute system voltage monitoring, under-voltage warning function(P06.48)  
 Protective functions  
 Overcurrent/overvoltage/overspeed/Input/output phase loss/encoder error  
 Protection classification, level 1-3 for warning and failure.  
 Support parameter management, monitoring and oscilloscope

X3E series servo drive – External dimension

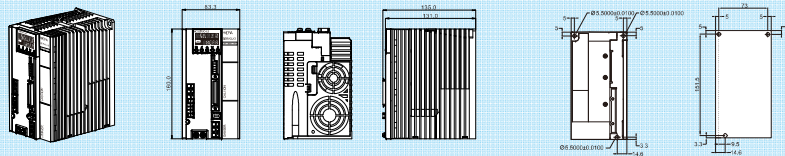
Models of 200W or less



Models of 400W/750W

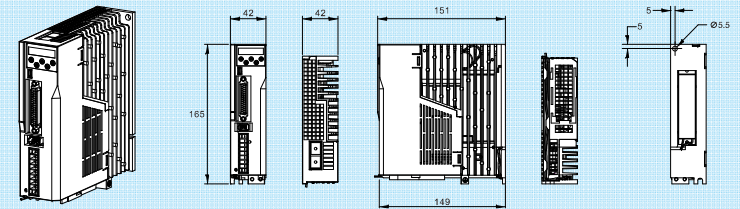


Models of 1kW or more

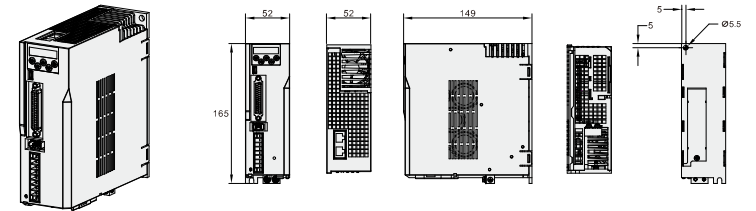


X2E series servo drive – External dimensions

Models of 750W or less

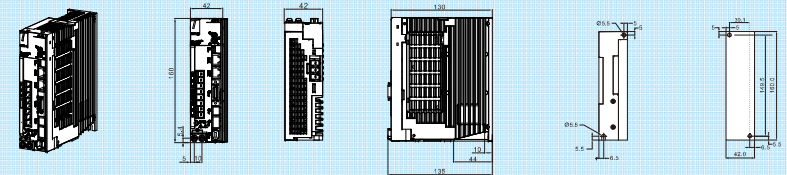


Models of 750W/1kW



X3T series servo drive – External dimensions

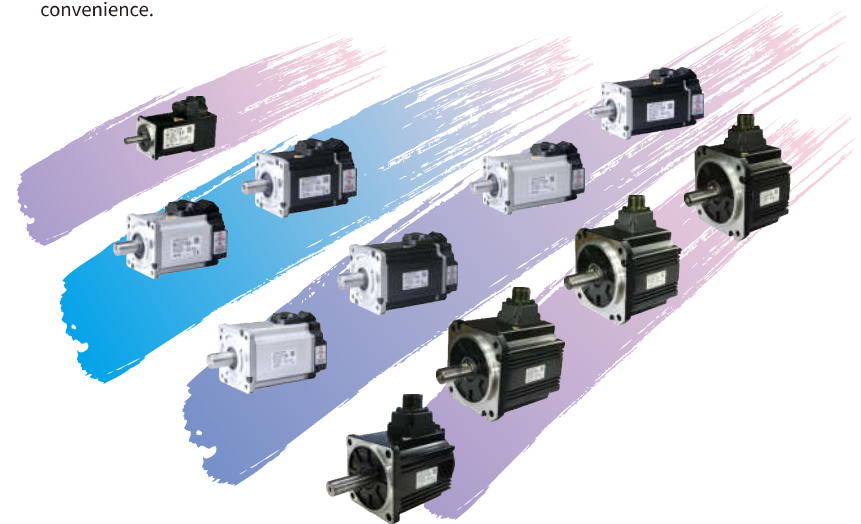
Models of 750W or less



HCSV-X1 series Servo motor

HCSV-X3 series Servo motor

SV series servo has provided the best solution for all the fields of manufacturing, which requires automation, high-speed, high-precision and convenience.



Model name identification

S V - X 3 M A 0 7 5 A - B 2 L N - \* \*

① Product series		③ Power specifications		④ Brake specifications		⑥ Shaft-end specifications		⑧ Customized version	
Symbol	Specifications	Symbol	Specifications	Symbol	Specifications	Symbol	Specifications	Symbol	Specifications
X1 series		005A	50W	N	No brake	K	Keyway shaft/no oil seal		**
X3 series		010A	100W	B	With brake	L	Keyway shaft/with oil seal		
		020A	200W						
		040A	400W						
		075A	750W						
		100A	1KW						
		150A	1.5KW						
		200A	2KW						
		300A	3KW						
		400A	4KW						
		500A	5KW						
		750A	7.5KW						
		115B	11.5KW						
		150B	15KW						
		220B	22KW						

② Inertia specifications		⑤ Power voltage specifications		⑦ Encoder specifications	
Symbol	Specifications	Symbol	Specifications	Symbol	Specifications
MA	Low inertia	1	110V	N	Single-turn absolute 17-bit
MM	Middle inertia	2	220V	A	Multi-turn absolute 17-bit
MH	High inertia	4	400V	B	Multi-turn absolute 20-bit
MG	Low-speed and high-torque	6	48V	C	Multi-turn absolute 22-bit
MQ	Straight type			D	Multi-turn absolute 24-bit
				T	Tama-gawa 17-bit
				M	Tama-gawa 23-bit
				K	Nikon single-turn absolute 20-bit
				L	Nikon multi-turn absolute 20-bit

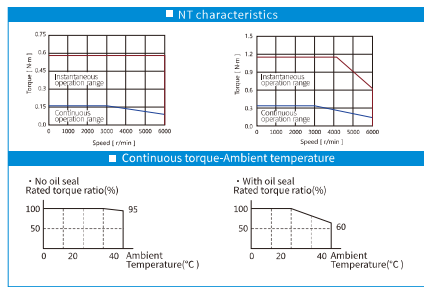
Notes: For special models, please refer to Model Selection.



MM005A/MM010A Outline



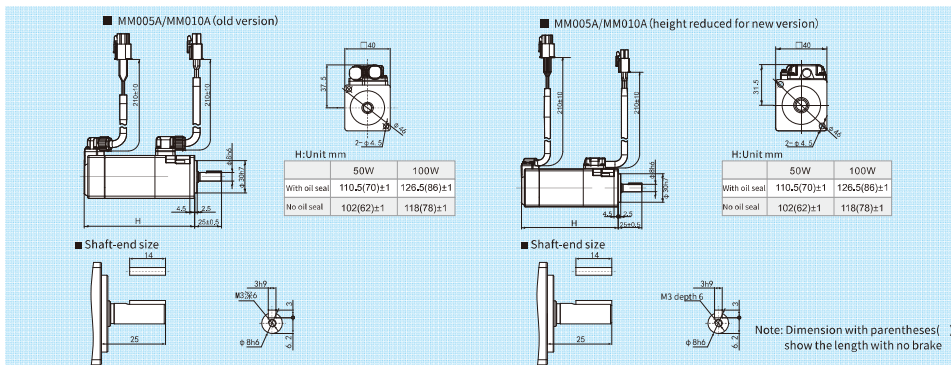
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	50W Middle inertia MM005A	100W Middle inertia MM010A
Fitting flange size		mm	φ40	φ40
Approximate mass(No brake)		Kg	0.4	0.4
Approximate mass(With brake)		Kg	0.6	0.8
Rated voltage		V	AC200	AC200
Rated output		W	50	100
Rated torque		N·m	0.16	0.32
Instantaneous max. torque		N·m	0.56	1.12
Rated current		Arms	0.6	0.8
Instantaneous max. current		Arms	1.8	2.4
Rated speed		r/min	3000	3000
Max. speed		r/min	6000	6000
Torque constant		N·m/A	0.30	0.45
Induced voltage constant per phase		MV(r/min)	10.6	15.8
Rated power rate(No brake)		KW/S	5.4	13.1
Rated power rate(With brake)		KW/S	4.7	12.2
Mechanical time constant(No brake)		ms	2.67	1.61
Mechanical time constant(With brake)		ms	3.04	1.74
Electrical time constant		ms	0.6	0.7
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.047	0.077
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.054	0.093
Usage			Holding	Holding
Rated voltage		V	DC24V±10%	DC24V±10%
Rated current		A	0.25	0.25
Static friction torque		Nm	0.16 or more	0.29 or more
Suction time		ms	35 at 100% voltage	35 at 100% voltage
Release time		ms	20 at 100% voltage	20 at 100% voltage
Release voltage		V	DC1V or more	DC1V or more

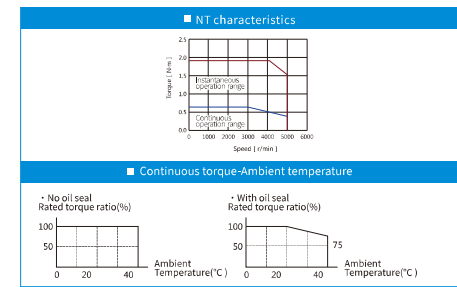
External dimensions



MA020A/MH020A Outline



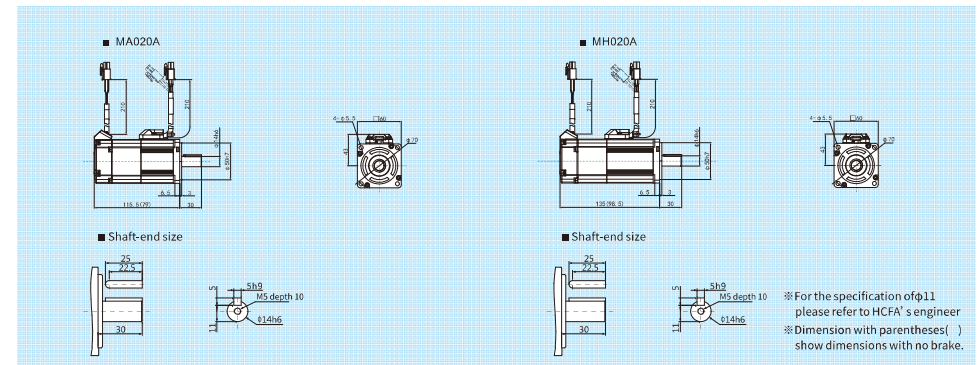
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	200W Low inertia MA020A	200W High inertia MH020A
Fitting flange size		mm	φ60	φ60
Approximate mass(No brake)		Kg	0.9	1.0
Approximate mass(With brake)		Kg	1.4	1.5
Rated voltage		V	AC200	AC200
Rated output		W	200	200
Rated torque		N·m	0.64	0.64
Instantaneous max. torque		N·m	1.91	1.91
Rated current		Arms	1.7	1.7
Instantaneous max. current		Arms	4.9	4.9
Rated speed		r/min	3000	3000
Max. speed		r/min	5000	5000
Torque constant		N·m/A	0.417	0.417
Induced voltage constant per phase		MV(r/min)	14.5	14.5
Rated power rate(No brake)		KW/S	23.9	9.3
Rated power rate(With brake)		KW/S	19.5	8.6
Mechanical time constant(No brake)		ms	1.12	2.87
Mechanical time constant(With brake)		ms	1.37	3.12
Electrical time constant		ms	1.99	1.99
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.17	0.43
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.21	0.47
Usage			Holding	Holding
Rated voltage		V	DC24V±10%	DC24V±10%
Rated current		A	0.4 MAX	0.4 MAX
Static friction torque		Nm	1.27 or more	1.27 or more
Suction time		ms	50 at 100% voltage	50 at 100% voltage
Release time		ms	15 at 100% voltage	15 at 100% voltage
Release voltage		V	DC1V or more	DC1V or more

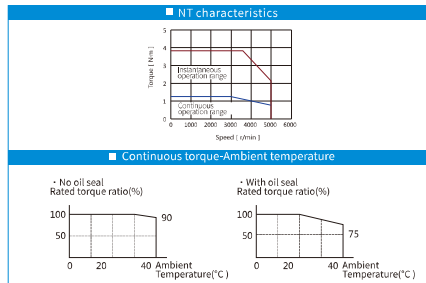
External dimensions



MA040A/MH040A Outline



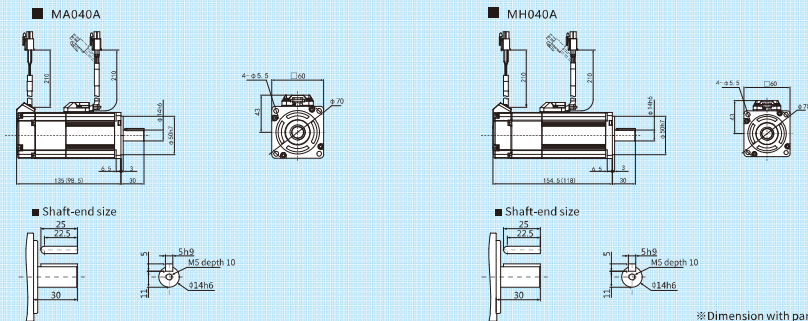
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	400W Low inertia MA040A	400W High inertia MH040A
Fitting flange size		mm	□60	□60
Approximate mass(No brake)		Kg	1.3	1.5
Approximate mass(With brake)		Kg	1.8	2.0
Rated voltage		V	AC200	AC200
Rated output		W	400	400
Rated torque		N·m	1.27	1.27
Instantaneous max. torque		N·m	3.82	3.82
Rated current		Arms	2.7	2.7
Instantaneous max. current		Arms	7.8	7.8
Rated speed		r/min	3000	3000
Max. speed		r/min	5000	5000
Torque constant		N·m/A	0.498	0.498
Induced voltage constant per phase		MV(r/min)	17.4	17.4
Rated power rate(No brake)		KW/S	58.7	23.5
Rated power rate(With brake)		KW/S	51.9	22.4
Mechanical time constant(No brake)		ms	0.67	1.66
Mechanical time constant(With brake)		ms	0.75	1.75
Electrical time constant		ms	2.47	2.47
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.28	0.69
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.31	0.72
Usage			Holding	Holding
Rated voltage		V	DC24V±10%	DC24V±10%
Rated current		A	0.4 MAX	0.4 MAX
Static friction torque		Nm	1.27 or more	1.27 or more
Suction time		ms	50 at 100% voltage	50 at 100% voltage
Release time		ms	15 at 100% voltage	15 at 100% voltage
Release voltage		V	DC1V or more	DC1V or more

External dimensions

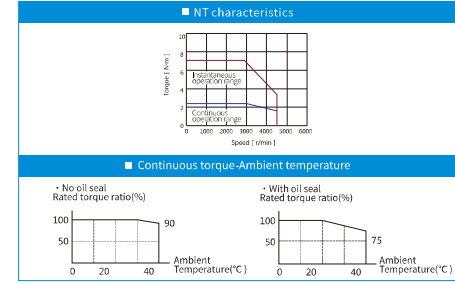


※ Dimension with parentheses ( ) show dimensions with no brake.

MA075A/MH075A Outline



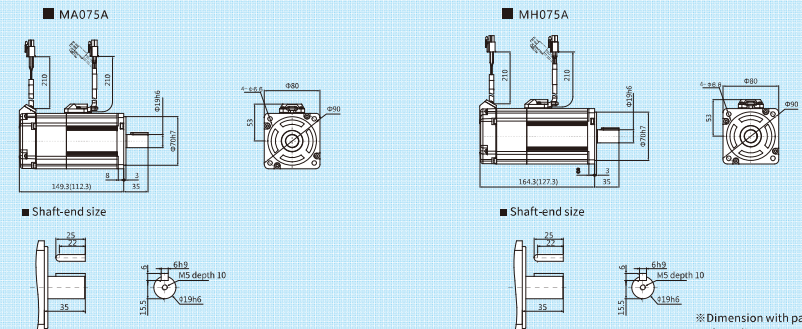
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	750W Low inertia MA075A	750W High inertia MH075A
Fitting flange size		mm	□80	□80
Approximate mass(No brake)		Kg	2.5	2.7
Approximate mass(With brake)		Kg	3.3	3.5
Rated voltage		V	AC200	AC200
Rated output		W	750	750
Rated torque		N·m	2.39	2.39
Instantaneous max. torque		N·m	7.1	7.1
Rated current		Arms	4.3	4.3
Instantaneous max. current		Arms	12.8	12.8
Rated speed		r/min	3000	3000
Max. speed		r/min	4500	4500
Torque constant		N·m/A	0.61	0.61
Induced voltage constant per phase		MV(r/min)	21.3	21.3
Rated power rate(No brake)		KW/S	64.1	35.9
Rated power rate(With brake)		KW/S	52.8	32.1
Mechanical time constant(No brake)		ms	0.53	0.94
Mechanical time constant(With brake)		ms	0.64	1.06
Electrical time constant		ms	4.3	4.3
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.89	1.59
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	1.08	1.78
Usage			Holding	Holding
Rated voltage		V	DC24V±10%	DC24V±10%
Rated current		A	0.4	0.4
Static friction torque		Nm	2.39 or more	2.39 or more
Suction time		ms	70 at 100% voltage	70 at 100% voltage
Release time		ms	20 at 100% voltage	20 at 100% voltage
Release voltage		V	DC1V or more	DC1V or more

External dimensions

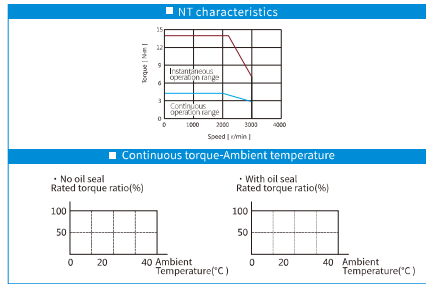


※ Dimension with parentheses ( ) show dimensions with no brake.

MM100A/MH100A Outline



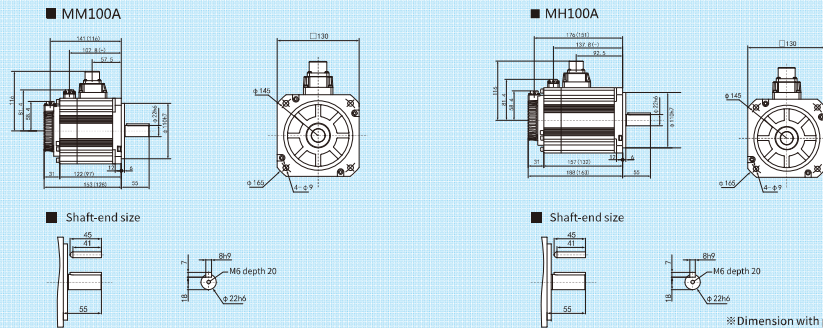
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	1KW Middle inertia MM100A	1KW High inertia MH100A
Fitting flange size		mm	□130	□130
Approximate mass(No brake)		Kg	5.6	1.5
Approximate mass(With brake)		Kg	7.0	2.0
Rated voltage		V	AC200	AC200
Rated output		W	1000	1000
Rated torque		N·m	4.77	4.77
Instantaneous max. torque		N·m	14.3	14.3
Rated current		Arms	5.6	5.6
Instantaneous max. current		Arms	15.6	15.6
Rated speed		r/min	2000	2000
Max. speed		r/min	3000	3000
Torque constant		N·m/A	0.88	0.88
Induced voltage constant per phase		MV(r/min)	30.9	30.9
Rated power rate(No brake)		KW/S	58.7	23.5
Rated power rate(With brake)		KW/S	51.9	22.4
Mechanical time constant(No brake)		ms	0.67	1.66
Mechanical time constant(With brake)		ms	0.75	1.75
Electrical time constant		ms	10.1	10.1
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	4.56	24.9
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	6.24	26.4
Usage			Holding	Holding
Rated voltage		V	DC24V±10%	DC24V±10%
Rated current		A	1	1
Static friction torque		Nm	9.55 or more	9.55 or more
Suction time		ms	120 at 100% voltage	120 at 100% voltage
Release time		ms	30 at 100% voltage	30 at 100% voltage
Release voltage		V	DC1V or more	DC1V or more

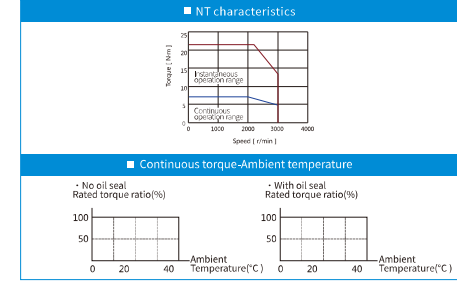
External dimensions



MM150A/MH150A Outline



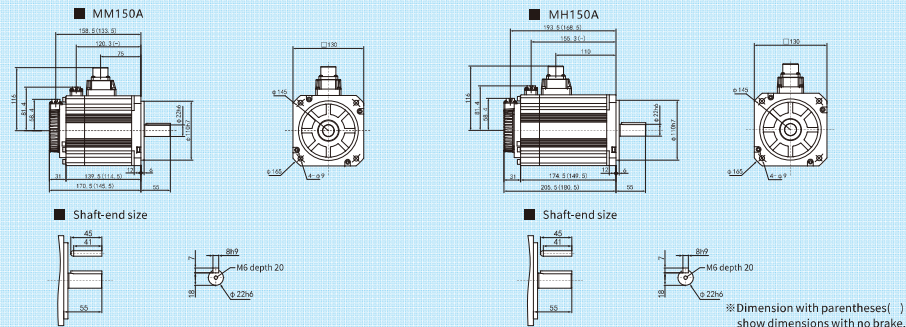
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	1.5KW Middle inertia MM150A	1.5KW High inertia MH150A
Fitting flange size		mm	□130	□130
Approximate mass(No brake)		Kg	7.0	9.0
Approximate mass(With brake)		Kg	8.4	10.4
Rated voltage		V	AC200	AC200
Rated output		W	1500	1500
Rated torque		N·m	7.16	7.16
Instantaneous max. torque		N·m	21.5	21.5
Rated current		Arms	9.9	9.9
Instantaneous max. current		Arms	27.9	27.9
Rated speed		r/min	2000	2000
Max. speed		r/min	3000	3000
Torque constant		N·m/A	0.81	0.81
Induced voltage constant per phase		MV(r/min)	28.4	28.4
Rated power rate(No brake)		KW/S	76.9	35.9
Rated power rate(With brake)		KW/S	61.4	32.1
Mechanical time constant(No brake)		ms	0.60	0.94
Mechanical time constant(With brake)		ms	0.75	1.06
Electrical time constant		ms	12.2	12.2
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	6.67	37.12
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	8.35	38.65
Usage			Holding	Holding
Rated voltage		V	DC24V±10%	DC24V±10%
Rated current		A	1	1
Static friction torque		Nm	9.55 or more	9.55 or more
Suction time		ms	120 at 100% voltage	120 at 100% voltage
Release time		ms	30 at 100% voltage	30 at 100% voltage
Release voltage		V	DC1V or more	DC1V or more

External dimensions

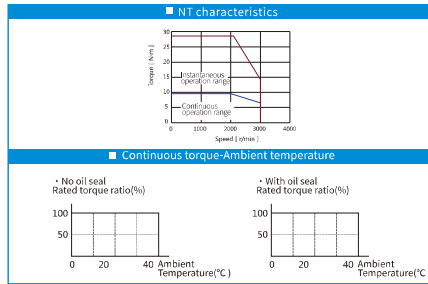




MM200A Outline



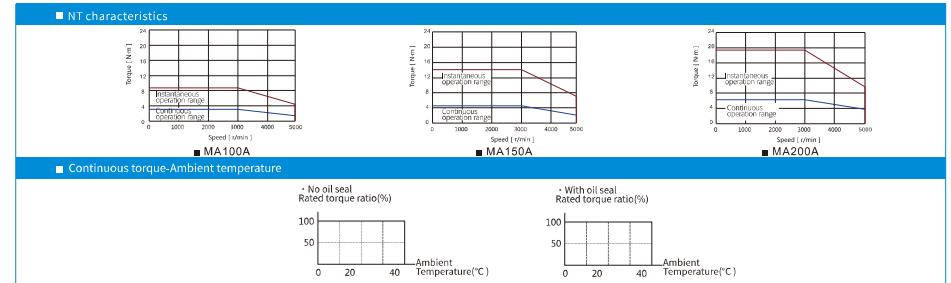
NT characteristics



MA100A/MA150A/MA200A Outline



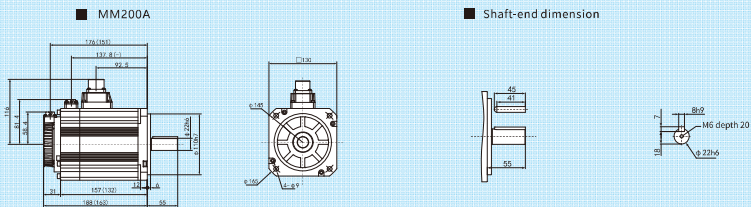
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	2KW Middle inertia MM200A
Fitting flange size		mm	□130
Approximate mass(No brake)		Kg	8.4
Approximate mass(With brake)		Kg	9.8
Rated voltage		V	AC200
Rated output		W	2000
Rated torque		N·m	9.55
Instantaneous max. torque		N·m	28.6
Rated current		Arms	12.2
Instantaneous max. current		Arms	34.6
Rated speed		r/min	2000
Max. speed		r/min	3000
Torque constant		N·m/A	0.85
Induced voltage constant per phase		MV(r/min)	29.6
Rated power rate(No brake)		KW/S	104.9
Rated power rate(With brake)		KW/S	87.9
Mechanical time constant(No brake)		ms	0.58
Mechanical time constant(With brake)		ms	0.69
Electrical time constant		ms	12.2
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	8.70
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	10.38
Usage			Holding
Rated voltage		V	DC24V ± 10%
Rated current		A	1
Static friction torque		Nm	9.55 or more
Suction time		ms	120 at 100% voltage
Release time		ms	30 at 100% voltage
Release voltage		V	DC1V or more

External dimensions



※ Dimension with parentheses ( ) show dimensions with no brake.

Specifications

Model Name	M□□□□□2□□**	Units	1KW Low inertia MA100A	1.5KW Low inertia MA150A	2KW Low inertia MA200A
Fitting flange size		mm	100	100	100
Approximate mass(No brake)		Kg	3.5	4.4	5.3
Approximate mass(With brake)		Kg	4.5	5.4	6.3
Rated voltage		V	200	200	200
Rated output		W	1000	1500	2000
Rated torque		N·m	3.18	4.77	6.37
Instantaneous max. torque		N·m	9.55	14.3	19.1
Rated current		Arms	6.6	8.2	11.3
Instantaneous max. current		Arms	28	35	48
Rated speed		r/min	3000	3000	3000
Max. speed		r/min	5000	5000	5000
Torque constant		N·m/A	0.52	0.628	0.607
Induced voltage constant per phase		MV(r/min)	18.15	21.92	21.247
Rated power rate(No brake)		KW/S	49.82	80.12	110.26
Rated power rate(With brake)		KW/S	43.03	71.775	101.19
Mechanical time constant(No brake)		ms	0.619	5.220.507	0.425
Mechanical time constant(With brake)		ms	0.717	0.566	0.463
Electrical time constant		ms	7.22	8.08	9.31
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	2.03	2.84	3.68
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	2.35	3.17	4.01
Usage			Holding	Holding	Holding
Rated voltage		V	24 ± 10%	24 ± 10%	24 ± 10%
Rated current		A	0.81 ± 10%	0.81 ± 10%	0.81 ± 10%
Static friction torque		Nm	7.8 or more	7.8 or more	7.8 or more
Suction time		ms	50	50	50
Release time		ms	15	15	15
Release voltage		V	2V or more	2V or more	2V or more



External Dimension

■ MA100A

■ Shaft-end dimension

※ Dimension with parentheses ( ) show dimensions with no brake.

■ MA150A

■ Shaft-end dimension

※ Dimension with parentheses ( ) show dimensions with no brake.

■ MA200A

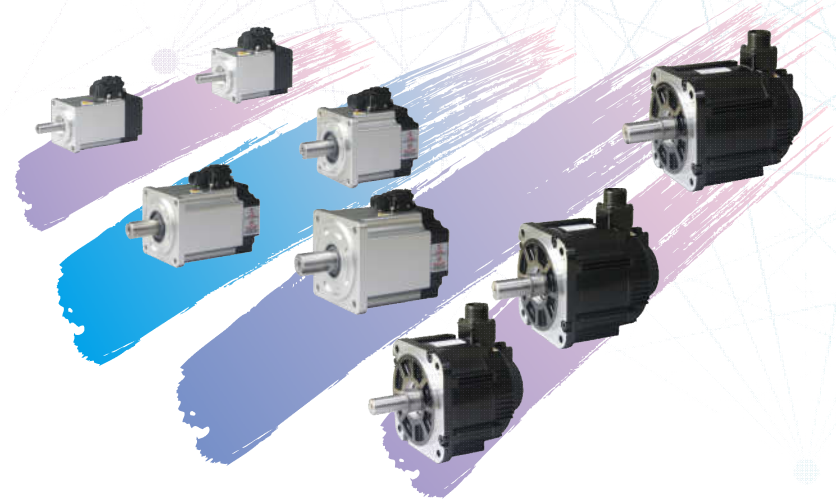
■ Shaft-end dimension

※ Dimension with parentheses ( ) show dimensions with no brake.

# HCSV-X2 / X6

SV series servo has provided the best solution for all the fields of manufacturing, which requires automation, high-speed, high-precision and convenience.

**IP67 WATER-PROOF LEVEL**  
5-POLE CONNECTOR TYPE



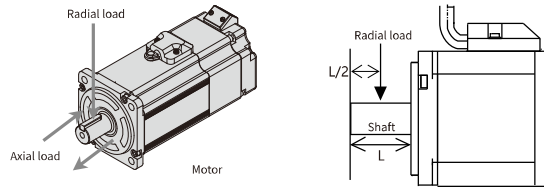
Model name identification

SV - X<sup>①</sup>6 M<sup>②</sup>H 075A - B<sup>④</sup> 2<sup>⑤</sup> L<sup>⑥</sup> N - \*<sup>⑧</sup>\*

<p>① Product series Specifications</p> <table border="1"> <tr><td>X2 series</td></tr> <tr><td>X6 series</td></tr> </table>	X2 series	X6 series	<p>② Inertia specifications</p> <table border="1"> <tr><th>Symbol</th><th>Specifications</th></tr> <tr><td>MA</td><td>Low inertia</td></tr> <tr><td>MM</td><td>Middle inertia</td></tr> <tr><td>MH</td><td>High inertia</td></tr> <tr><td>MG</td><td>Low-speed and high-torque</td></tr> </table>	Symbol	Specifications	MA	Low inertia	MM	Middle inertia	MH	High inertia	MG	Low-speed and high-torque	<p>③ Power specifications</p> <table border="1"> <tr><th>Symbol</th><th>Specifications</th></tr> <tr><td>005A</td><td>50W</td></tr> <tr><td>010A</td><td>100W</td></tr> <tr><td>020A</td><td>200W</td></tr> <tr><td>040A</td><td>400W</td></tr> <tr><td>075A</td><td>750W</td></tr> <tr><td>100C</td><td>1KW</td></tr> <tr><td>085A</td><td>850W</td></tr> <tr><td>130A</td><td>1.3KW</td></tr> <tr><td>180A</td><td>1.8KW</td></tr> </table>	Symbol	Specifications	005A	50W	010A	100W	020A	200W	040A	400W	075A	750W	100C	1KW	085A	850W	130A	1.3KW	180A	1.8KW	<p>④ Holding brake</p> <table border="1"> <tr><th>Symbol</th><th>Brake</th></tr> <tr><td>N</td><td>No brake</td></tr> <tr><td>B</td><td>24V brake</td></tr> <tr><td>X</td><td>7V brake (ultra-thin)</td></tr> </table>	Symbol	Brake	N	No brake	B	24V brake	X	7V brake (ultra-thin)	<p>⑤ Power voltage specifications</p> <table border="1"> <tr><th>Symbol</th><th>Voltage</th></tr> <tr><td>2</td><td>DC280 ~ 325V (AC200 ~ 230V)</td></tr> </table>	Symbol	Voltage	2	DC280 ~ 325V (AC200 ~ 230V)	<p>⑥ Shaft-end specifications</p> <table border="1"> <tr><th>Symbol</th><th>Shaft-end/oil seal</th></tr> <tr><td>L</td><td>Lead-wire/with oil seal</td></tr> <tr><td>K</td><td>Lead-wire/no oil seal</td></tr> <tr><td>C</td><td>Connector/with oil seal</td></tr> <tr><td>D</td><td>Connector/no oil seal</td></tr> </table>	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	<p>⑦ Encoder specifications</p> <table border="1"> <tr><th>Symbol</th><th>Specifications</th></tr> <tr><td>N</td><td>Single-turn absolute 17-bit</td></tr> <tr><td>A</td><td>Multi-turn absolute 17-bit</td></tr> </table>	Symbol	Specifications	N	Single-turn absolute 17-bit	A	Multi-turn absolute 17-bit	<p>⑧ Customized version Specifications</p> <table border="1"> <tr><td>**</td></tr> </table>	**
X2 series																																																																				
X6 series																																																																				
Symbol	Specifications																																																																			
MA	Low inertia																																																																			
MM	Middle inertia																																																																			
MH	High inertia																																																																			
MG	Low-speed and high-torque																																																																			
Symbol	Specifications																																																																			
005A	50W																																																																			
010A	100W																																																																			
020A	200W																																																																			
040A	400W																																																																			
075A	750W																																																																			
100C	1KW																																																																			
085A	850W																																																																			
130A	1.3KW																																																																			
180A	1.8KW																																																																			
Symbol	Brake																																																																			
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Notes: For special models, please refer to Model Selection.

Output shaft permissible load for X3/X1 series servo motor

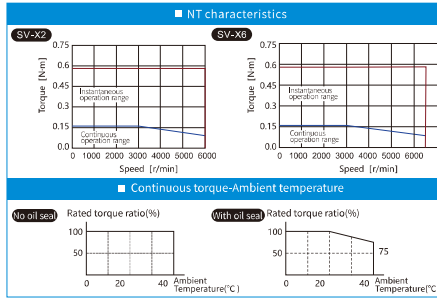


Permissible load	Units	50W	100W	200W	400W	750W	1kW	1.5kW	2kW	850W	1.3KW	1.8KW
Radial load	N	68	68	245	245	392	490	490	490	490	686	980
Axial load	N	58	58	98	98	147	196	196	196	98	343	392

MH005A Outline



NT characteristics

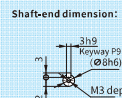
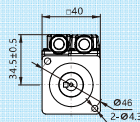
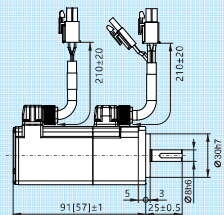


Specifications

Model Name	M□□□□□2□□**	Units	50W High inertia MH005A
Fitting flange size		mm	φ40
Approximate mass(No brake)		Kg	0.33
Approximate mass(With brake)		Kg	0.55
Rated voltage		V	AC200
Rated output		W	50
Rated torque		N·m	0.16
Instantaneous max. torque		N·m	0.56
Rated current		Arms	1.1
Instantaneous max. current		Arms	5.5
Rated speed		r/min	3000
Max. speed		r/min	6500/6000※ (*※ is parameter for X2 series servo motor)
Torque constant		N·m/A	0.168
Induced voltage constant per phase		MV(r/min)	5
Rated power rate(No brake)		KW/S	6.7
Rated power rate(With brake)		KW/S	6.1
Mechanical time constant(No brake)		ms	2.8
Mechanical time constant(With brake)		ms	3.09
Electrical time constant		ms	1.12
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.038
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.042
Usage			Holding
Rated voltage		V	DC24V±2.4
Rated current		A	0.25
Static friction torque		Nm	0.38 or more
Suction time		ms	35 or less
Release time		ms	20 or less
Release voltage		V	1V or more

External dimensions

MH005A

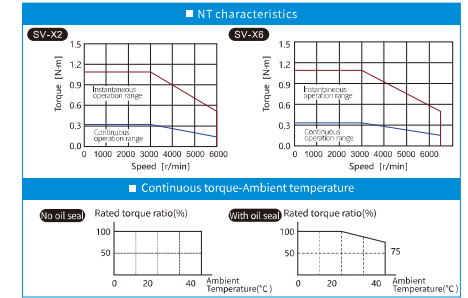


※ Dimension with parentheses ( ) show dimensions with no brake.

MH010A Outline



NT characteristics

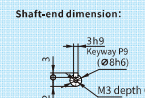
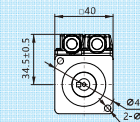
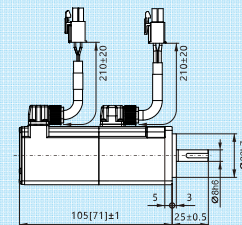


Specifications

Model Name	M□□□□□2□□**	Units	100W High inertia MH010A
Fitting flange size		mm	φ40
Approximate mass(No brake)		Kg	0.45
Approximate mass(With brake)		Kg	0.66
Rated voltage		V	AC200
Rated output		W	100
Rated torque		N·m	0.32
Instantaneous max. torque		N·m	1.11
Rated current		Arms	1.1
Instantaneous max. current		Arms	5.5
Rated speed		r/min	3000
Max. speed		r/min	6500
Torque constant		N·m/A	0.327
Induced voltage constant per phase		MV(r/min)	10.43
Rated power rate(No brake)		KW/S	14.4
Rated power rate(With brake)		KW/S	13.8
Mechanical time constant(No brake)		ms	2.17
Mechanical time constant(With brake)		ms	2.26
Electrical time constant		ms	1.32
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.071
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.074
Usage			Holding
Rated voltage		V	DC24V±2.4
Rated current		A	0.3
Static friction torque		Nm	0.38 or more
Suction time		ms	35 or less
Release time		ms	20 or less
Release voltage		V	1V or more

External dimensions

MH010A

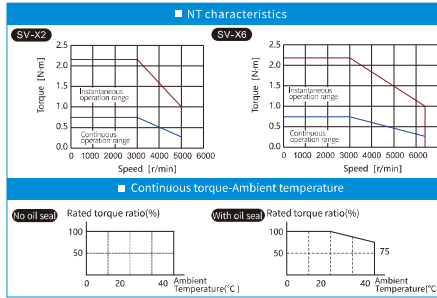


※ Dimension with parentheses ( ) show dimensions with no brake.

MH020A Outline



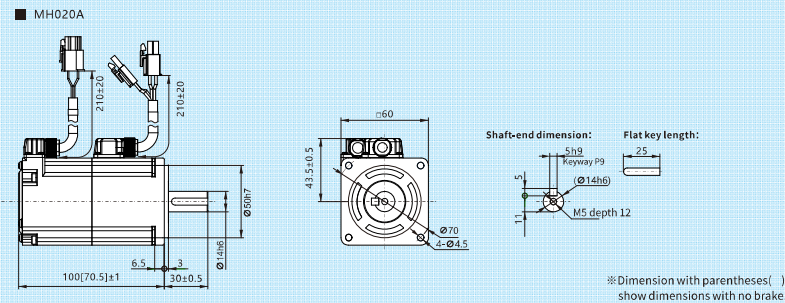
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	200W High inertia MH020A
Fitting flange size		mm	□60
Approximate mass(No brake)		Kg	0.87
Approximate mass(With brake)		Kg	1.27
Rated voltage		V	AC200
Rated output		W	200
Rated torque		N·m	0.64
Instantaneous max. torque		N·m	2.23
Rated current		Arms	1.4
Instantaneous max. current		Arms	6.9
Rated speed		r/min	3000
Max. speed		r/min	6500/5000* (* is parameter for X2 series servo motor)
Torque constant		N·m/A	0.5
Induced voltage constant per phase		MV(r/min)	14.61
Rated power rate(No brake)		KW/S	14.1
Rated power rate(With brake)		KW/S	13.2
Mechanical time constant(No brake)		ms	1.39
Mechanical time constant(With brake)		ms	1.49
Electrical time constant		ms	3.9
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.29
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.31
Usage			Holding
Rated voltage		V	DC24V±2.4
Rated current		A	0.36
Static friction torque		Nm	1.6 or more
Suction time		ms	50 or less
Release time		ms	20 or less
Release voltage		V	1V or more

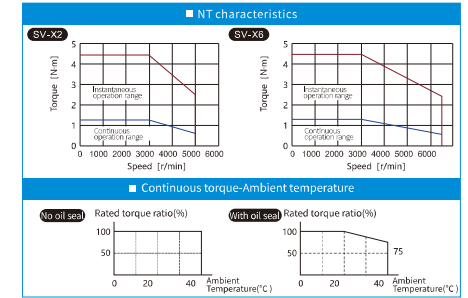
External dimensions



MH040A Outline



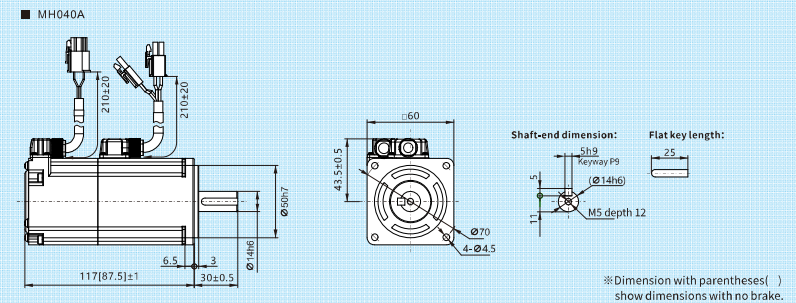
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	400W High inertia MH040A
Fitting flange size		mm	□60
Approximate mass(No brake)		Kg	1.22
Approximate mass(With brake)		Kg	1.61
Rated voltage		V	AC200
Rated output		W	400
Rated torque		N·m	1.27
Instantaneous max. torque		N·m	4.46
Rated current		Arms	2.1
Instantaneous max. current		Arms	10.4
Rated speed		r/min	3000
Max. speed		r/min	6500/5000* (* is parameter for X2 series servo motor)
Torque constant		N·m/A	0.67
Induced voltage constant per phase		MV(r/min)	20.85
Rated power rate(No brake)		KW/S	28.8
Rated power rate(With brake)		KW/S	27.8
Mechanical time constant(No brake)		ms	1.3
Mechanical time constant(With brake)		ms	1.35
Electrical time constant		ms	4.21
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.56
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	0.58
Usage			Holding
Rated voltage		V	DC24V±2.4
Rated current		A	0.36
Static friction torque		Nm	1.6 or more
Suction time		ms	50 or less
Release time		ms	20 or less
Release voltage		V	1V or more

External dimensions

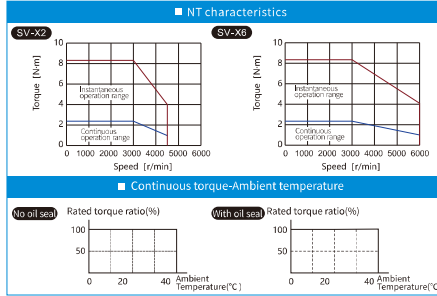




MH075A Outline



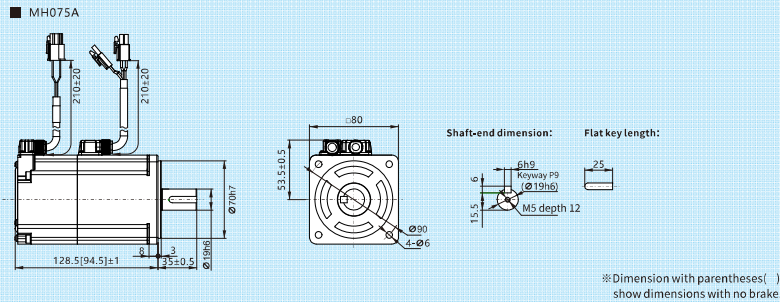
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	750W High inertia MH075A
Fitting flange size		mm	φ80
Approximate mass(No brake)		Kg	2.25
Approximate mass(With brake)		Kg	3.01
Rated voltage		V	AC200
Rated output		W	750
Rated torque		N·m	2.39
Instantaneous max. torque		N·m	8.36
Rated current		Arms	3.8
Instantaneous max. current		Arms	18.8
Rated speed		r/min	3000
Max. speed		r/min	6000/4500* (* is parameter for X2 series servo motor)
Torque constant		N·m/A	0.63
Induced voltage constant per phase		MV(r/min)	22.5
Rated power rate(No brake)		KW/S	36.6
Rated power rate(With brake)		KW/S	34.4
Mechanical time constant(No brake)		ms	1.26
Mechanical time constant(With brake)		ms	1.34
Electrical time constant		ms	6.54
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	1.56
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	1.66
Usage			Holding
Rated voltage		V	DC24V±2.4
Rated current		A	0.42
Static friction torque		Nm	3.8 or more
Suction time		ms	70 or less
Release time		ms	20 or less
Release voltage		V	1V or more

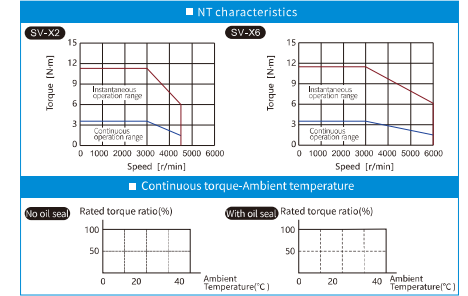
External dimensions



MH100C Outline



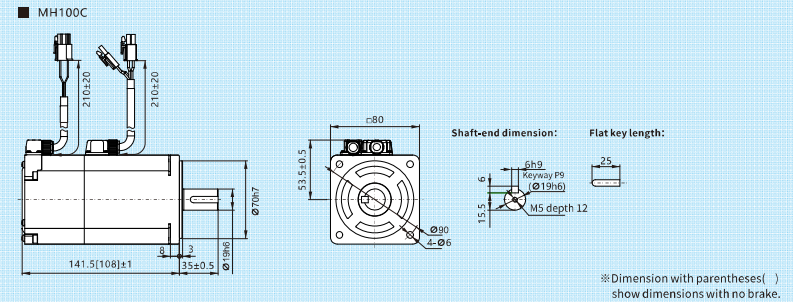
NT characteristics



Specifications

Model Name	M□□□□□2□□**	Units	1KW High inertia MH100C
Fitting flange size		mm	φ80
Approximate mass(No brake)		Kg	2.68
Approximate mass(With brake)		Kg	3.45
Rated voltage		V	AC200
Rated output		W	1000
Rated torque		N·m	3.815
Instantaneous max. torque		N·m	11.13
Rated current		Arms	5.7
Instantaneous max. current		Arms	30
Rated speed		r/min	3000
Max. speed		r/min	6000/4500* (* is parameter for X2 series servo motor)
Torque constant		N·m/A	0.552
Induced voltage constant per phase		MV(r/min)	21.2
Rated power rate(No brake)		KW/S	50.6
Rated power rate(With brake)		KW/S	48.2
Mechanical time constant(No brake)		ms	0.78
Mechanical time constant(With brake)		ms	0.82
Electrical time constant		ms	4.68
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	2
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	2.1
Usage			Holding
Rated voltage		V	DC24V±2.4
Rated current		A	0.42
Static friction torque		Nm	3.8 or more
Suction time		ms	70 or less
Release time		ms	20 or less
Release voltage		V	1V or more

External dimensions





MG085A/MG130A/MG180A Outline



MG085A



MG130A

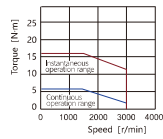


MG180A

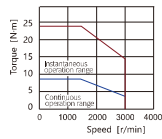
NT characteristics

NT characteristics

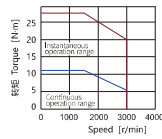
MG085A



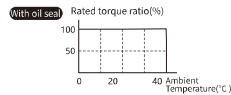
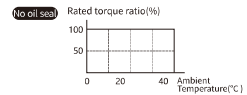
MG130A



MG180A



Continuous torque-Ambient temperature

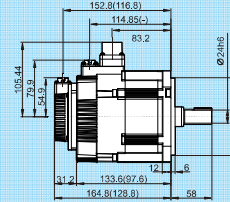


Specifications

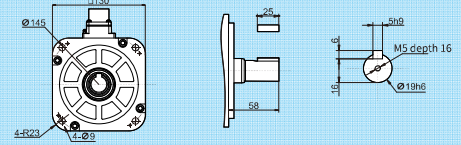
Model Name	M□□□□□2□□**	Units	850W MG085	1.3KW MG130	1.8KW MG180
Fitting flange size		mm	□130	□130	□130
Approximate mass(No brake)		Kg	5.5	7.1	8.6
Approximate mass(With brake)		Kg	7.5	9	11
Rated voltage		V	200	200	200
Rated output		W	850	1300	1800
Rated torque		N·m	5.39	8.28	11.5
Instantaneous max. torque		N·m	16.2	24.84	34.5
Rated current		Arms	6.7	9.6	15.6
Instantaneous max. current		Arms	17	28	42
Rated speed		r/min	1500	1500	1500
Max. speed		r/min	3000	3000	3000
Torque constant		N·m/A	0.89	0.92	0.774
Induced voltage constant per phase		MV/(r/min)	31.04	32.08	27
Rated power rate(No brake)		KW/S	20.9	35	50.9
Rated power rate(With brake)		KW/S	18.2	31.6	47.1
Mechanical time constant(No brake)		ms	2.74	2.23	1.95
Mechanical time constant(With brake)		ms	3.16	2.46	2.29
Electrical time constant		ms	4.61	5.4	5.58
Moment of inertia(No brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	12.2	18.2	24.4
Moment of inertia(With brake)		×10 <sup>-4</sup> Kg·m <sup>2</sup>	16	22	28.1
Usage			Holding	Holding	Holding
Rated voltage		V	DC24V±2.4	DC24V±2.4	DC24V±2.4
Rated current		A	0.41	0.41	0.41
Static friction torque		Nm	19.6	19.6	19.6
Suction time		ms	80	80	80
Release time		ms	100	100	100
Release voltage		V	1.5V or more	1.5V or more	1.5V or more

External dimensions

MG085A

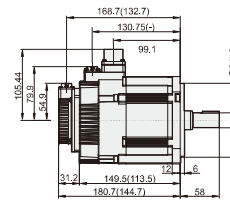


Shaft-end size

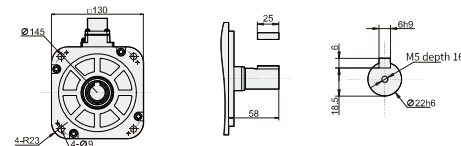


※Dimension with parentheses ( ) show dimensions with no brake.

MG130A

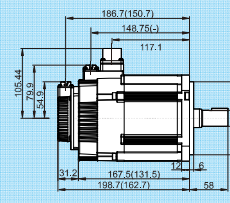


Shaft-end size

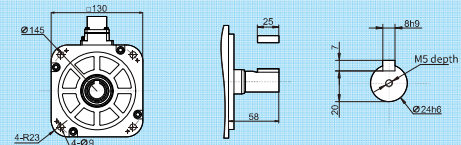


※Dimension with parentheses ( ) show dimensions with no brake.

MG180A

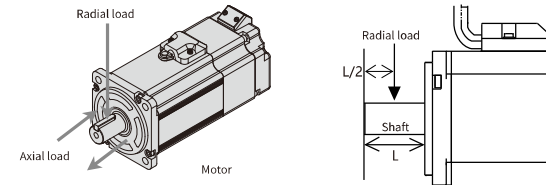


Shaft-end size



※Dimension with parentheses ( ) show dimensions with no brake.

Output shaft permissible load for X2/X6 series servo motor



Permissible load	Units	50W	100W	200W	400W	750W	1kW	1.5kW	2kW	850W	1.3KW	1.8KW
Radial load	N	68	68	245	245	392	490	490	490	490	686	980
Axial load	N	58	58	98	98	147	196	196	196	196	343	392