YASKAWA

AC SERVO DRIVES
JUNMA SERIES

MECHATROLINK-Ⅱ COMMUNICATIONS TYPE SERVOPACK TYPE SJDE
SERVOMOTOR TYPE SJME

Great stability despite load changes! Quick and efficient setup!
Improved machine efficiency! Enhanced control functions!

Great Stability
despite Load Changes!

High-speed Network MECHATROLINK-Ⅱ Communications Type JUNMA*

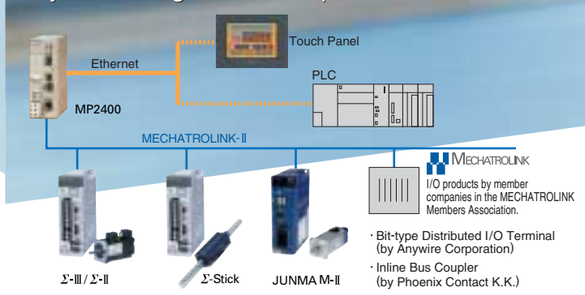
*: Referred to as JUNMA M-Ⅱ in this catalogue.

Like speed skaters, who compete by using refined skills to maintain high speeds both linearly and on curves...

The JUNMA M-Ⅱ
servo drive can maintain
steady operation at high speed by automatically adjusting the speed to compensate for load change in real time.
There is no need to bother with parameter settings and gain adjustments, which are usually required for servo drives.

See for yourself how the JUNMA M-Ⅱ can improve performance, response, and usability of your machine.

● System Configuration Example



Features

Automatic speed adjustment when load changes! Quick and efficient setup!

- Connect and go! Shared concept with other products in the JUNMA series. No troublesome parameter settings and gain adjustments needed.
- Equipped with a constant automatic adjustment function that quickly reacts to load changes, the JUNMA-Ⅱ brings steady operation to applications with high frequency speed and torque changes.

Added value with MECHATROLINK-Ⅱ communications!

- Requires less space and less wiring. You can build the system to your own need because the YASKAWA AC servo drives, as well as various devices made by member companies of the MECHATROLINK Members Association, can be connected to your system.
- Startup time is greatly reduced by incorporating a machine controller from the YASKAWA MP2000 series. Servomotor information, including position, speed, motor ID, servo parameters, and error information, is digitally managed to simplify monitoring and maintenance.

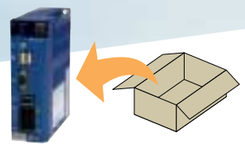
Enhanced control functions!

- High-precision and high-performance positioning. The position reference, speed reference, and acceleration/deceleration time can be changed in real time during positioning.
- External positioning function using position latch signal: Detects the accurate position when a latch signal is received and adjusts the amount of movement. This is useful for transfer, wrapping, and printing equipment.
- Zero point return: A zero point can be individually set for each of customer's machines.
- Other functions: Interpolation, JOG operation, alarm reset, and other helpful functions.

Conforms to international standards.

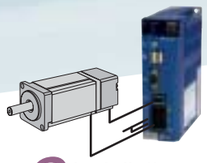
Note: Scheduled to conform to the RoHS directive. (RoHS directive: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment)

Connect it and, zip! It's ready to go.



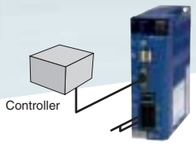
1 Unpacking

Remove the SERVOPACK from the box.



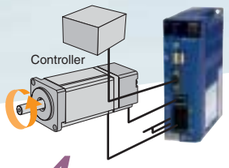
2 Installation and Wiring

Connect the cables for the power supply and signals. Then connect the servomotor, SERVOPACK and the MECHATROLINK-Ⅱ compatible controller.



3 Communication Settings

Only required for communication settings. No gain adjustments are needed.

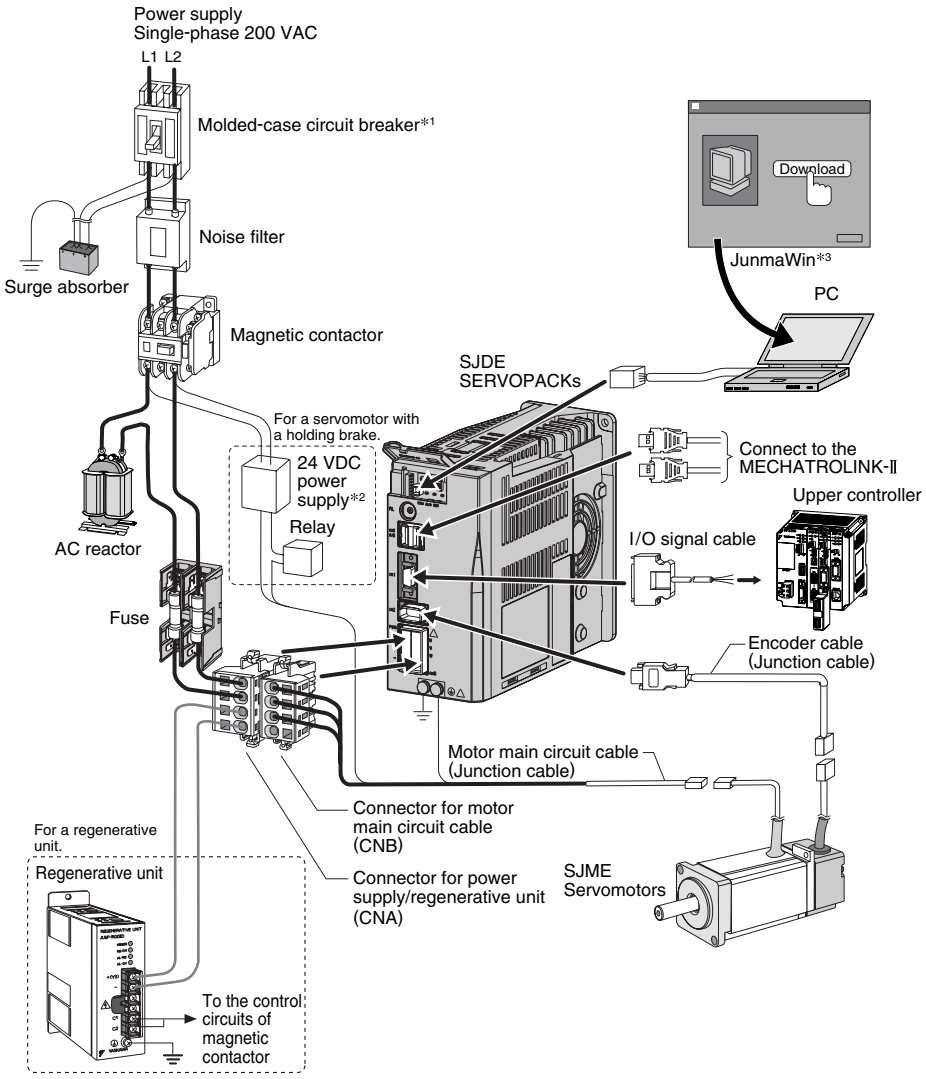


4 Setup Completion

The motor is ready to run with the reference from the controller.

CONTENTS

Connection to Peripheral Devices



*1 : Install a ground fault interrupter to protect against both overloads and shortcircuits, or install a ground fault interrupter for ground protection and a molded-case circuit breaker.
*2 : Prepare 24 VDC power supplies for a holding brake and I/O signals.
*3 : JunmaWin software can be downloaded from http://www.e-mechatronics.com.

Model Designation

SERVOPACKs

SJDE − 02 A N A

JUNMA-series
SJDE SERVOPACKs

Applicable Servomotor Capacity

Code	Capacity
01	100 W
02	200 W
04	400 W
08	750 W

Design Revision Order
A

Interface Specification
N : MECHATROLINK-Ⅱ

Power Supply Voltage
A : 200 VAC

Servomotors

SJME − 02 A M B 4 1

JUNMA-series
SJME Servomotors

Rated Output
01 : 100 W
02 : 200 W
04 : 400 W
08 : 750 W

Power Supply Voltage
A : 200 VAC

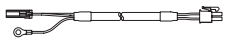
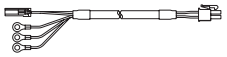
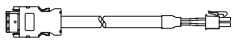
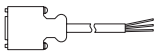
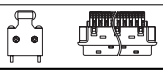
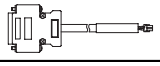
Encoder Specification
M : Incremental encoder

Design Revision Order
B

Options
1 : No option
C : 24 VDC holding brake

Shaft End Specification
4 : Straight, key

Cables and Connectors

Name	Type		Model	Length	Appearance	Ref. Page	Contact
Servomotor Main Circuit Cables with Connectors at Both Ends (Junction Cables)	Without holding brake		JZSP-CHM000-03	3 m		P.20	Yaskawa Local Office
			JZSP-CHM000-05	5 m			
			JZSP-CHM000-10	10 m			
			JZSP-CHM000-15	15 m			
			JZSP-CHM000-20	20 m			
	With holding brake		JZSP-CHM030-03	3 m			
			JZSP-CHM030-05	5 m			
			JZSP-CHM030-10	10 m			
			JZSP-CHM030-15	15 m			
			JZSP-CHM030-20	20 m			
Connector Kits for Servomotor Main Circuit Cable*1	To Servomotor Plug (For servomotors w/wo brake)	Crimp Type	JZSP-CHM9-1*2	–		P.21	Yaskawa Local Office
	To SERVOPACK CNB (For servomotors w/wo brake)	Spring Type	JZSP-CHM9-2*3	–		P.21	Yaskawa Local Office
		Crimp Type	Receptacle: F32FSS-04V-KY×1 Receptacle contact: SF3F-41GF-P2.0×4 Crimping tool: YRF-880	–		P.21	J.S.T.Mfg Co., Ltd
Power Supply and Regenerative Unit Connector Kits*1	To SERVOPACK CNA	Spring Type	JZSP-CHG9-1*3	–		P.21	Yaskawa Local Office
Encoder Cables with Connectors at Both Ends (Junction Cables)			JZSP-CHP800-03	3 m		P.22	Yaskawa Local Office
			JZSP-CHP800-05	5 m			
			JZSP-CHP800-10	10 m			
			JZSP-CHP800-15	15 m			
			JZSP-CHP800-20	20 m			
Encoder Cable Connector Kits*1	To Servomotor	Crimp Type	JZSP-CHP9-1*2	–		P.22	Yaskawa Local Office
	To SERVOPACK CN2	Soldered Type(Black)	JZSP-CHP9-2	–			
		Soldered Type(Gray)	JZSP-CHP9-3	–			
I/O Signal Cables			JZSP-CHI003-01	1 m		P.23	Yaskawa Local Office
			JZSP-CHI003-02	2 m			
			JZSP-CHI003-03	3 m			
I/O Signal Connector Kits*1	For SERVOPACK CN1	Soldered Type	JZSP-CHI9-1	–			
MECHATROLINK-Ⅱ Communication Cable	Cable with Connectors at Both Ends*4 (Without Ferrite Core)		JEPMC-W6002-□□*5	–		–	Yaskawa Local Office
			JEPMC-W6002-□□*5-E (Compliant with RoHS Directive)	–			
	Cable with Connectors at Both Ends*4 (With Ferrite Core)		JEPMC-W6003-□□*5	–			
			JEPMC-W6003-□□*5-E (Compliant with RoHS Directive)	–			
	Terminators		JEPMC-W6022-□□*5	–			
			JEPMC-W6022-□□*5-E (Compliant with RoHS Directive)	–			
Cable for Personal Computer	Cables		JZSP-CPS00-02	2 m			

*1 : Sold separately. If making cable assemblies, these connectors are necessary.
*2 : Refer to page 21 for the crimping tool model number. The crimping tool must be prepared by customers.
*3 : With tool (lever for wiring).
*4 : The total cable length must be 50 m max. and the cable length between stations 0.5 m min.
*5 : Specify the cable length in□□ when ordering as shown in the table below.

□□	Cable length m	□□	Cable length m
A5	0.5	10	10
01	1.0	20	20
03	3.0	30	30
05	5.0	40	40
07	7.0	50	50

SERVOPACKs and Applicable Peripheral Devices

Rated Output	Servomotor		SERVOPACK	Power Supply Capacity per SERVOPACK kVA	Current Capacity for Molded-case Circuit Breakers Arms	Current Capacity and Model of External Fuse	Inrush Current (A_{0-P})	Magnetic Contactor
	Without Holding Brake	With Holding Brake						
100 W	SJME-01AMB41	SJME-01AMB4C	SJDE-01ANA	0.40	4	0KLK015.T (15 Arms)	30	HI-11J
200 W	SJME-02AMB41	SJME-02AMB4C	SJDE-02ANA	0.75				
400 W	SJME-04AMB41	SJME-04AMB4C	SJDE-04ANA	1.2	8			
750 W	SJME-08AMB41	SJME-08AMB4C	SJDE-08ANA	2.2	16	0KLK030.T(30 Arms)	60	HI-15J
Manufacturer	Yaskawa Electric Corporation			–	–	Littelfuse Inc.	–	Yaskawa Controls Co., Ltd.
Contact	Yaskawa Local Office			–	–	Yaskawa Local Office	–	Yaskawa Local Office
Details	–			–	–	P.25	–	P.24

Rated Output	Servomotor		SERVOPACK	Noise Filter	Surge Absorber	AC Reactor	Regenerative Unit
	Without Holding Brake	With Holding Brake					
100 W	SJME-01AMB41	SJME-01AMB4C	SJDE-01ANA	FN2070-6/07	R·C·M-601BQZ-4	X5052	JUSP-RG08D
200 W	SJME-02AMB41	SJME-02AMB4C	SJDE-02ANA			X5053	
400 W	SJME-04AMB41	SJME-04AMB4C	SJDE-04ANA	FN2070-10/07		X5054	
750 W	SJME-08AMB41	SJME-08AMB4C	SJDE-08ANA	FN2070-16/07		X5056	
Manufacturer	Yaskawa Electric Corporation			Schaffner Electronic	Okaya Electric Industries Co., Ltd.	Yaskawa Controls Co., Ltd.	Yaskawa Electric Corporation
Contact	Yaskawa Local Office			Yaskawa Local Office	Yaskawa Local Office		Yaskawa Local Office
Details	–			P.26	P.27		P.25

Precautions When Selecting Peripheral Devices

Molded-case Circuit Breaker (MCCB)

Observe the following precautions when selecting a molded-case circuit breaker.

<Maximum Input Current>

- The instantaneous maximum output of SERVOPACK is approximately 3 times the rated output and the output can last up to 3 seconds. Select a molded-case circuit breaker whose operating time is 5 seconds or more at 300% of SERVOPACK rated current. The general-purpose low-speed acting molded-case circuit breakers are applicable.
- Rated torque for a molded-case circuit breaker must be equal to or greater than the total power consumption of all devices including the controllers. If using more than one SERVOPACK, calculate an effective load current from the total power supply capacity. The power capacity per SERVOPACK is shown in the table above, SERVOPACKs and Applicable Peripheral Devices.

<Inrush Current>

- Select a molded-case circuit breaker with an allowable current larger than the total inrush current of the SERVOPACKs if multiple SERVOPACKs are turned on at the same time.
- SERVOPACK's inrush current is shown in the table above, SERVOPACKs and Applicable Peripheral Devices.

Ground Fault Interrupter

- Use ground fault interrupters for high-frequency compliant inverters. If a general-purpose ground fault interrupter is used, select a rated current of 200 mA or more.
- High-frequency current may leak through the armature of a servomotor due to high-speed switching in the SERVOPACKs.

Magnetic Contactor

A magnetic contactor is required to make the AC power to SERVOPACK on/off sequence externally. Be sure to attach a spark killer to the exciting coil of the magnetic contactor.

Noise Filter

- Install a noise filter on the power supply lines for peripheral devices as necessary.
- Because the SJDE SERVOPACK is designed as an industrial device, it provides no mechanism to prevent noise interference. Use a noise filter to prevent noise interference. If the equipment is to be used near private houses or may receive noise interference, install a noise filter on the input side of the power supply line.
- Place the reference input device and noise filter as close to the SERVOPACK as possible.

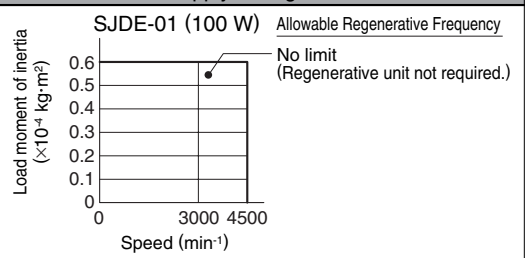
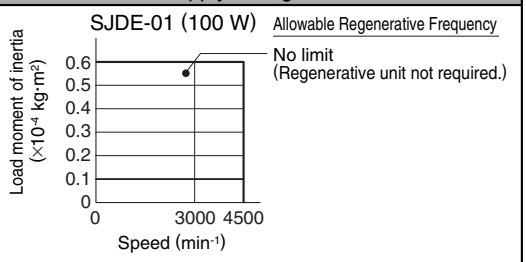
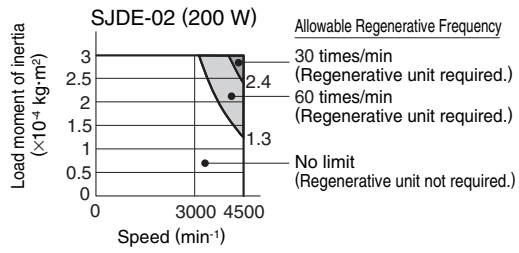
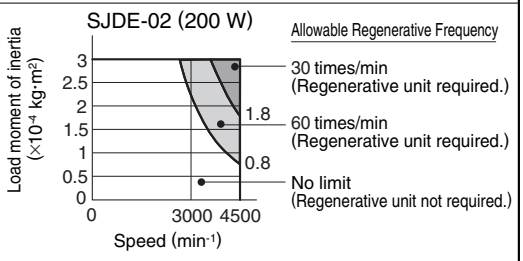
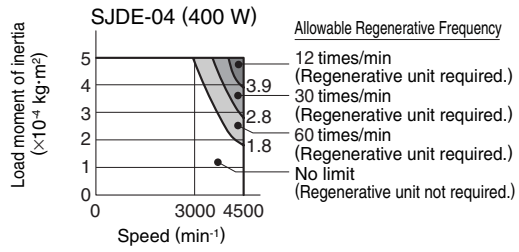
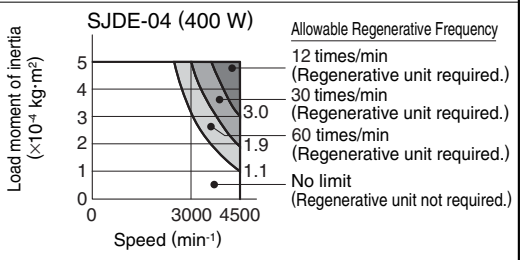
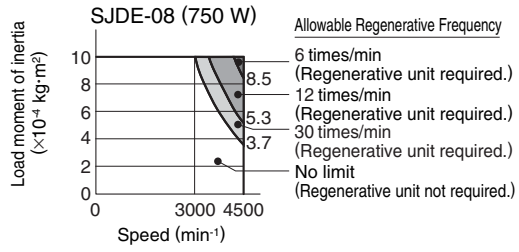
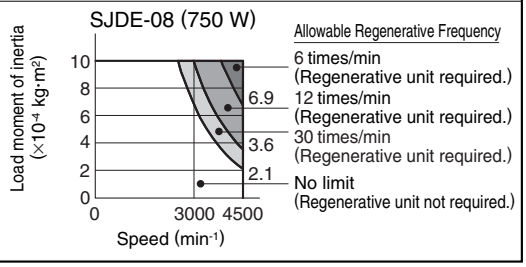
● Regenerative Units

The rotational energy of driven machines, including the servomotor, is returned to the SERVOPACK as electric power. This is called regenerative power. The power is absorbed by the main capacitor inside the SERVOPACK. When the capacitor has reached its limit in power absorption, the regenerative unit is reguired to dissipate the excess. The servomotor will be driven in the regeneration state in the following circumstances:

- Deceleration period to a stop during deceleration operations.
- During continuous descending operations along the vertical axis.
- During continuous operations with the servomotor rotated from the load side (negative load).

<Allowable Regenerative Frequency>

The following graphs show the allowable regenerative frequency determined by load moment of inertia and motor speed. The graphs show values for the horizontal axis. For the vertical axis, refer to the results obtained with the SigmaJunmaSize+: AC Servomotor Selection Software.

Power Supply Voltage: 200 V	Power Supply Voltage: 230 V
	
	
	
	

Note : An overvoltage alarm will occur if the regenerative frequency exceeds its allowable limit. This may cause a failure of the regenerative unit.

<Caution>

- The regenerative unit heats up and reaches a high temperature. Use heat-resistant, non-flammable cables and make sure that the cables do not touch the unit. Refer to P16 for the applicable size of cables to connect the unit.
- The regenerative unit has three error detection functions: regenerative resistor disconnection, regenerative transistor fault, and overvoltage detection. When one of these errors is detected, the built-in alarm relay will operate and the C1 and C2 output terminals of the regenerative unit will be opened.
- The power supply (through L1 and L2) to the SERVOPACK must be turned off when the alarm relay turns on.
- Two to three seconds are required to reset the alarm relay once the alarm relay operates. The alarm state will return to normal after the main capacitor in the SERVOPACK finishes discharging.

Ratings and Specifications

Voltage		200 VAC				Description
Servomotor Model : SJME-□□A		01	02	04	08	
Applicable SERVOPACK Model : SJDE-□□A		01	02	04	08	–
Rated Output	W	100	200	400	750	Motor output at the rated operating point
Rated Torque*	N·m	0.318	0.637	1.27	2.39	Torque at the rated operating point
Instantaneous Peak Torque	N·m	0.955	1.91	3.82	7.16	Maximum instantaneous torque of the motor
Rated Current	Arms	0.84	1.1	2.0	3.7	Current flowing to the motor at the rated operating point
Instantaneous Max. Current	Arms	2.5	3.3	6.0	11.1	Maximum current allowed to flow instantaneously to the motor
Rated Speed	min^{-1}	3000				Speed at the rated operating point
Max. Speed	min^{-1}	4500				Highest possible speed
Torque Constant	N·m/Arms	0.413	0.645	0.682	0.699	Generated torque ratio per current flowing to the motor
Rotor Moment of Inertia	$kg·m^2×10^{-4}$	0.0634	0.330	0.603	1.50	Inertia moment at the rotor shaft
Rated Power Rate	kw/s	16.0	12.3	26.7	38.1	Motor output per unit time
Rated Angular Acceleration	rad/s^2	50200	19300	21100	15900	The theoretical angular acceleration (also called torque-to-inertia ratio) at the rated torque
Time Rating		Continuous				"Continuous rating" means that the temperature of the servomotor in continuous operation under specified conditions will not exceed a specified temperature or other limitation.
Thermal Class		B				Highest allowable temperature for armature winding : 130℃
Vibration Class		V15				The maximum vibration amplitude of the motor expressed in units of micrometers on the condition that the vibration is measured with a vibrometer parallel to the shaft and in two directions perpendicular to the shaft.
Withstand Voltage		1500 VAC for one minute				–
Insulation Resistance		500 VDC, 10 MΩ min.				–
Enclosure		Totally enclosed, self-cooled, IP55 (excluding shaft opening and connectors)				Level of protection from dust and water drops
Impact Resistance		Impact acceleration : 490 m/s^2 in three directions — vertical, side to side, and front to back. Impact occurrences : 2				Impact resistance of the motor in three directions (up and down, left and right, and back and forth) with the motor shaft mounted horizontally
Vibration Resistance		Vibration acceleration : 490 m/s^2 in three directions - vertical,side to side, and front to back.				Vibration resistance of the motor in three directions (up and down, left and right, and back and forth) with the motor shaft mounted horizontally

*: The rated torques listed here are the values for the continuous allowable torque at 40℃ with an aluminum heatsink (250 mm×250 mm×6 mm) attached.

Holding Brake Specifications

Servomotor Model : SJME-□□A		01	02	04	08	Description
Rated Voltage		24 VDC ±10%				–
Holding Brake Moment of Inertia*	$kg·m^2×10^{-4}$	0.0075	0.064		0.171	–
Capacity	W	6	6.9		7.7	–
Min. Holding Torque (Static Friction Torque)	N·m	0.318	1.27		2.39	Torque against an external force to hold the shaft
Coil Resistance	Ω (at 20℃)	96	83		75	Resistance of the built-in coil in the holding brake
Rated Current	A (at 20℃)	0.25	0.29		0.32	Current that flows when the holding brake is released
Holding Brake Release Time	ms	80 max.				–
Rise Time for Holding Torque	ms	100 max.				–

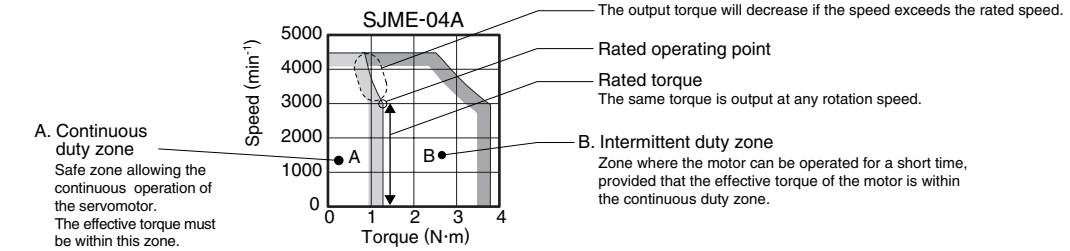
*: To obtain the moment of inertia of a motor with a holding brake, add the holding brake moment of inertia to the rotor moment of inertia. The rated power rate and rated angular acceleration of the motor will change according to the motor moment of inertia.

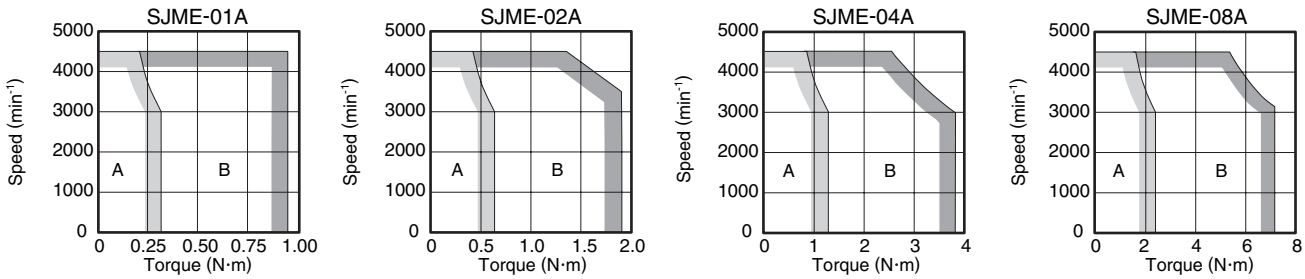
Notes : 1 The holding brake is only used to hold the load and cannot be used to stop the servomotor.

2 Do not apply the holding brake when the servo is on. Failure to observe this caution may cause an overload in the SERVOPACK or a decrease in the brake life.

Speed / Torque Characteristics

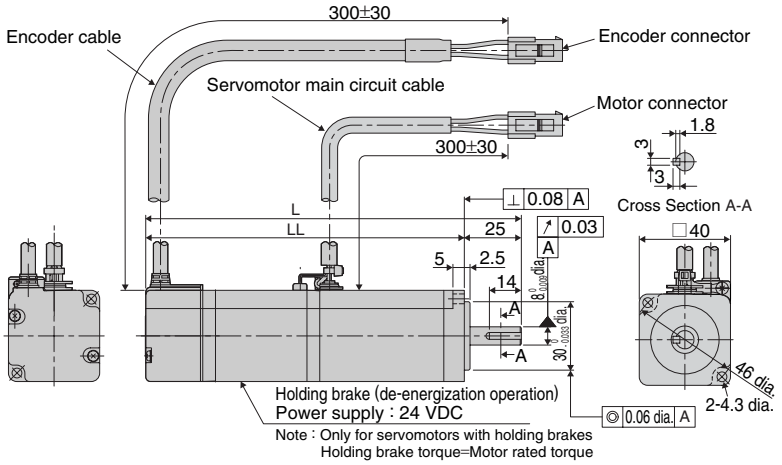
How to Read a Gragh of Speed and Torque Characteristics





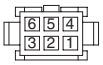
Dimensions Units : mm

● SJME-01A (100 W)



Type	L	LL	Approx. Mass kg
SJME-01AMB41	119	94	0.5
SJME-01AMB4C	164	139	0.7

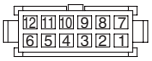
Motor Connector Specifications



Plug : 5559-06P-210
Terminal (No.1 to 3,5,6) : 5558T (chained)
or 5558TL (detached)
Grounding Pin (No.4) : 30490-2002 (chained)
or 30490-2012 (detached)
(Manufacture: Molex Japan Co., Ltd)

	Without brake		With brake	
1	Phase U	Red	Phase U	Red
2	Phase V	White	Phase V	White
3	Phase W	Blue	Phase W	Blue
4	FG	Green/Yellow	FG	Green/Yellow
5	–	–	Brake	Red
6	–	–	Brake	Black

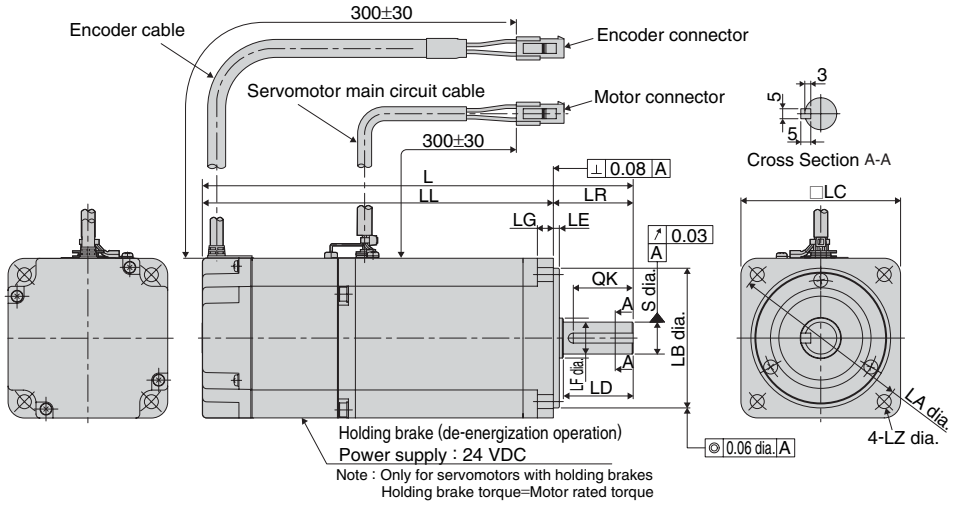
Encoder Connector Specifications



Plug : 5559-12P-210
Terminal : 5558T2 (chained)
or 5558T2L (detached)
(Manufacture: Molex Japan Co., Ltd)

1	PG5 V	Red
2	PG0 V (GND)	Black
3	Phase A+	Blue
4	Phase A–	Blue/White
5	Phase B+	Yellow
6	Phase B–	Yellow/White
7	Phase /Z	Purple
8	Phase U	Gray
9	Phase V	Green
10	Phase W	Orange
11	–	–
12	FG	Shield

● SJME-02A, 04A, 08A (200 W, 400 W, 750 W)



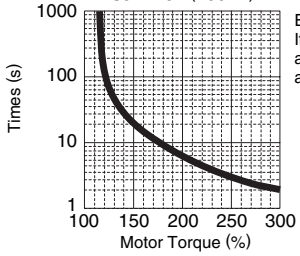
Type	L	LL	LR	LG	LE	S	LB	LC	LD	LF	LA	LZ	QK	Approx. Mass kg
SJME-02AMB41	125.5	95.5	30	6	3	$14^{0}_{-0.011}$	$50^{0}_{-0.039}$	60	–	–	70	5.5	20	0.9
SJME-02AMB4C	165.5	135.5												1.5
SJME-04AMB41	148.5	118.5							–	–				1.3
SJME-04AMB4C	188.5	158.5												1.9
SJME-08AMB41	173	133	40	8	3	$16^{0}_{-0.011}$	$70^{0}_{-0.046}$	80	35	20	90	7	30	2.6
SJME-08AMB4C	216	176												3.5

Specifications

SERVOPACK Model SJDE-□□□□				01ANA	02ANA	04ANA	08ANA
Basic Specifications	Applicable Servomotor Capacity		kW	0.1	0.2	0.4	0.75
	Continuous Output Current		Arms	0.84	1.1	2	3.7
	Instantaneous Max. Output Current		Arms	2.5	3.3	6	11.1
	Input Power Supply (for main circuit and control circuit)	Voltage		Single-phase 200 to 230 VAC, +10 to −15%			
		Frequency		50/60 Hz ± 5%			
		Voltage Frequency Capacity at Rated Output	kVA	0.40	0.75	1.2	2.2
	Power Loss at Rated Output		W	14	16	24	35
	Input Control Method			Capacitor-input type, single-phase full-wave rectification with resistance to prevent inrush currents.			
	Output Control Method			PWM control, sine wave power driven system			
	Allowable Load Moment of Inertia*1		kgm^2	0.5×10^{-4}	3×10^{-4}	5×10^{-4}	10×10^{-4}
	Leakage Current			3.5 mA max.			
Built-in Functions	Dynamic Brake(DB)			Activated when the power is off, a servo is OFF, or an alarm occurs. (Released after the motor stops; Applied if the power supply is turned off)			
	Communications for Maintenance			JunmaWin (Modification/initialization of parameters, JOG operatoin, etc)			
	Regenerative Processing			If the regenerative energy is too large, mount a regenerative unit.			
	Emergency Stop			Emergency Stop (E-STP)			
	Overtravel(OT) Prevention			Forward run prohibited (P-OT), reverse run prohibited (N-OT)			
	Display			Four LED indicators : (PWR, RDY, COM, ALM)			
	Monitor			Power supply status monitor, servo ON/OFF monitor, MECHATROLINK monitor			
	Feedback			Incremental encoder (8192 pulses/rev)			
	Reference Resolution Setting (Electronic Gear)			0.01 ≦ B/A ≦ 100			
	Protection			Speed error, overload*2, encoder error, voltage error, overcurrent, built-in cooling fan stop, system error, ground fault*3.			
MECHATROLINK Communications		Communications Protocol		MECHATROLINK-Ⅱ			
		Station Address		41H to 5FH			
		Transmission Speed		10 Mbps			
		Transmission Cycle		1 ms, 1.5 ms, 2 ms, 3 ms, 4 ms			
		Data Length		17 bytes or 32 bytes			
Command Method		Performance		MECHATROLINK-Ⅱ communications			
				MECHATROLINK-Ⅱ commands (For motion, data setting/reference, monitor, adjustment, and other commands)			
Sequence Input Signals		Fixed Inputs		5 points (External latch signal, homing deceleration signal, forward run prohibited signal, reverse run prohibited signal, and emergency stop signal)			
Sequence Output Signals		Fixed Outputs		2 points (Servo alarm and holding brake)			
Operating Temperature / Operating Humidity				0℃ to + 55℃ / 90% RH or less (no condensation)			
Storage Temperature / Storage Humidity				-20℃ to + 70℃ / 90% RH or less (no condensation)			
Ambient Conditions				Free from corrosive gases,Free from dust and iron particles,Free from water droplets or machine oil			
Altitude				1000 m or below			
Vibration Resistance / Shock Resistance				4.9 m/s^2 / 19.6 m/s^2			
Operating Conditions				Installation category (overvoltage category) : Ⅱ , Pollution degree : 2, Protection class : IP1X (EN50178)			

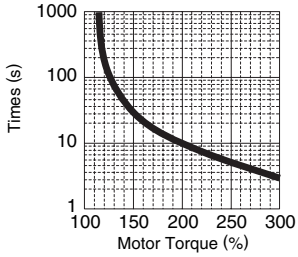
*1 : Be sure to use the motor within the allowable load moment of inertia.The motor will become unstable if the load moment of inertia exceeds the allowable value.
*2 : The overlord characteristics are shown below. The motor torque in the graphs are shown in percentage for the rated torque.
*3 : The ground protection circuit is designed for ground fault inside the motor windings while the motor is running. Therefore, it may not protect the system under the following cases.
・A low-resistance ground fault occurs in the main circuit cable or in the connector of the cable for the servomotor.
・The power supply is turned on during a ground fault.
To make your system even safer, install a ground fault interrupter for overloads and shortcircuits, or install a molded-case circuit breaker combined with a ground fault interrupter for ground faults.

SJME-01 (100 W)



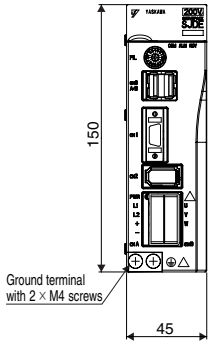
Example :
If the motor torque is 300%, an overload alarm will occur in approximately two seconds

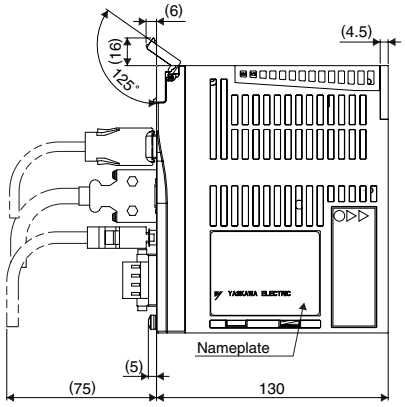
SJME-02 (200 W) to SJME-08 (750 W)



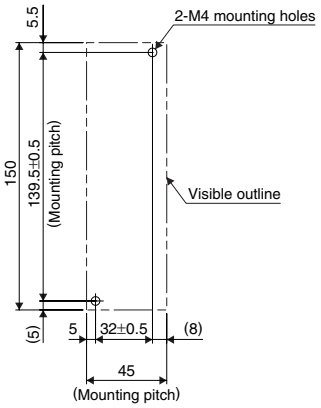
Dimensions Units : mm

● SJDE-01, 02 (100 W, 200 W)

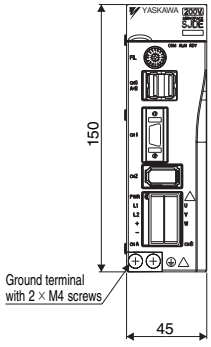


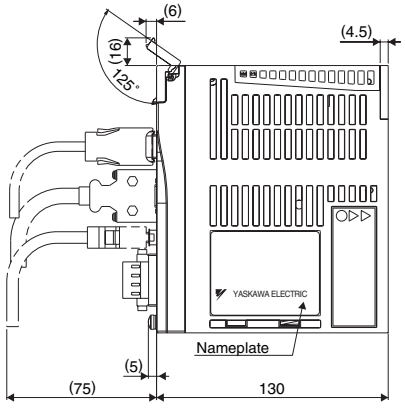


Mounting Hole Diagram

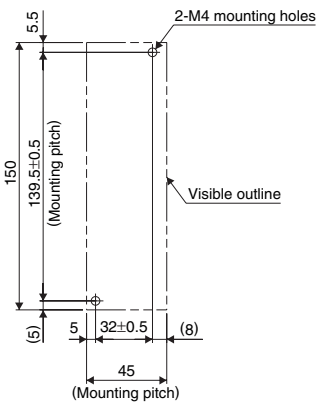


● SJDE-04 (400 W)

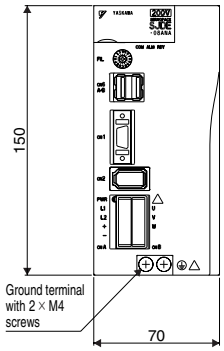


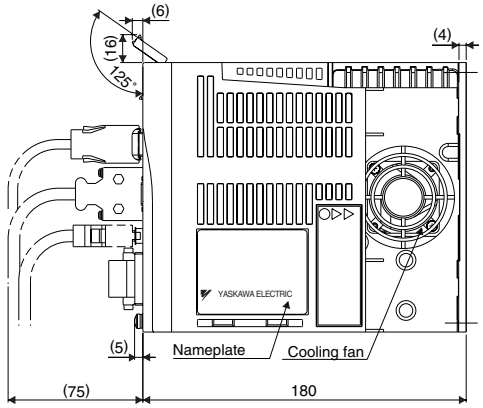


Mounting Hole Diagram

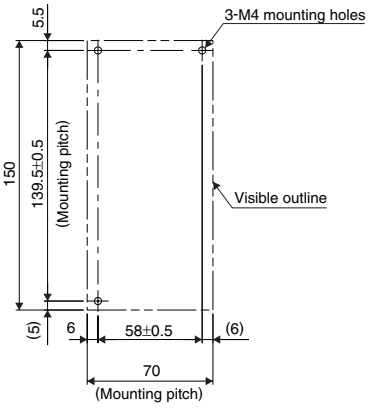


● SJDE-08 (750 W)

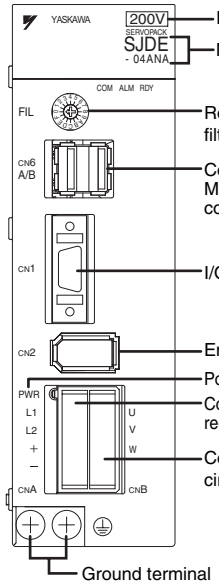




Mounting Hole Diagram



Part Names and Functions



● Rotary Switch (FIL)

If the machine vibrates when starting or stopping, set a larger value.
The factory setting is 0. Not necessary to change this value unless machine vibrates.

Setting	Rise Time*1	Positioning Settling Time*2	Description
0	45 ms	100 to 200 ms	▲Small filter time constant (short positioning time) Large filter time constant (little vibration with a long positioning time)▼
1	50 ms	110 to 220 ms	
2	60 ms	130 to 260 ms	
3	65 ms	150 to 300 ms	
4	70 ms	170 to 340 ms	
5	80 ms	200 to 400 ms	
6	85 ms	250 to 500 ms	
7	170 ms	500 to 1000 ms	
8 to F	Do not set 8 through F.		

*1 : Required time to reach reference speed.
*2 : The value depends on conditions such as the amplitude of accel/decel reference, the rigidity of the machine, and the reference resolution.

● Connector (CN1)

Pin No.	I/O	Symbol	Signal Name
1	Input	/EXT1	External latch
2	Input	/DEC	Zero point return
3	Input	P-OT	Reverse run prohibited
4	Input	N-OT	Forward run prohibited
5	Input	+24VIN	External input power supply
6	Input	E-STP	Emergency stop
7	Output	SG-COM	Output signal ground
8	–	–	–
9	–	–	–
10	–	–	–
11	–	–	–
12	Output	ALM	Servo alarm
13	Output	/BK	Brake
14	–	–	–
Shell	–	–	FG

● Connector (CNA)

Pin No.	Symbol	Signal Name
1	L1	Power supply input terminals
2	L2	
3	+	Regenerative unit connection terminals
4	–	

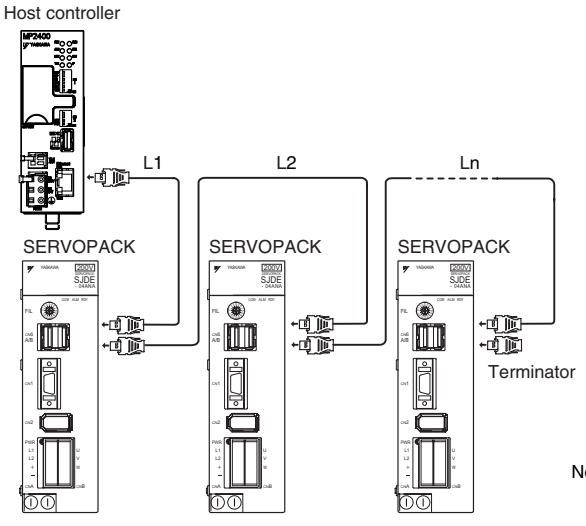
● Connector (CNB)

Pin No.	Symbol	Signal Name
1	U	Phase U
2	V	Phase V
3	W	Phase W
4	–	Not used

● Connector (CN2)

Pin No.	Symbol	Signal Name
1	PG5 V	PG power supply+5 V
2	PG0 V	PG power supply 0 V
3	A+	Phase A+
4	A–	Phase A–
5	B+	Phase B+
6	B–	Phase B–
7	/ Z	Phase / Z
8	U	Phase U
9	V	Phase V
10	W	Phase W

MECHATROLINK-Ⅱ Connections



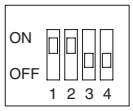
L1+L2+ ··· +Ln ≦50 m
Cable length between stations: 0.5 m min.

Notes : 1 A repeater is required for 17 or more stations or for a communication line longer than 30 m with 16 or fewer stations.
2 Terminators must be installed at both ends of the communication line. In the diagram on the left, one of the terminators is built into the host controller.

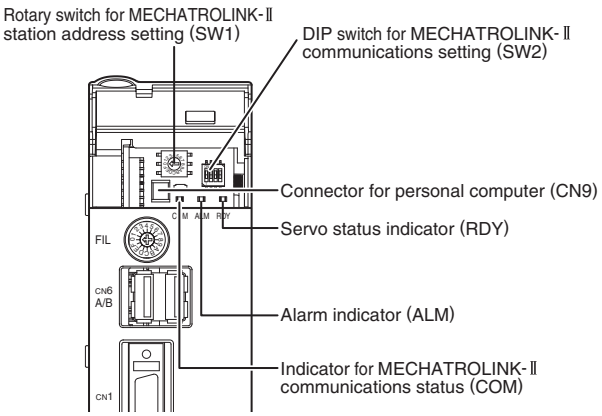
MECHATROLINK-Ⅱ Communications Settings

The SW1 and SW2 switches set the MECHATROLINK-Ⅱ communications settings. Changed settings are valid when the power is turned OFF and then ON again.

SW1 (Factory Setting)



SW2 (Factory Setting)



● DIP Switch (SW2)

SW2	Name	Setting	Description	Factory Setting
1	Reserved	OFF	Do not set	ON
		ON	Fixed	
2	Transmission bytes	OFF	17 bytes	ON
		ON	32 bytes	
3	Station address	OFF	Station address=40H+SW1	OFF
		ON	Station address=50H+SW1	
4	Selection of filter setting method	OFF	Sets by using the FIL rotary switch(invalid setting by Pn00A)	OFF
		ON	Sets by Pn00A(invalid setting by using the FIL rotary switch)	

● Number of Stations

The number of stations that can be connected depends on the transmission cycle being used. The transmission cycle is automatically set by the controller.

Transmission Bytes	Transmission Cycle				
	1.0 ms	1.5 ms	2.0 ms	3.0 ms	4.0 ms
17 bytes	14 stations	23 stations	30 stations	30 stations	30 stations
32 bytes	8 stations	14 stations	23 stations	30 stations	30 stations

If connecting 17 stations or more, use a repeater. The table indicates the maximum number of stations that can be connected by MECHATROLINK communications. The actual number of stations may differ depending on the Machine Controller. Refer to the relevant Machine Controller's manual.

MECHATROLINK-Ⅱ Communications Status Indicators

The COM LED(green) on the front of SERVOPACK is lit when MECHATROLINK-Ⅱ communications with the host controller is established.

:Unlit :Lit :Blinking

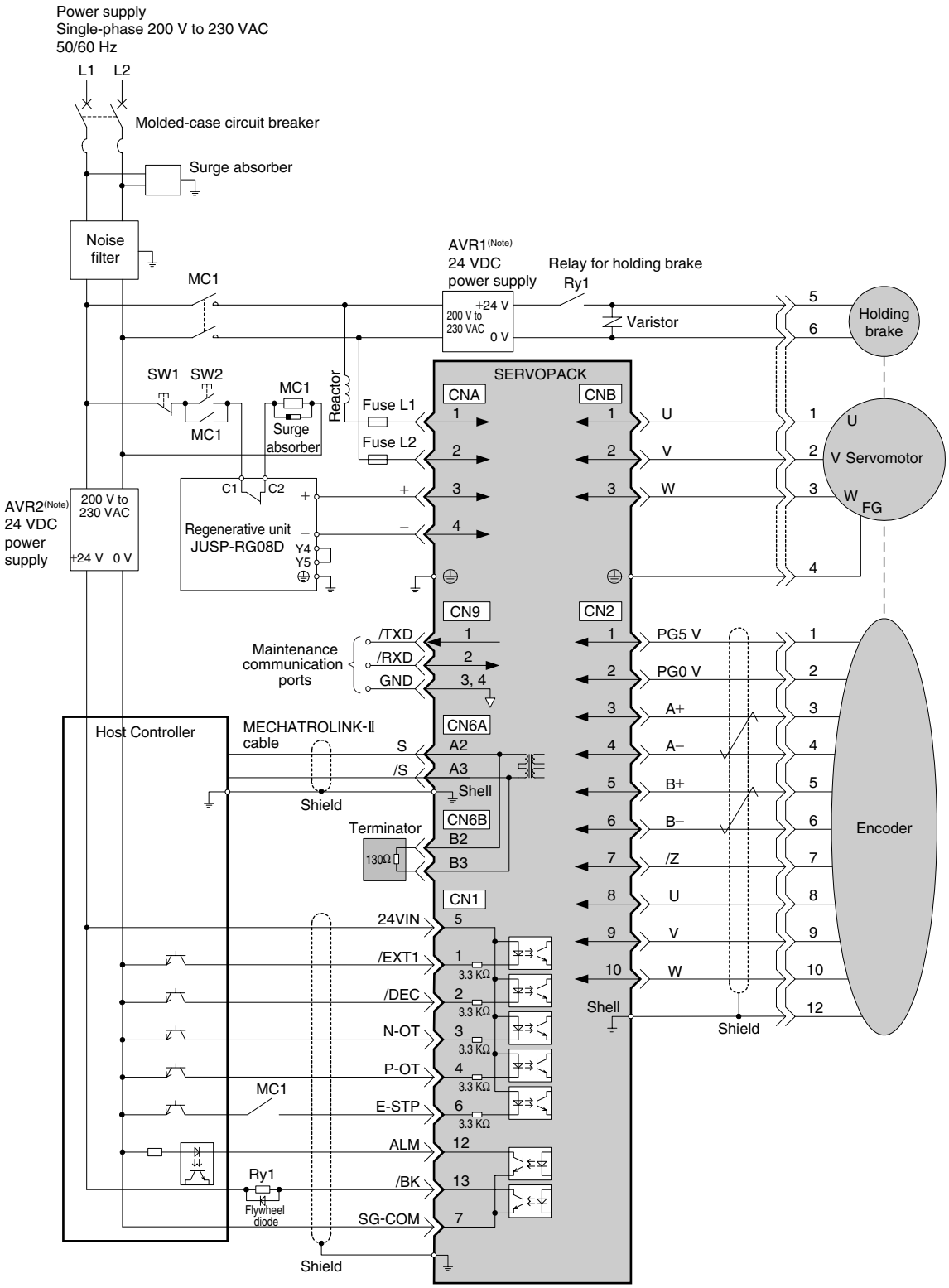
● When Operating Normally

Status LEDs	SERVOPACK Status
COM ALM RDY 2 seconds after the power turns ON COM ALM RDY	Standby for establishment of communicaions
COM ALM RDY	MECHATROLINK-Ⅱ communications busy
COM ALM RDY	Servo On status (Power is being supplied to the servomotor.)

● When an Error Occurs

Status LEDs	SERVOPACK Status	Alarm Confirmation
COM ALM RDY	Alarm	Check the alarm via MECHATROLINK-Ⅱ communications with the host controller.
COM ALM RDY	Alarm	Check the alarm with a PC running JunmaWin connected to the SERVOPACK.
COM ALM RDY	Warning	Check the warning via MECHATROLINK-Ⅱ communications with the host controller.

Connection Diagram



AVR1	24 VDC power supply for a holding brake	SW1	Emergency stop switch
		SW2	Power on switch
AVR2	24 VDC power supply for I/O signals	MC1	Magnetic contactor
		Ry1	Relay for holding brake

Note : Prepare separate 24 VDC power supplies for a holding brake and I/O signals.

Manufacturers of Components

Surge absorber	Okaya Electric Industries Co., Ltd. (Spark killer)	CRE-50500
Flywheel diode	Toshiba Corp.	1NH42
Relay for holding brake	Omron Corp.	MY series
Varistor	Nippon Chemi-Con Corp.	TNR7V121K

Input Signals

● External Latch Signal Input

This input signal is used to obtain current position data during a positioning operation.

Signal Name	Signal	Function	
External Latch Signal Input	/EXT1	ON(low level)	The external signal is ON.
		OFF(high level)	The external signal is OFF.

● Homing Deceleration Signal Input

This input signal is a deceleration signal for home position return.

Signal Name	Signal	Function	
Homing Deceleration Signal Input	/DEC	ON(low level)	The limit switch turns ON.
		OFF(high level)	The limit switch turns OFF.

● Forward/Reverse Run Prohibited Inputs (Overtravel Inputs)

Connect these signals to limit switches to forcibly stop the servomotor when the machine movable part travels beyond the allowable motion range.The servomotor will decelerate to a stop, and then the zero clamp is performed.The maximum torque during deceleration to a stop will be the servomotor maximum torque.

Note : For forward/reverse run prohibited inputs, the SERVOPACK processing for stopping is executed by the software.As the safety specifications of some applications may not satisfy local safety requirements, add external safety circuits as required.

Signal Name	Signal	Function	
Forward Run Prohibited Input	P-OT	ON(low level)	Forward run allowed (normal status)
		OFF(high level)	Forward run prohibited (reverse run allowed)
Reverse Run Prohibited Input	N-OT	ON(low level)	Reverse run allowed (normal status)
		OFF(high level)	Reverse run prohibited (forward run allowed)

<Enable/Disable Settings>

Parameter		Descriptions
Pn.50A	n.2□□□	Forward run permitted when P-OT signal is ON (low level). (Factory setting)
	n.8□□□	P-OT signal disabled. Forward run always permitted.
Pn.50B	n.□4□□	Reverse run permitted when N-OT signal is ON (low level). (Factory setting)
	n.□8□□	N-OT signal disabled. Reverse run always permitted

● Emergency Stop Signal Input

When the signal turns OFF while the servomotor is rotating, the servomotor will be stopped by the dynamic brake.

Signal Name	Signal	Function	
Emergency Stop Signal Input	E-STP	ON(low level)	Released the emergency stop
		OFF(high level)	Emergency stop(Forced servo OFF)

<Enable/Disable Settings>

Parameter		Descriptions
Pn.515	n.□4□□	Emergency stop when E-STP signal is OFF (high level). (Factory setting)
	n.□8□□	E-STP signal disabled. Emergency stop always disabled.

● Servo Alarm Output

This signal is output when the SERVOPACK detects an error.

Signal Name	Signal	Function
Servo Alarm Output	ALM	Normal status when ON(close)
		Alarm output when OFF(open)

Note : Open colletor outputs are used for output signals.
- At alarm occurrence, an alarm code is output to the host controller through MECHATROLINK-Ⅱ transmission.Take care that the SERVOPACK power supply is not turned OFF when the alarm output signal turns ON.
- Configure the system so that the SERVOPACK power supply is turned OFF by the contact signal between C1 and C2 of the regenerative unit or the contact signal of the thermostat switch for the external resistor.The power supply must be turned OFF and the emergency stop input signal must be open when using the system emergency stop.

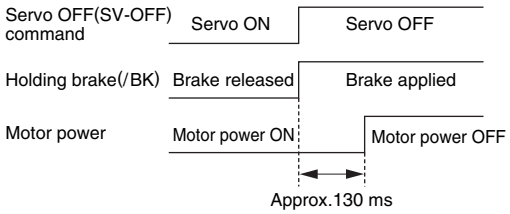
● Brake Interlock Output

This signal turns ON when the servo is ON and turns OFF when the servo is OFF. This is used to control the holding brake.

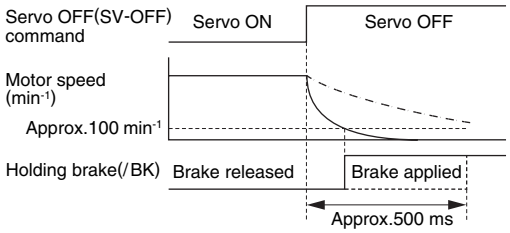
Signal Name	Signal	Function
Brake Interlock Output	/BK	Releases the brake when ON (close)
		Applies the brake when OFF (open)

● /BK Signal Timing

①When the servo is OFF while the servomotor is stopped.



②When the servo is OFF while the servomotor is running.



/BK signal turns ON when either of the following is satisfied while the servomotor is rotating.

- The servomotor speed decreases to 100 min^{-1} or less after the servo is OFF.
- 500 ms elapses after the servo is OFF.

Power Loss

Main Circuit Power Supply	SERVOPACK Model	SERVOPACK Capacity	Output Current (Effective Value) A	Main Circuit Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Single-phase 200 V	SJDE-01ANA	100 W	0.84	6	9	15
	SJDE-02ANA	200 W	1.1	8		17
	SJDE-04ANA	400 W	2.0	16		25
	SJDE-08ANA	750 W	3.7	27		36

Note : Values obtained with the servomotor rated output.

Main Circuit and Signal Cables

Cable Types

Symbol	Name	Allowable Conductor Temperature
PVC	Standard vinyl cable	–
IV	600 V vinyl cable	60℃
HIV	Heat-resistant vinyl cable	75℃

- Cable sizes are selected for three cables per bundle at 40℃ ambient temperature with the rated current.
- Use cables with a minimum withstand voltage of 600 V for main circuits.
- If cables are bundled in hard vinyl conduits or metal conduits, consider the derating of the allowable current.
- Use heat-resistant cables under high ambient temperatures in a panel where standard vinyl cables will rapidly deteriorate.
- Do not use cables under continuous regenerative state.

Cable Size and Allowable Current

The following table provides cable sizes and allowable currents for three cables per bundle. Use cables at a current equal to or lower than the allowable current shown in the table.

600-V Heat-resistant Vinyl Cables (HIV)

AWG Size	Nominal Cross Section mm²	Configuration wires/mm	Conductive Resistance Ω/km	Allowable Current at Ambient Temperature A 30℃	40℃	50℃
20	0.5	19/0.18	39.5	6.6	5.6	4.5
–	0.75	30/0.18	26.0	8.8	7.0	5.5
18	0.9	37/0.18	24.4	9.0	7.7	6.0
16	1.25	50/0.18	15.6	12.0	11.0	8.5
14	2.0	7/0.6	9.53	23	20	16

Note : The values in the table are only for reference.

Power Supply Input Terminals (L1, L2), Motor Connection Terminals (U, V, W), and Regenerative Unit Connection Terminals (+, –)

Capacity W	SERVOPACK Type	Terminal Symbol L1, L2	U, V, W,	+, –
100	SJDE-01ANA	HIV1.25 mm²	HIV1.25 mm² Wiring length: 20 m max.	HIV1.25 mm² Wiring length: 0.5 m max.
200	SJDE-02ANA			
400	SJDE-04ANA	HIV2.0 mm²		
750	SJDE-08ANA			

Note : Connectors are used for all wiring.

Cable Type

Wire Size	Terminal Screw Size	Tightening Torque
HIV2.0 mm² min.	M4	1.2 to 1.4 N · m

<Signal Line Cable Sizes>

The following table specifies the appropriate cables for the CN1 and CN2 connectors on the SERVOPACK.

Connector Name and Symbol		Item	Specification
I/O Signal Connector	CN1	Cable	Use twisted-pair cables or shielded twisted-pair cables.
		Maximum cable length	3 m
		Applicable cable	AWG24 (0.2 mm²), AWG26 (0.12 mm²), AWG28 (0.08 mm²)
		Finished cable dimension	8 mm dia. max.
Encoder Signal Connector	CN2	Cable	Use the cables specified by Yaskawa or use shielded twisted-pair cables.
		Maximum cable length	20 m
		Applicable cable	AWG22 (0.33 mm²), AWG26 (0.12 mm²) Use AWG22 for the encoder power supply and AWG26 for signal lines.
		Finished cable dimension	9 mm dia. max.

Wiring Precautions

- Make sure to securely ground the SERVOPACK and servomotor. Wiring must be performed by experts in electrical work.
- Do not run the power and signal lines together in the same duct, or do not bundle them together. The distance between a power line (such as power supply lines or servomotor cables) and signal lines must be at least 30 cm.
- If the servomotor is used to drive a vertical axis, take safety measures to prevent the workpiece from falling down when an alarm occurs. Failure to observe this precaution may result in injury or damage to the equipment caused by fallen workpieces.

Main Circuit Wiring Precautions

- For SJDE SERVOPACKs, use a power supply capacity of 5,000 Arms or less (230 Vrms max.).
- Use UL-approved fuses or circuit breakers. Wiring should meet the National Electrical Code (NEC) or an equivalent.
- Use 75˚C heat-resistant copper cables or an equivalent.

Cable Precautions

- For wiring, use the specified cables. The wiring distance should be as short as possible.
- Do not bend exessively or apply tension to cables. The conductor of a signal cable is very thin (0.08 to 0.12 mm^2), so handle the cables carefully.

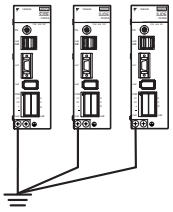
Protection of Power-supply Lines

- Use a molded-case circuit breaker and fuse to protect the power supply line. The SJDE SERVOPACK is connected directly to a commercial power supply without a transformer, so always use a circuit breaker and fuse to protect the SERVOPACK from accidents.

Grounding Precautions

To ground a SERVOPACK, follow these conditions.

- Use as thick a cable as possible (HIV2.0 mm^2 min.) for grounding.
- A ground resistance of 100 Ω or less is recommended.
- Use a single point ground as shown in the figure.



Servomotor

Precautions

The service life of the servomotor will be shortened or unexpected problems will occur if the servomotor is installed incorrectly or in an inappropriate location. Always observe the precautions in this section when installing a servomotor.

- If the junction cables are connected to the motor, be sure to connect the servomotor's main circuit cable before connecting the encoder cable. If the encoder cable is connected first, the encoder may become damaged because of the voltage differences between the ground and the frame.
- If using cables that are not made by Yaskawa, ensure that connector pins and cables are correctly configured.
- Make sure there is no foreign matter (such as dust and metal chips) in the connector before connecting.
- When handling a servomotor with its cables connected, hold the servomotor body. Otherwise the connectors and cables will be damaged.

Installation Conditions

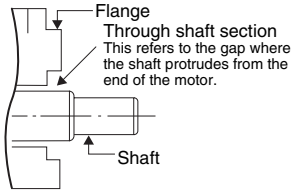
Item Conditions	Description
Operating temperature	0 to +40℃ without freezing
Operating humidity	20 to 80%RH with no condensation
Installation sites	Indoors Free from corrosive or explosive gases Well-ventilated and free from dust and moisture Facilitates inspection and cleaning
Storage conditions	If the power cable is disconnected, store the motor under these conditions. Temperature : −20 to +60℃ without freezing Humidity : 20～80%RH with no condensation
Altitude	1000 m or below above sea level

Note : Do not directly connect the servomotor to a commercial power line. This will damage the servomotor.

Waterproof Specifications

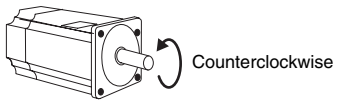
The protective structure of the servomotors is designed with an IP55 rating.

- The servomotor can be used in a location that is subject to water drops, except for the connector and the section where the shaft passes through.
- Do not use the servomotor in a location that is subject to oil mist.



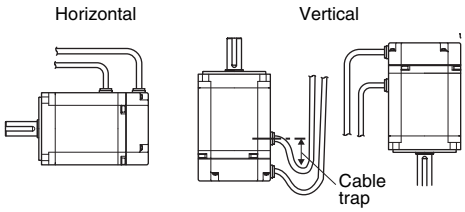
Direction of Servomotor Rotation

The forward rotation of the servomotor is counterclockwise when viewed from the load.



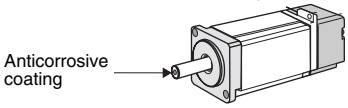
Installation Direction

- The motor can be installed horizontally or vertically. If the motor is mounted vertically, provide a cable trap so that water drops do not enter the motor. If the motor is installed with the axis pointing up, take preventive measures so that oil does not splash on the motor from other parts of the machine such as the gearbox.
- Do not bend or pull excessively any cables, the lead openings, and the junctions of the cables.The cores in the encoder cable and the brake signal line in the main circuit cable are only 0.2 mm^2 or 0.3 mm^2. Be sure to protect them from stress.

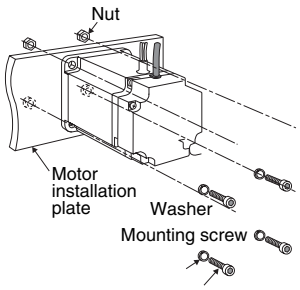


Installation Method

- The end of the motor shaft is coated with an anticorrosive coating. Thoroughly remove the coating prior to installation, or it will not be possible to couple the motor to the mechanical system.

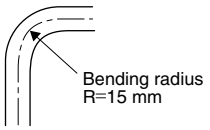


- Use the mounting holes (two for 100-W models and four for 200- to 750-W models) on the motor installation surface to secure the motor.
- Do not apply shock directly to the output shaft or encoder when mounting the motor, because the servomotor shaft is directly coupled to the encoder. The encoder may be damaged by the shock.



<Precautions>

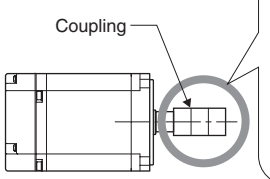
The motor main circuit cable, encoder cable, and junction cable cannot be used for applications in which the cables are moved, twisted, or rotated to a small bending radius. The cable bending radius in the center of the cable must be of 15 mm or larger. If the cables need to be bent, contact your Yaskawa representative.

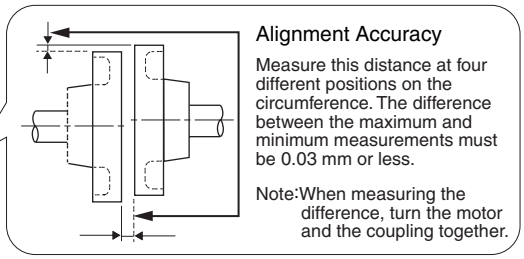


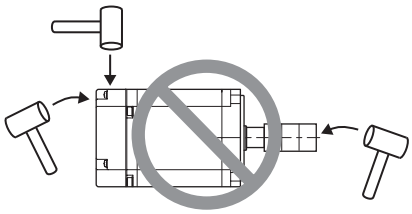
● Coupling to the Machine

Observe the following precautions when coupling the servomotor with the drive axis of the machine.

- Align the shaft of the servomotor with the shaft of the equipment, and then couple the shafts.
- Make sure that the motor and the machine are accurately aligned.Failure to observe this caution may result in damage to the motor axis or deterioration of the service life of the servomotor by an eccentric load. Keep the eccentric load as small as possible.
- A metal plate-spring coupling with high torsion rigidity designed for servomotors is recommended to maintain the response characteristics and durability of the servomotor.
- When attaching the coupling to the shaft of the servomotor, do not hammer the axis or near the encoder. Such shocks and vibrations may cause the encoder to malfunction.



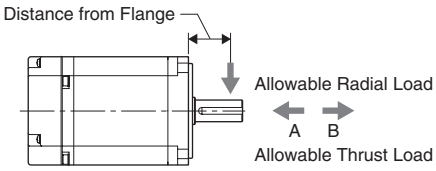




● Allowable Loads

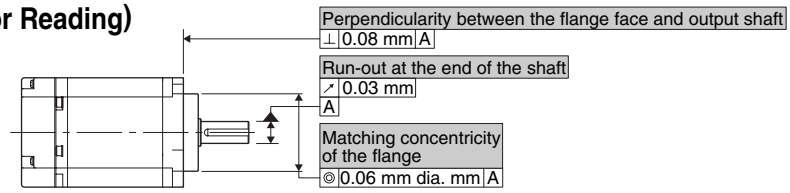
Design the mechanical system so that, during operation, the thrust and radial loads applied to the servomotor shaft do not exceed the range shown in the table below.

Servomotor Model	Allowable Radial Load M	Allowable Thrust Load (Direction A or B) N	Distance from Flange mm
SJME-01A	78	54	20
SJME-02A	245	74	25
SJME-04A	245	74	25
SJME-08A	392	147	35



● Mechanical Tolerance TIR (Total Indicator Reading)

The diagram on the right shows tolerances for the servomotor's output shaft and installation area.



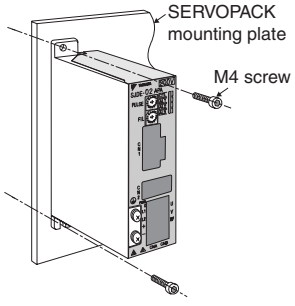
SERVOPACK

● Mounting Conditions

Installation Site	Precautions
In a control panel	The ambient temperature around the SERVOPACK must be 55℃ or less. Design the control panel size, unit layout, and cooling method accordingly. Note : The maximum ambient temperature for long-term reliability is 45℃
Near a heating unit	The ambient temperature around the SERVOPACK must be 55℃ or less. Minimize the heat radiating from the heating unit as well as any temperature rise caused by natural convection.
Near a source of vibration	Install a vibration isolator beneath the SERVOPACK to eliminate vibrations from the machine.
At a site where corrosive gasses might enter the control panel	Take appropriate action to avoid corrosive gases. Corrosive gases do not have an immediate effect on the SERVOPACK but will eventually cause the electronic components, relays, and magnetic contactors to malfunction.
At a contaminated site	Take appropriate action to avoid any contaminants such as dust, iron particles, water drops, or oil mist. Contamination will cause the electronic components to immediate malfunction.

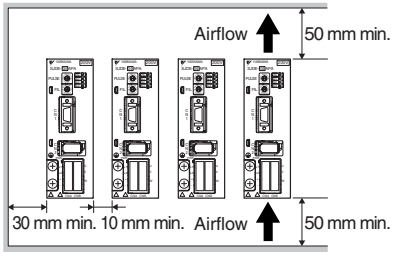
● Mounting Method

- Mount the SERVOPACK vertically, so the bottom is perpendicular to the wall. The SERVOPACK must be mounted in the specified direction because it contains a built-in fan for cooling. Fix the mounting plate securely with the two M4 screws in the mounting holes.



● Spacing

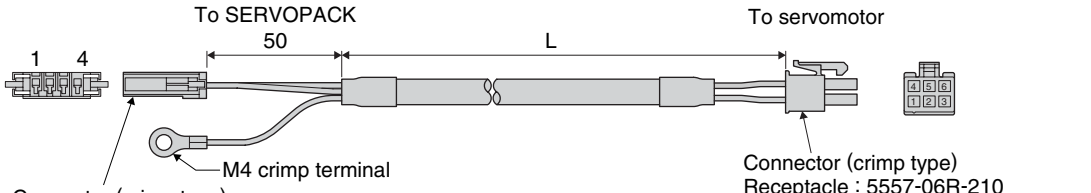
To ensure effective cooling, sufficient space must be kept between the individual SERVOPACK units and also between the SERVOPACK units as shown in the figure.



Servomotor Main Circuit Cables with Connectors (Junction Cables)

Motor Type	Model	Cable Length (L)	Contact
Without brakes	JZSP-CHM000-03	3 m	Yaskawa Local Office
	JZSP-CHM000-05	5 m	
	JZSP-CHM000-10	10 m	
	JZSP-CHM000-15	15 m	
	JZSP-CHM000-20	20 m	
With brakes	JZSP-CHM030-03	3 m	
	JZSP-CHM030-05	5 m	
	JZSP-CHM030-10	10 m	
	JZSP-CHM030-15	15 m	
	JZSP-CHM030-20	20 m	

● JZSP-CHM000-□□ (For Motors without Brakes)



<Wiring Specifications>

Connector for SERVOPACK

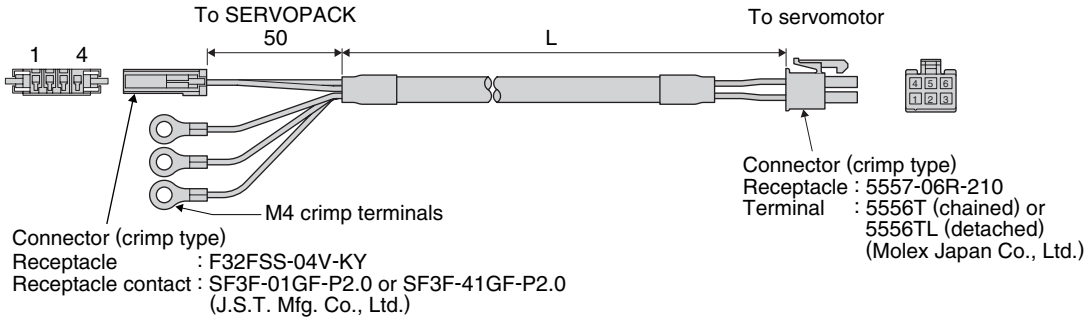
Pin No.	Signal	Cable Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	–	–
Crimp terminal	FG*	Green/Yellow

Connector for Servomotor

Pin No.	Signal	Cable Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green/Yellow
5	–	–
6	–	–

*: Connect the FG pin to the grounding terminal of the SERVOPACK.

● JZSP-CHM030-□□ (For Motors with Brakes)



<Wiring Specifications>

Connector for SERVOPACK

Pin No.	Signal	Cable Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	–	–
Crimp terminal	FG*1	Green/Yellow
Crimp terminal	Holding Brake*2	Black
Crimp terminal	Holding Brake*2	Black

Connector for Servomotor

Pin No.	Signal	Cable Color
1	Phase U	Red
2	Phase V	White
3	Phase W	Blue
4	FG	Green/Yellow
5	Holding Brake	Black
6	Holding Brake	Black

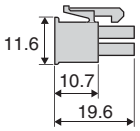
*1 : Connect the FG pin to the grounding terminal of the SERVOPACK.
*2 : No polarity for holding brake.

Servomotor Main Circuit Cable Connector Kits for Servomotor

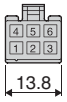
Type	Model	Part No.	Qty	Manufacturer	Contact
Crimp Type (For servomotor w/wo brake)	JZSP-CHM9-1	Receptacle : 5557-06R-210	1	Molex Japan Co.,Ltd.	Yaskawa Local Office
		Terminal : 5556T (chained) or 5556TL (detached)	7		
	57027-5000	Crimping tool : 57027-5000	–	Molex Japan Co.,Ltd.	Yaskawa Local Office

Note : A crimping tool is ordered separately.

• Receptacle

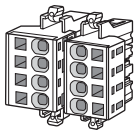


• Terminals



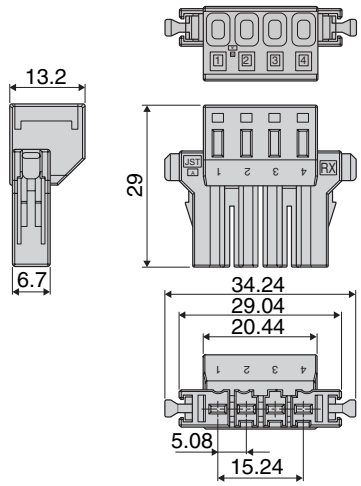
Servomotor Main Circuit Cable Connector Kits for SERVOPACK CNB Power Supply/Regenerative Unit Connector Kits for SERVOPACK CNA

Type		Model	Part No.	Qty	Manufacture	Contact
Main Circuit Cable Connector Kits for CNB (For servomotor w/wo brake)	Spring Type	JZSP-CHM9-2	Connector : 04JFAT-SAYGF-N Tool (lever for wiring) : J-FAT-OT		J.S.T.Mfg. Co.,Ltd.	Yaskawa Local Office
	Crimp Type	F32FSS-04V-KY	Receptacle : F32FSS-04V-KY	1	J.S.T.Mfg. Co.,Ltd.	Yaskawa Local Office
		SF3F-41GF-P2.0	Receptacle contact : SF3F-41GF-P2.0	4		
		YRF-880	Crimping tool : YRF-880	–		
Power Supply/ Regenerative Unit Connector Kits for CNA	Spring Type	JZSP-CHG9-1	Connector : 04JFAT-SBXGF-N Tool (lever for wiring) : J-FAT-OT		J.S.T.Mfg. Co.,Ltd.	Yaskawa Local Office

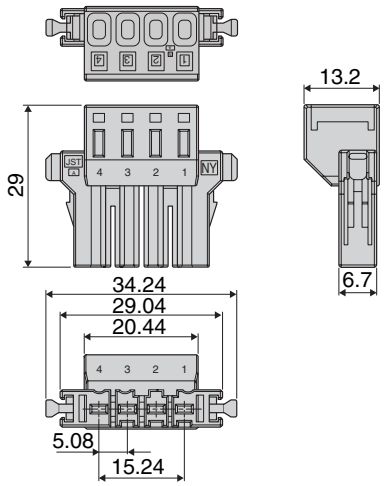


Note : A crimping tool is ordered separately.

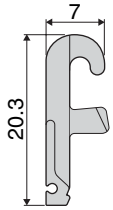
● CNA Connector Model : 04JFAT-SBXGF-N



● CNB Connector Model : 04JFAT-SAYGF-N



● Wiring Tool (Lever for Wiring) Model : J-FAT-OT

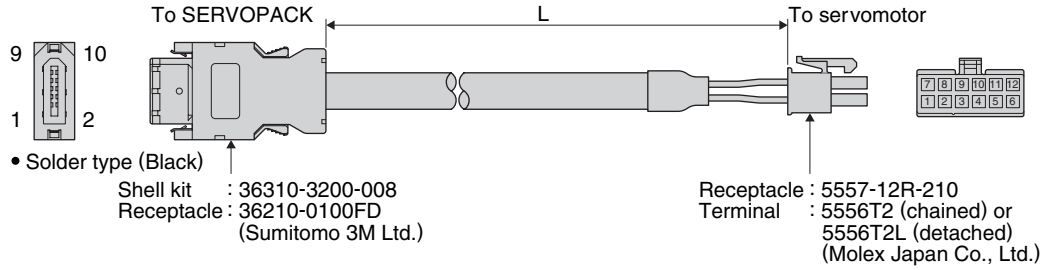


Cable and Connector Dimensions

Units : mm

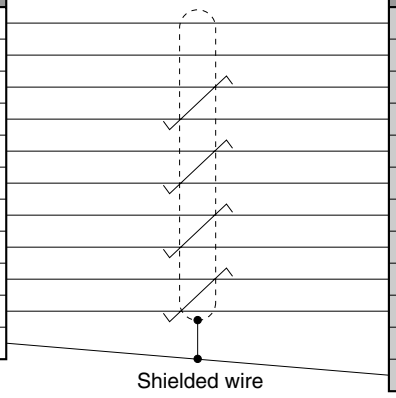
Encoder Cables with Connectors (Junction Cable)

Model	Length (L)	Contact
JZSP-CHP800-03	3 m	Yaskawa Local Office
JZSP-CHP800-05	5 m	
JZSP-CHP800-10	10 m	
JZSP-CHP800-15	15 m	
JZSP-CHP800-20	20 m	



<Wiring Specifications>

Pin No.	Signal	Wire Color
1	PG5 V	Red
2	PG0 V(GND)	Black
3	Phase A+	Blue
4	Phase A−	Blue/White
5	Phase B+	Yellow
6	Phase B−	Yellow/White
7	Phase /Z	Purple
8	Phase U	Gray
9	Phase V	Green
10	Phase W	Orange
Shell	−	Shield wire



Pin No.	Signal	Wire Color
1	PG5 V	Red
2	PG0 V(GND)	Black
3	Phase A+	Blue
4	Phase A−	Blue/White
5	Phase B+	Yellow
6	Phase B−	Yellow/White
7	Phase /Z	Purple
8	Phase U	Gray
9	Phase V	Green
10	Phase W	Orange
11	−	−
12	FG	Shield

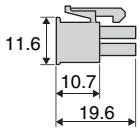
Encoder Cable Connector Kits

● For Servomotor Encoder Plug

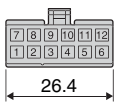
Type	Model	Part No.	Qty	Manufacturer	Contact
Crimp Type	JZSP-CHP9-1	Receptacle : 5557-12R-210	1	Molex Japan Co., Ltd.	Yaskawa Local Office
		Terminal : 5556T2 (chained) or 5556T2L (detached)	12		
	57026-5000	Crimping tool : 57026-5000	−	Molex Japan Co., Ltd.	Yaskawa Local Office

Note : A crimping tool is ordered separately.

• Receptacle

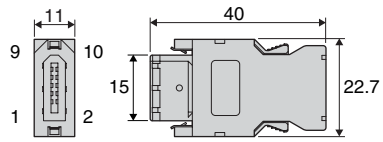


• Terminals



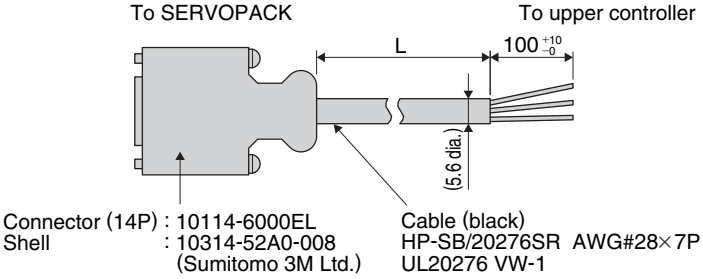
● For SERVOPACK CN2

Type	Model	Part No.	Manufacturer	Contact
Soldered Type (black)	JZSP-CHP9-2	Shell kit : 36310-3200-008 Receptacle : 36210-0100FD	Sumitomo 3M Ltd.	Yaskawa Local Office
Soldered Type (gray)	JZSP-CHP9-3	Plug and cable cover : 54599-1019 Plug connector : 54593-1019	Molex Japan Co.,Ltd.	Yaskawa Local Office



I/O Signal Cables

Cable Mode	Length (L)	Contact
JZSP-CHI003-01	1 m	Yaskawa Local Office
JZSP-CHI003-02	2 m	
JZSP-CHI003-03	3 m	



<Wiring Specifications>

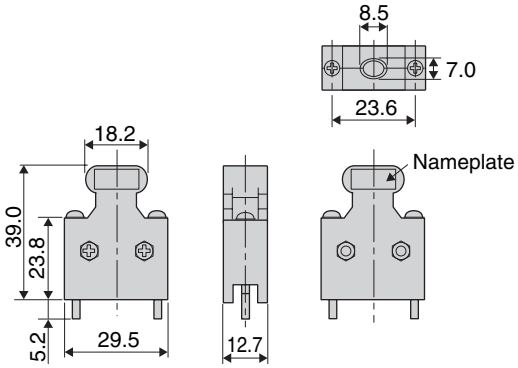
Pin No.	I/O	Code	Signal Name	Lead Color	Dot Mark Number	Dot Mark Color	Pin No.	I/O	Code	Signal Name	Lead Color	Dot Mark Number	Dot Mark Color
1	Input	/EXT1	External latch	Orange	1	Black	9				Pink	1	Black
2	Input	/DEC	Homing deceleration			Red	10						Red
3	Input	N-OT	Reverse run prohibit	Light gray		Black	11				Orange	2	Black
4	Input	P-OT	Forward run prohibit			Red	12	Output	ALM	Servo alarm			Red
5	Input	+24VIN	External input power supply	White		Black	13	Output	/BK	Brake	Light gray		Black
6	Input	E-STP	Emergency stop			Red	14						Red
7	Output	SG-COM	Output signal ground	Yellow		Black	Shell	–	–	FG	–	–	
8						Red							

I/O Signal Connector Kits

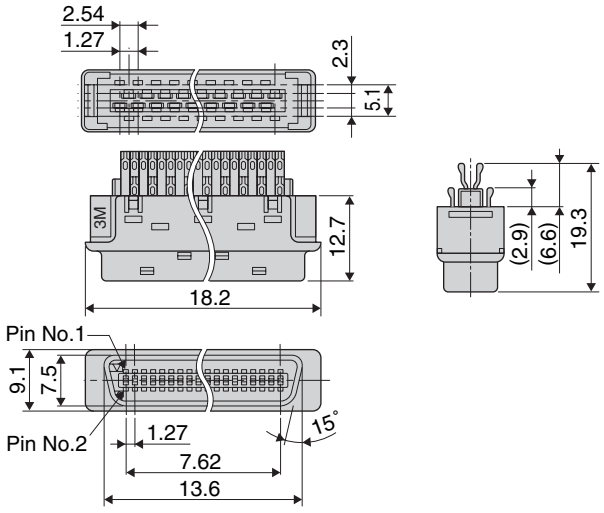
● For SERVOPACK CN1

Type	Models	Part No.	Manufacturer	Contact
Soldered type	JZSP-CHI9-1	Shell kit : 10314-52A0-008 Plug : 10114-3000PE	Sumitomo 3M Ltd.	Yaskawa Local Office

• Shell Kit

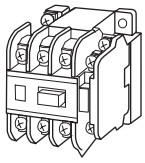


• Plug



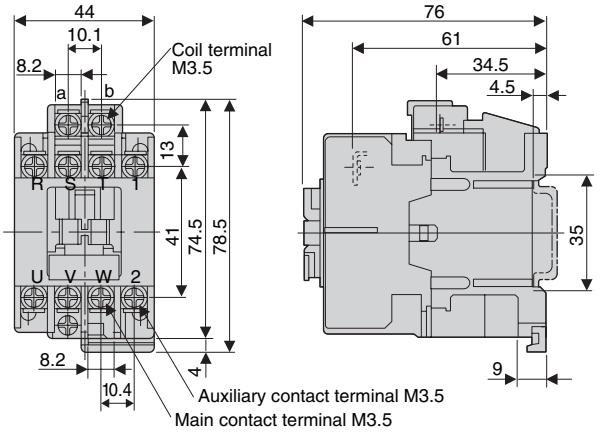
Magnetic Contactor

Model	Specifications	Manufacturer	Contact
HI-11J	20 A	Yaskawa Controls Co., Ltd.	Yaskawa Local Office
HI-15J	35 A		

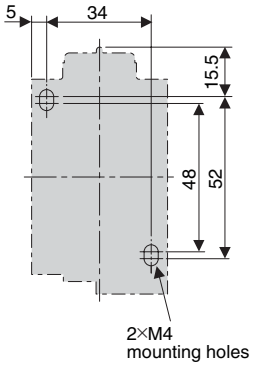


● HI-11J

Dimensions



Mounting Hole Dimensions

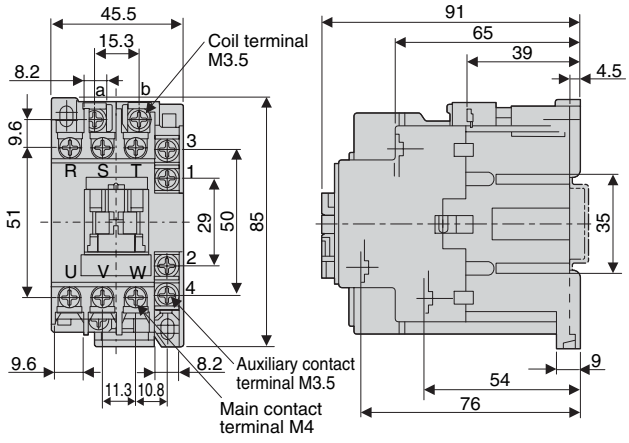


Terminal Symbols

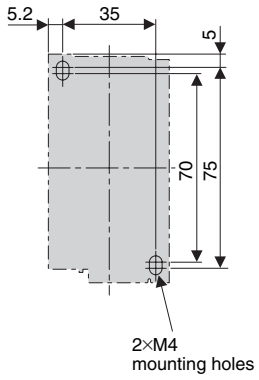
Auxiliary Contact	Structure
NO	NO A1 — A2 NC R 1 S 3 T 5 1 13 U 2 V 4 W 6 2 14
NC	NO A1 — A2 NC R 1 S 3 T 5 1 11 U 2 V 4 W 6 2 12

● HI-15J

Dimensions



Mounting Hole Dimensions



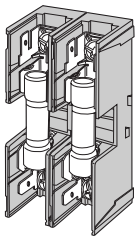
Terminal Symbols

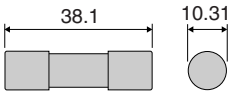
Auxiliary Contact	Structure
NONC	NO A1 — A2 NC R 1 S 3 T 5 1 21 3 13 U 2 V 4 W 6 2 22 4 14

External Fuse

Fuse

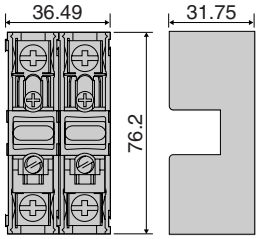
Model	Rated Current	Rated Voltage	Fusing Time	Applicable SERVOPACKs	Manufacturer	Contact
OKLK015.T	15 Arms	600 V	Within 2 s at 200%	SJDE-01 to 04	Littelfuse Inc.	Yaskawa Local Office
OKLK030.T	30 Arms			SJDE-08		





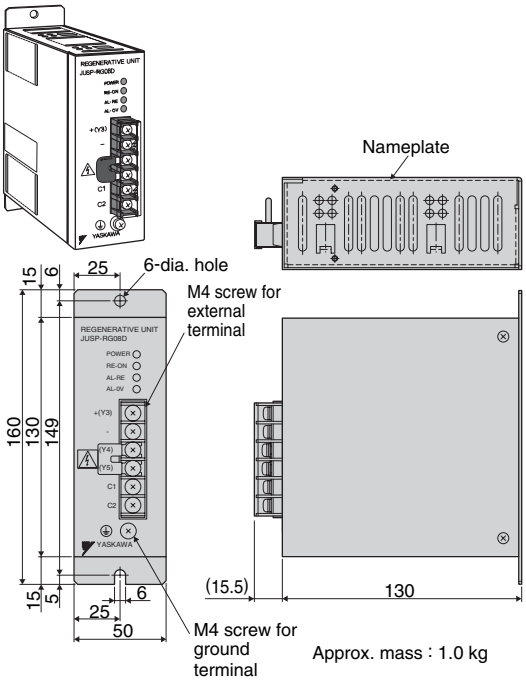
Fuse Block

Model	Type	Manufacturer	Contact
L60030M2SQ	Screw terminal, 2 poles	Littelfuse Inc.	Yaskawa Local Office
L60030M2C	Copper box lug, 2 poles		



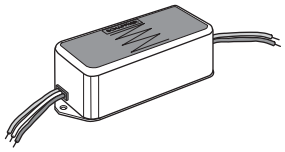
Regenerative Unit

Model	JUSP-RG08D	Manufacturer	Contact
Resistance	50 Ω	Yaskawa Electric Corporation	Yaskawa Local Office
Allowable regenerative energy	12 W		
Regenerative voltage	380 Vdc		
Regenerative current	8 Adc		
Error detection	Disconnection of regenerative resistance, failure of regenerative transistor, or overvoltage		
Alarm output	NC contact (Open when an error is detected.) Contact specifications : 250 VAC, 1.5 A (inductive load)		



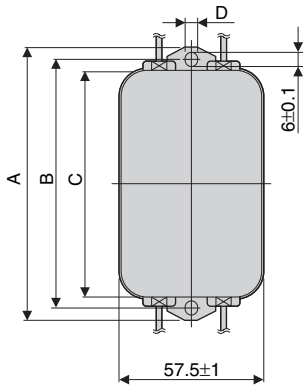
Noise Filter

Model	Specifications	Manufacturer	Contact
FN2070-6/07	Single-phase 250 VAC, 6 A	Shaffner EMC, Inc.	Yaskawa Local Office
FN2070-10/07	Single-phase 250 VAC, 10 A		
FN2070-16/07	Single-phase 250 VAC, 16 A		

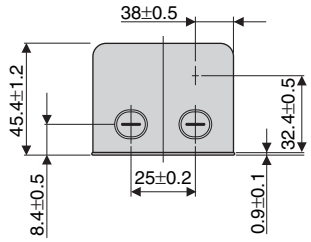


● FN2070-6/07, FN2070-10/07

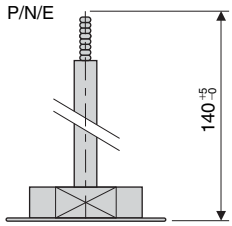
Top view



Side view



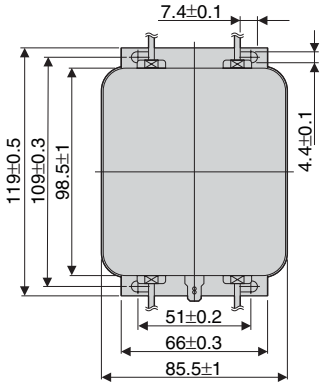
Contact terminal



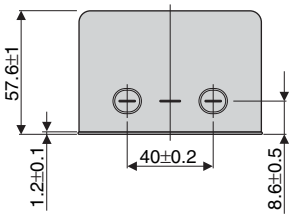
Model	A	B	C	D
FN2070-6/07	113.5±1	103±0.3	94±1	4.4±0.1
FN2070-10/07	156±1	143±0.3	130.5±1	5.3±0.1

● FN2070-16/07

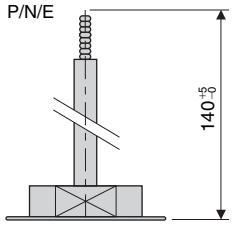
Top view



Side view

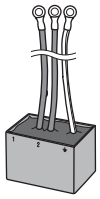


Contact terminal

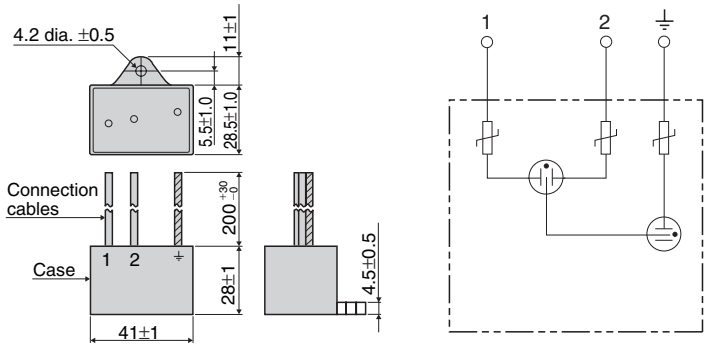


Surge Absorber (For lightning surge protection)

Model	Specifications	Manufacturer	Contact
R·C·M-601BQZ-4	Single-phase 250 VAC	Okaya Electric Industries Co., Ltd.	Yaskawa Local Office

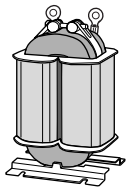


<Internal Connection Diagram>

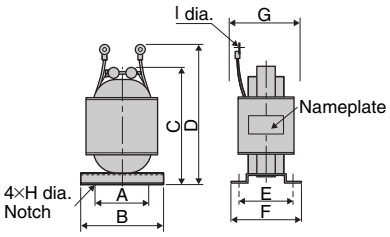


AC Reactor

Model	Inductance (mH)	Rated Current (A)	Contact
X5052	45.0	1.0	Yaskawa Local Office
X5053	20.0	2.0	
X5054	5.0	3.0	
X5056	2.0	5.0	

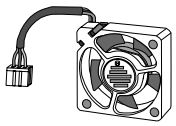


Model	Dimensions mm									Approx. Mass
	A	B	C	D	E	F	G	H	I	kg
X5052	35	52	80	95	30	40	45	4	4.3	0.4
X5053	35	52	90	105	35	45	50	4	4.3	0.6
X5054	35	52	80	95	30	40	45	4	4.5	0.4
X5056	35	52	80	95	30	40	45	4	4.3	0.4

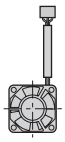


Replacement Cooling Fan

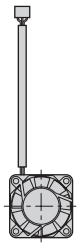
Model	Applicable SERVOPACKs	Contact
JZSP-CHF08-1	SJDE-01 to 04	Yaskawa Local Office
JZSP-CHF08-2	SJDE-08	



• JZSP-CHF08-1



• JZSP-CHF08-2



Personal Computer Support Software JunmaWin

JunmaWin is an engineering tool used to set up MECHATROLINK-Ⅱ compatible JUNMA series AC servo drives. It can be downloaded from Yaskawa's technology and products website, http://www.e-mechatronics.com.

● Functions of JunmaWin

Parameter Setting

Sets parameters.

Alarm Display/Monitoring

Monitors and displays SERVOPACK status.

Setup and Trial Operation

Supports trial operation and initial setting before operation.

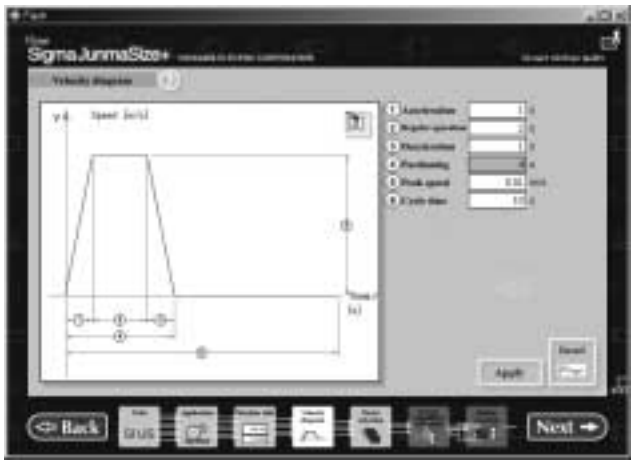
AC Servomotor Selection Program: SigmaJunmaSize+

SigmaJunmaSize+ is the software that can help you select the optimal servo drive for your system.
It can be downloaded from Yaskawa's technology and products website, http://www.e-mechatronics.com.

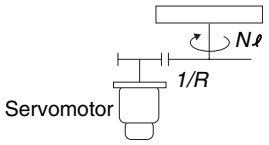
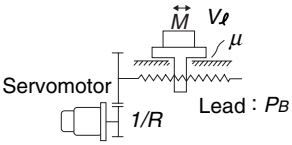
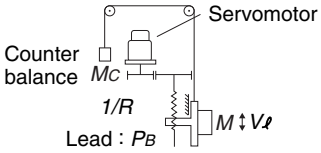
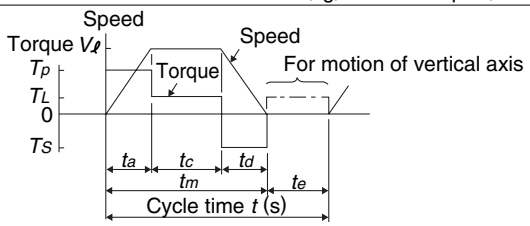
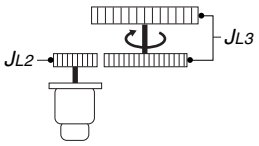
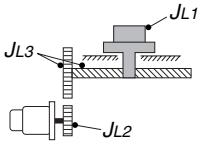
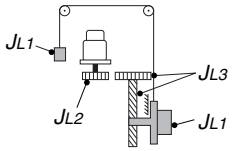
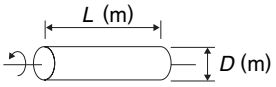
Features

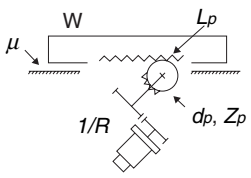
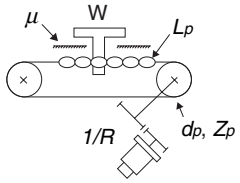
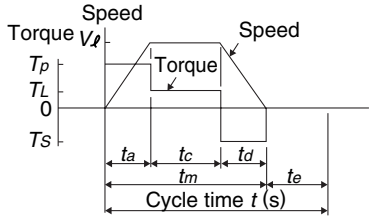
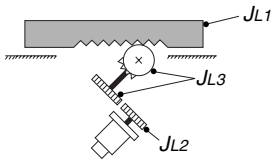
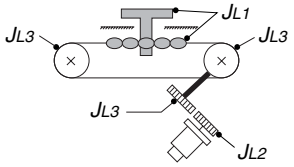
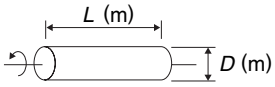
- Obtain product updates.
- Select the optimal servomotor with the help of an interactive wizard.
- Refer to and reuse stored data.

Servomotor Selection Screen



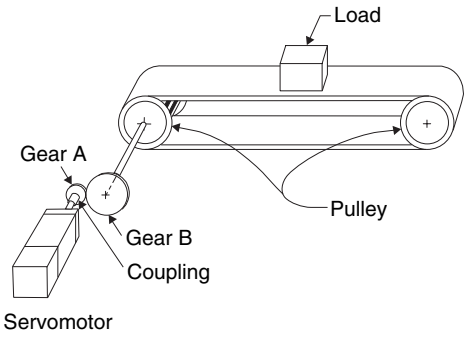
Formulas for Selecting Servomotor Capacity

Motions	Rotational Motion	Linear Motion	
		Horizontal Axis	Vertical Axis
Mechanical Configuration			
	$N\ell$: Load axis speed (min^{-1}) $V\ell$: Load speed (m/min) $T\ell$: Load torque (N·m) μ : Friction coefficient	P_B : Ball screw lead (m) M : Mass of linear-motion section (kg) M_C : Mass of counterbalance (kg)	$1/R$: Gear ratio η : Mechanical efficiency T_{PM} : Servomotor maximum torque (N·m)
Speed Diagram			
Travel Distance (m)	$S=\frac{V\ell}{60}\cdot\frac{t_a+2t_c+t_d}{2}$ $\left(\text{Where } t_a=t_d,\quad S=\frac{V\ell}{60}(t_m-t_a)\right)$		
Load axis speed (min^{-1})	$N\ell$	$N\ell=\frac{V\ell}{P_B}$	$N\ell=\frac{V\ell}{P_B}$
Motor Speed (min^{-1})	$N_M=N\ell\cdot R$		
Load Torque at Motor Shaft (N·m)	$T_L=\frac{T\ell}{R\cdot\eta}$	$T_L=\frac{9.8\times\mu\cdot M\cdot P_B}{2\pi\cdot R\cdot\eta}$	$T_L=\frac{9.8\times(M-M_C)P_B}{2\pi\cdot R\cdot\eta}$
Load Moment of Inertia at Motor Shaft (kg·m^2)	$J_L=J_{L1}+J_{L2}+J_{L3}$		
			
Linear Motion	—	$J_{L1}=M\cdot\left(\frac{P_B}{2\pi R}\right)^2$	$J_{L1}=(M+M_C)\cdot\left(\frac{P_B}{2\pi R}\right)^2$
Rotational Motion	·Solid cylinder  <Inertia for motor shaft> At gear input side $J_{L2}=J_K$ At gear output side $J_{L3}=\frac{J_K}{R^2}$	$J_K=\frac{1}{8}M_K\cdot D^2$ or $J_K=\frac{\pi}{32}\rho\cdot L\cdot D^4$ M_K : Mass (kg) ρ : Density (kg/m^3)…Iron $\rho=7.87\times10^3$ (kg/m^3) …Aluminum $\rho=2.70\times10^3$ (kg/m^3)	
Running Power (W)	$P_0=\frac{2\pi\cdot N_M\cdot T_L}{60}$		
Acceleration Power (W)	$P_a=\left(\frac{2\pi}{60}\cdot N_M\right)^2\frac{J_L}{t_a}$		
Required Starting Torque (N·m)	$T_P=\frac{2\pi\cdot N_M(J_M+J_L)}{60\times t_a}+T_L$		
Required Braking Torque (N·m)	$T_s=\frac{2\pi\cdot N_M(J_M+J_L)}{60\times t_d}-T_L$		
Effective Torque (N·m)	$T_{rms}=\sqrt{\frac{T_P^2\cdot t_a+T_L^2\cdot t_c+T_S^2\cdot t_d}{t}}$		$T_{rms}=\sqrt{\frac{T_P^2\cdot t_a+T_L^2(t_c+t_e)+T_s^2\cdot t_d}{t}}$
Min. Starting Time (s)	$t_{am}=\frac{2\pi\cdot N_M(J_M+J_L)}{60(T_{PM}-T_L)}$		
Min. Braking Time (s)	$t_{dm}=\frac{2\pi\cdot N_M(J_M+J_L)}{60(T_{PM}+T_L)}$		

Motions	Linear Motion	
	Rack & Pinion	Chain and Timing Belt
Mechanical Configuration		
	N_ℓ : Load axis speed (min^{-1}) M : Mass of linear-motion section (kg) d_p : Pitch diameter (m) V_ℓ : Load speed (m/min) $1/R$: Gear ratio Z_p : Number of gear T_ℓ : Load torque at load shaft (N·m) η : Mechanical efficiency L_p : Pitch (m) μ : Friction coefficient T_{PM} : Servomotor maximum torque (N·m) P_B : $Z_p \cdot L_p$ or $\pi \cdot d_p$	
Speed Diagram		
Travel Distance (m)	$S = \frac{V_\ell}{60} \cdot \frac{t_a + 2t_c + t_d}{2}$ $\left\{ \text{Where } t_a = t_d,\ S = \frac{V_\ell}{60}(t_m - t_a) \right\}$	
Load axis speed (min^{-1})	$N_\ell = \frac{V_\ell}{P_B}$	
Motor Speed (min^{-1})	$N_M = N_\ell \cdot R$	
Load Torque at Motor Shaft (N·m)	$T_L = \frac{9.8 \times \mu \cdot M \cdot P_B + 2\pi \cdot T_\ell}{2\pi \cdot R \cdot \eta}$	
Load Moment of Inertia at Motor Shaft (kg·m^2)	$J_L = J_{L1} + J_{L2} + J_{L3}$	
		
Linear Motion	$J_{L1} = M \cdot \left(\frac{P_B}{2\pi R} \right)^2$	
Rotational Motion	·Solid cylinder  <Inertia for motor shaft> At gear input side $J_{L2} = J_K$ At gear output side $J_{L3} = \frac{J_K}{R^2}$	$J_K = \frac{1}{8} M_K \cdot D^2$ or $J_K = \frac{\pi}{32} \rho \cdot L \cdot D^4$ M_K: Mass (kg) ρ : Density (kg/m^3)…Iron $\rho = 7.87 \times 10^3$ (kg/m^3) …Aluminum $\rho = 2.70 \times 10^3$ (kg/m^3)
Running Power (W)	$P_0 = \frac{2\pi \cdot N_M \cdot T_L}{60}$	
Acceleration Power (W)	$P_a = \left(\frac{2\pi}{60} \cdot N_M \right)^2 \frac{J_L}{t_a}$	
Required Starting Torque (N·m)	$T_P = \frac{2\pi \cdot N_M (J_M + J_L)}{60 \times t_a} + T_L$	
Required Braking Torque (N·m)	$T_S = \frac{2\pi \cdot N_M (J_M + J_L)}{60 \times t_d} - T_L$	
Effective Torque (N·m)	$T_{rms} = \sqrt{\frac{T_P^2 \cdot t_a + T_L^2 \cdot t_c + T_S^2 \cdot t_d}{t}}$	
Min. Starting Time (s)	$t_{am} = \frac{2\pi \cdot N_M (J_M + J_L)}{60 (T_{PM} - T_L)}$	
Min. Braking Time (s)	$t_{dm} = \frac{2\pi \cdot N_M (J_M + J_L)}{60 (T_{PM} + T_L)}$	

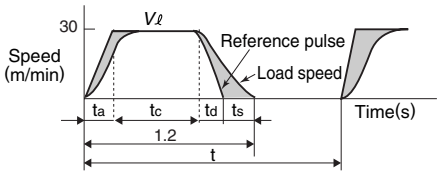
Servomotor Selection Example 1

Mechanical Specifications



- Load speed : $V\ell$ = 30 m/min
- Mass of linear-motion section : M = 4 kg
- Pulley diameter : D_P = 0.064 m
- Pulley thickness : L_P = 0.02 m
- Pulley density : M_P = 2690 kg/m³
- Coupling mass : M_C = 0.3 kg
- Coupling outer diameter : D_C = 0.03 m
- Gear A outer diameter : D_A = 0.02 m
- Gear A thickness : L_A = 0.02 m
- Gear B outer diameter : D_B = 0.1 m
- Gear B thickness : L_B = 0.02 m
- Gear density : ρA, ρB = 7870 kg/m³
- Gear ratio : R = 5
- Positioning frequency : n = 40 times/min
- Traveling distance : ℓ = 0.5 m
- Positioning time : t_m = 1.2 s max.
- Friction coefficient : μ = 0.2
- Load torque at load shaft : $T\ell$ = 0.05 N·m
- Mechanical efficiency : η = 0.9 (90%)

● Speed Diagram



Cycle time $t = \frac{60}{n} = \frac{60}{40} = 1.5$ (s)

Where acceleration time (t_a) = deceleration time (t_d) and settling time (t_s) = 0.1 s when the filter setting of the FIL rotary switch is 0.

Acceleration time: $t_a = t_d = t_m - t_s - \frac{60 \times \ell}{V\ell} = 1.2 - 0.1 - \frac{60 \times 0.5}{30} = 0.1$ (s)

Constant-speed time: $t_c = t_m - t_s - t_a - t_d = 1.2 - 0.1 - 0.1 - 0.1 = 0.9$ (s)

● Speed

$P_B = \pi d = \pi \times 0.064 = 0.201$

- Load axis speed $N\ell = \frac{V\ell}{P_B} = \frac{30}{0.201} = 149$ (min^{-1})
- Motor speed $N_M = N\ell \cdot R = 149 \times 5 = 745$ (min^{-1})

● Load Torque at Motor Shaft

$$T_L = \frac{\mu \cdot 9.8 \cdot M \cdot P_B + 2\pi \cdot T\ell}{2\pi R \cdot \eta} = \frac{0.2 \times 9.8 \times 4 \times 0.201 + 2\pi \times 0.05}{2\pi \times 5 \times 0.9} = 0.0669 \text{ (N·m)}$$

● Load Moment of Inertia

- Linear-motion section $J_{L1} = M\left(\frac{P_B}{2\pi R}\right)^2 = 4 \times \left(\frac{0.201}{2\pi \times 5}\right)^2 = 1.639 \times 10^{-4}$ (kg·m²)
- Load-shaft motion section: Pulley × 2 + Gear B

$$J_{L2} = \frac{\Sigma J_i}{R^2} = \frac{1}{5^2} \times \frac{\pi}{32} \times (2690 \times 0.02 \times (0.064)^4 \times 2 + 7870 \times 0.02 \times (0.1)^4) = 0.687 \times 10^{-4} \text{ (kg·m}^2\text{)}$$

- Motor-shaft motion section: Gear A + Coupling

$$J_{L3} = \frac{\pi}{32} \times 7870 \times 0.02 \times (0.02)^4 + \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.362 \times 10^{-4} \text{ (kg·m}^2\text{)}$$

- Load moment of inertia at motor shaft $J_L = J_{L1} + J_{L2} + J_{L3} = (1.639 + 0.687 + 0.362) \times 10^{-4} = 2.69 \times 10^{-4}$ (kg·m²)

● Load Running Power

$$P_O = \frac{2\pi N_M \cdot T_L}{60} = \frac{2\pi \times 745 \times 0.0669}{60} = 5.2 \text{ (W)}$$

● Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} N_M\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times 745\right)^2 \times \frac{2.69 \times 10^{-4}}{0.1} = 16.4 \text{ (W)}$$

● Provisional Selection

Selection criteria
- $T_L \leqq$ Motor rated torque
- $Pa + Po$ =(1 to 2) ×Motor rated output
- $N_M \leqq$ Motor rated speed or maximum speed
- $J_L \leqq$ Allowable load moment of inertia of SERVOPACK

The following combination of SERVOPACK and servomotor satisfies the selection criteria.
- Servomotor : SJME-02AMB41
- SERVOPACK : SJDE-02APA

<Ratings>

- Rated output : 200 (W)
- Rated speed : 3000 (min^{-1})
- Maximum speed : 4500 (min^{-1})
- Rated torque : 0.637 (N·m)
- Instantaneous peak torque : 1.91 (N·m)
- Rotor moment of inertia : 0.330×10^{-4} ($kg \cdot m^2$)
- Allowable load moment of inertia of SERVOPACK : 3×10^{-4} ($kg \cdot m^2$)

● Final Selection

Required Starting Torque

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L = \frac{2\pi \times 745 \times (0.330 + 2.69) \times 10^{-4}}{60 \times 0.1} + 0.0669 = 0.303 \text{ (N·m)}$$

< 1.91 (N·m) = Instantaneous peak torque
Therefore, the provisionally selected servomotor can be used.

Required Braking Torque

$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_a} - T_L = \frac{2\pi \times 745 \times (0.330 + 2.69) \times 10^{-4}}{60 \times 0.1} - 0.0669 = 0.169 \text{ (N·m)}$$

< 1.91 (N·m) = Instantaneous peak torque
Therefore, the provisionally selected servomotor can be used.

Effective Torque

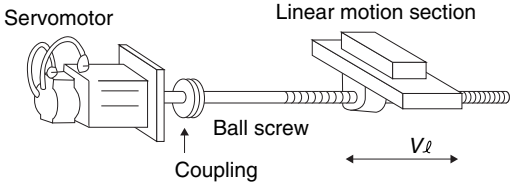
$$T_{rms} = \sqrt{\frac{T_P^2 \cdot t_a + T_L^2 \cdot t_c + T_S^2 \cdot t_d}{t}} = \sqrt{\frac{(0.303)^2 \times 0.1 + (0.0669)^2 \times 0.9 + (0.169)^2 \times 0.1}{1.5}}$$

= 0.103 (N·m)
< 0.637 (N·m) = Rated torque
Therefore, the provisionally selected servomotor can be used.

The provisional selection of SERVOPACK and servomotor has been confirmed to have sufficient capacity to satisfy the selection criteria.

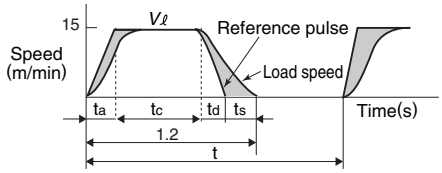
Servomotor Selection Example 2

Mechanical Specifications



- Load speed : $V\ell$ = 15 m/min
- Mass of linear-motion section : M = 80 kg
- Ball screw length : L_B = 0.8 m
- Ball screw diameter : D_B = 0.016 m
- Ball screw lead : P_B = 0.005 m
- Coupling mass : M_C = 0.3 kg
- Coupling outer diameter : D_C = 0.03 m
- Positioning frequency : n = 40 times/min
- Traveling distance : ℓ = 0.25 m
- Positioning time : t_m = 1.2 s max.
- Electrical stopping accuracy : δ = ±0.01 mm
- Friction coefficient : μ = 0.2
- Mechanical efficiency : η = 0.9 (90%)

● Speed Diagram



Cycle time $t = \frac{60}{n} = \frac{60}{40} = 1.5$ (s)

Where acceleration time (t_a) = deceleration time (t_d) and settling time (t_s) = 0.1 s when the filter setting of the FIL rotary switch is 0.

Acceleration time: $t_a = t_d = t_m - t_s - \frac{60 \times \ell}{V\ell} = 1.2 - 0.1 - \frac{60 \times 0.5}{30} = 0.1$ (s)

Constant-speed time: $t_c = t_m - t_s - t_a - t_d = 1.2 - 0.1 - 0.1 - 0.1 = 0.9$ (s)

● Speed

- Load axis speed $N\ell = \frac{V\ell}{P_B} = \frac{15}{0.005} = 3000$ (min^{-1})
- Motor speed The gear ratio is $1/R = 1/1$ because of direct coupling. Then, $N_M = N\ell \cdot R = 3000 \times 1 = 3000$ (min^{-1})

● Load Torque at Motor Shaft

$$T_L = \frac{\mu \cdot 9.8 \cdot M \cdot P_B}{2\pi R \cdot \eta} = \frac{0.2 \times 9.8 \times 80 \times 0.005}{2\pi \times 1 \times 0.9} = 0.139 \text{ (N·m)}$$

● Load Moment of Inertia

- Linear-motion section $J_{L1} = M\left(\frac{P_B}{2\pi R}\right)^2 = 80 \times \left(\frac{0.005}{2\pi \times 1}\right)^2 = 0.507 \times 10^{-4}$ (kg·m^2)
- Ball screw $J_B = \frac{\pi}{32}\rho \cdot L_B \cdot D_B{}^4 = \frac{\pi}{32} \times 7.87 \times 10^3 \times 0.8 \times (0.016)^4 = 0.405 \times 10^{-4}$ (kg·m^2)
- Coupling $J_C = \frac{1}{8} M_C \cdot D_C{}^2 = \frac{1}{8} \times 0.3 \times (0.03)^2 = 0.338 \times 10^{-4}$ (kg·m^2)
- Load moment of inertia at motor shaft

$$J_L = J_{L1} + J_B + J_C = 1.25 \times 10^{-4} \text{ (kg·m}^2\text{)}$$

● Load Running Power

$$P_O = \frac{2\pi N_M \cdot T_L}{60} = \frac{2\pi \times 3000 \times 0.139}{60} = 43.7 \text{ (W)}$$

● Load Acceleration Power

$$Pa = \left(\frac{2\pi}{60} N_M\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times 3000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4 \text{ (W)}$$

● Provisional Selection

Selection criteria
- $T_L \leqq$ Motor rated torque
- $Pa + Po$ =(1 to 2) ×Motor rated output
- $N_M \leqq$ Motor rated speed or maximum speed
- $J_L \leqq$ Allowable load moment of inertia of SERVOPACK

The following combination of SERVOPACK and servomotor satisfies the selection criteria.
- Servomotor : SJME-02AMB41
- SERVOPACK : SJDE-02APA

<Ratings>

- Rated output : 200 (W)
- Rated speed : 3000 (min^{-1})
- Maximum speed : 4500 (min^{-1})
- Rated torque : 0.637 (N·m)
- Instantaneous peak torque : 1.91 (N·m)
- Rotor moment of inertia : 0.330×10^{-4} ($kg \cdot m^2$)
- Allowable load moment of inertia of SERVOPACK : 3×10^{-4} ($kg \cdot m^2$)

● Final Selection

Required Starting Torque

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L = \frac{2\pi \times 3000 \times (0.330 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139 \fallingdotseq 0.635 \text{ (N·m)}$$

< 1.91 (N·m) = Instantaneous peak torque
Therefore, the provisionally selected servomotor can be used.

Required Braking Torque

$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_a} - T_L = \frac{2\pi \times 3000 \times (0.330 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139 \fallingdotseq 0.357 \text{ (N·m)}$$

< 1.91 (N·m) = Instantaneous peak torque
Therefore, the provisionally selected servomotor can be used.

Effective Torque

$$T_{rms} = \sqrt{\frac{T_P^2 \cdot t_a + T_L^2 \cdot t_c + T_S^2 \cdot t_d}{t}} = \sqrt{\frac{(0.635)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.357)^2 \times 0.1}{1.5}}$$

$\fallingdotseq$ 0.217 (N·m)
< 0.637 (N·m) = Rated torque
Therefore, the provisionally selected servomotor can be used.

The provisional selection of SERVOPACK and servomotor has been confirmed to have sufficient capacity to satisfy the selection criteria.

List of Parameters

<Conditions to Validate Settings>
◎: Immediately validated after setting or changing
○: Validated when DEN = 1
(Do not change when DEN = 0. If any change is made when DEN = 0, safe operation cannot be secured.)
△: Validated when the power supply is turned OFF and then ON again, or by sending CONFIG command.

Parameter No.	Name	Min. Set Value	Max. Set Value	Units	Factory Setting	Validation
Pn000	Function Selection Basic Switch 0	–	–	–	0010	△
	n. 4th digit [0] 3rd digit [0] 2nd digit [1] 1st digit [□] (✻ ✻ ✻) ✻: Fixed parameter. Do not change.					
	Rotation Direction Selection: 0 – Sets CCW as forward direction. / 1 – Sets CW as forward direction. (Reverse Rotation Mode). / 2 and 3 – Reserved (Do not change.)					
Pn00A	Filter Setting (Note)	0000H	0000FH	–	0000H	◎
Pn20E	Electronic Gear Ratio (Numerator)	1	1073741824	–	1	△
Pn210	Electronic Gear Ratio (Denominator)	1	1073741824	–	1	△
Pn304	JOG Speed	0	10000	min^{-1}	500	◎
Pn50A	Input Signal Selection 1	2881H	8881H	–	2881H	△
	n. 4th digit [□] 3rd digit [8] 2nd digit [8] 1st digit [1] (✻ ✻ ✻) ✻: Fixed parameter. Do not change.					
	P-OT Signal Mapping: 2 – Forward run enabled when CN1-4 input signal is ON (L-level). / 8 – Always sets the signal to ON to enable forward run.					
Pn50B	Input Signal Selection 2	8883H	8888H	–	8883H	△
	n. 4th digit [8] 3rd digit [8] 2nd digit [8] 1st digit [□] (✻ ✻ ✻) ✻: Fixed parameter. Do not change.					
	N-OT Signal Mapping: 3 – Reverse run enabled when C1-3 input signal is ON (L-level). / 8 – Always sets the signal to ON to enable reverse run.					
Pn515	Input Signal Selection 5	8488H	8888H	–	8488H	△
	n. 4th digit [8] 3rd digit [□] 2nd digit [8] 1st digit [8] (✻ ✻ ✻) ✻: Fixed parameter. Do not change.					
	E-STP Signal Mapping: 4 – Emergency stop when C1-6 input signal is OFF (H-level). / 8 – Always sets the signal to ON to disable emergency stop.					
Pn522	Positioning Completion Width	0	1073741824	1 reference unit	10	◎
Pn524	NEAR Signal Width	1	1073741824	1 reference unit	100	◎

Note : The setting method is the same as for FIL rotary switch.

Parameter No.	Name	Min. Set Value	Max. Set Value	Units	Factory Setting	Validation
Pn800	Communication Control	0000H	0F73H	–	0040H	◎

4th digit 3rd digit 2nd digit 1st digit

n. [0] [0] [□] [0]

✻ ✻ ✻

✻: Fixed parameter. Do not change.

Warning Check Mask	
0	Normal status
1	Ignores data setting warning (A.94 ✻).
2	Ignores command warning (A.95 ✻).
3	Ignores both A.94 ✻ and A.95 ✻.
4	Ignores communications warning (A.960).
5	Ignores both A.94 ✻ and A.960.
6	Ignores both A.95 ✻ and A.960.
7	Ignores A.94 ✻, A.95 ✻, and A.960.

Parameter No.	Name	Min. Set Value	Max. Set Value	Units	Factory Setting	Validation
Pn801	Function Selection Application 6 (Software LS)	0000H	0103H	–	0003H	◎

4th digit 3rd digit 2nd digit 1st digit

n. [0] [□] [0] [□]

✻ ✻

✻: Fixed parameter. Do not change.

Software Limit Function	
0	Forward and reverse software limits enabled.
1	Forward software limit disabled.
2	Reverse software limit disabled.
3	Software limits disabled in both directions.

Software Limit Check Using References	
0	No software limit check using references
1	Software limit check using references

Parameter No.	Name	Min. Set Value	Max. Set Value	Units	Factory Setting	Validation
Pn803	Origin Range	0	250	1 reference unit	10	◎
Pn804	Forward Software Limit	−1073741823	1073741823	1 reference unit	1073741823	◎
Pn806	Reverse Software Limit	−1073741823	1073741823	1 reference unit	−1073741823	◎
Pn80B	Linear Acceleration Parameter	1	65535	10000 reference units/s²	100	○
Pn80E	Linear Deceleration Parameter	1	65535	10000 reference units/s²	100	○
Pn814	Final Travel Distance for External Input Positioning	−1073741823	1073741823	1 reference unit	100	○
Pn816	Homing Mode Setting	0000H	0001H	–	0000H	○

4th digit 3rd digit 2nd digit 1st digit

n. [0] [0] [0] [□]

✻ ✻ ✻

✻: Fixed parameter. Do not change.

Homing Direction	
0	Forward
1	Reverse

Parameter No.	Name	Min. Set Value	Max. Set Value	Units	Factory Setting	Validation
Pn817	Homing Approach Speed 1	0	65535	100 reference units/s²	50	○
Pn818	Homing Approach Speed 2	0	65535	100 reference units/s²	5	○
Pn819	Final Travel Distance for Homing	−1073741823	1073741823	1 reference unit	100	○
Pn820	Latching Area Upper Limit	−2147483648	2147483648	1 reference unit	0	◎
Pn822	Latching Area Lower Limit	−2147483648	2147483648	1 reference unit	0	◎

MECHATROLINK-Ⅱ Main Commands

<Processing Classifications> N: Network command D: Data communication command C: Control command M: Motion command

Classifications	Command Code	Command Name	Functions	Processing Classifications	Synchronization Classifications	Subcommand
Common Commands	00H	NOP	No Operation	N	Asynchronous	Can be used
	01H	PRM_RD	Read Parameter	D	Asynchronous	Cannot be used
	02H	PRM_WR	Write Parameter	D	Asynchronous	Cannot be used
	03H	ID_RD	Read ID	D	Asynchronous	Cannot be used
	04H	COFING	Setup Device	C	Asynchronous	Cannot be used
	05H	ALM_RD	Read Alarm or Warning	D	Asynchronous	Cannot be used
	06H	ALM_CLR	Clear Alarm or Warning	C	Asynchronous	Cannot be used
	0DH	SYNC_SET	Start Synchronous Communication	N	Asynchronous	Cannot be used
	0EH	CONNECT	Establish Connection	N	Asynchronous	Cannot be used
	0FH	DISCONNECT	Release Disconnection	N	Asynchronous	Cannot be used
	1CH	PPRM_WR	Write Stored Parameter	D	Asynchronous	Cannot be used
Common Motion Commands	20H	POS_SET	Set Coordinates	D	Asynchronous	Cannot be used
	21H	BRK_ON	Apply Brake	C	Asynchronous	Cannot be used
	22H	BRK_OFF	Release Brake	C	Asynchronous	Cannot be used
	23H	SENS_ON	Turn Sensor ON	C	Asynchronous	Cannot be used
	24H	SENS_OFF	Turn Sensor OFF	C	Asynchronous	Cannot be used
	25H	HOLD	Stop Motion	M	Asynchronous	Can be used
	28H	LTMOD_ON	Request Latch Mode	C	Asynchronous	Cannot be used
	29H	LTMOD_OFF	Release Latch Mode	C	Asynchronous	Cannot be used
Servo Standard Commands	30H	SMON	Status Monitoring	D	Asynchronous	Can be used
	31H	SV_ON	Servo ON	C	Asynchronous	Can be used
	32H	SV_OFF	Servo OFF	C	Asynchronous	Can be used
	34H	INTERPOLATE	Interpolation Feed	M	Synchronous	Can be used
	35H	POSING	Positioning	M	Asynchronous	Can be used
	36H	FEED	Constant Speed Feed	M	Asynchronous	Can be used
	38H	LATCH	Interpolation Feeding with Position Detection	M	Synchronous	Can be used
	39H	EX_POSING	External Input Positioning	M	Asynchronous	Can be used
	3AH	ZRET	Homing	M	Asynchronous	Can be used
	3EH	ADJ	Adjustment	D	Asynchronous	Cannot be used

MECHATROLINK-Ⅱ Subcommands

Command Code	Command Name	Functions	Command Code	Command Name	Functions
00H	NOP	No Operation	1CH	PPRM_WR	Write Stored Parameter
01H	PRM_RD	Read Parameter	28H	LTMOD_ON	Request Latch Mode
02H	PRM_WR	Write Parameter	29H	LTMOD_OFF	Release Latch Mode
05H	ALM_RD	Read Alarm or Warning	30H	SMON	Status Monitoring

Service Life

Servodrive parts are subject to deterioration caused by mechanical wear and aging.

- The following values for the service life are only for reference. The service life varies with environmental conditions and applications. Refer to the values for the service life in the tables and contact your Yaskawa representative to determine whether part replacement is required. If a problem occurs before the estimated service life expires, an inspection is necessary.

SERVOPACKs

Part	Service Life	Remarks
Cooling fan	30,000 hours	The service life varies with the operating conditions. Check for abnormal sounds or vibration with daily inspection.

Note : The following cooling fans are available for replacement. Contact your Yaskawa representative when ordering.
• SJDE-01 to 04: JZSP-CHF08-1 • SJDE-08: JZSP-CHF08-2

Servomotors

Part	Service Life	Remarks
Bearings	20,000 hours	The service life varies with the operating conditions. Check for abnormal sounds or vibration with daily inspection.

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Regulations. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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