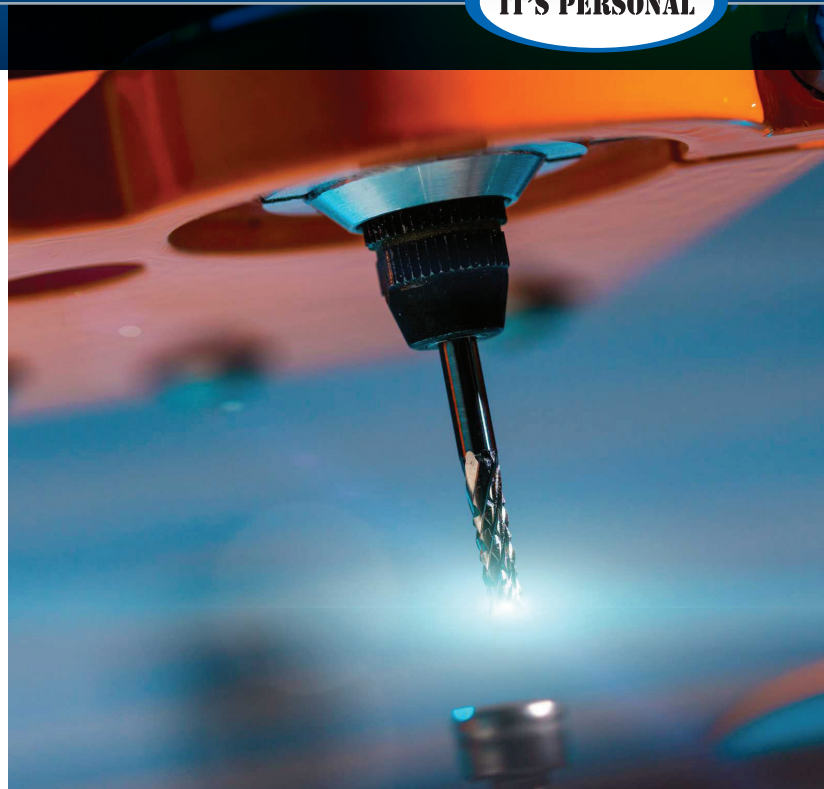


YASKAWA

SIGMA-SD

SPINDLE MOTORS AND DRIVES
TECHNICAL SUPPLEMENT

IT'S PERSONAL



SIGMA-SD

AC Spindle Motor Drives with Power Regeneration

Product Lineup

200 VAC INPUT

	200 VAC Input Spindle Motor	Power Regeneration Converter Model	SERVOPACK Model	AC Reactor	Stock Status
Single Winding	UAKAJ-04C	CACP-JU15A3	CACR-JU028A	X008017	Non-Stock
	UAKAJ-06C				Non-Stock
	UAKAJ-08C		Limited Stock		
	UAKAJ-11C		Limited Stock		
	UAKAJ-15C		Limited Stock		
	UAKAJ-19C	CACP-JU19A3	CACR-JU084A	X008018	Limited Stock
	UAKAJ-22C	CACP-JU22A3	CACR-JU102A	X008019	Limited Stock
	UAKAJ-30C	CACP-JU30A3	CACR-JU126A	X008020	Limited Stock
	UAKAJ-37C	CACP-JU45A3	CACR-JU196A	X008022	Non-Stock
	UAKAJ-45C				Non-Stock

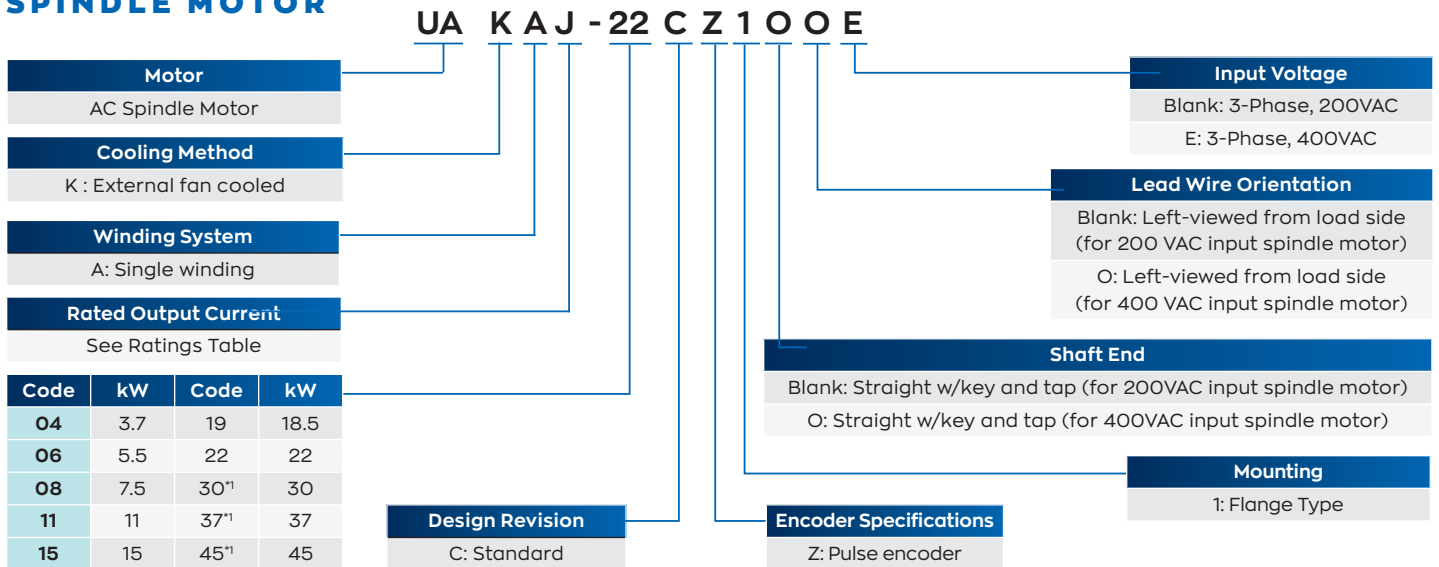
400 VAC INPUT

	400 VAC Input Spindle Motor	Power Regeneration Converter Model	SERVOPACK Model	AC Reactor	Stock Status
Single Winding	UAKAJ-04C	CACP-JU15D3	CACR-JU014AD	X008010	Non-Stock
	UAKAJ-06C				Non-Stock
	UAKAJ-08C		CACR-JU018D		Limited Stock
	UAKAJ-11C		CACR-JU033D		Limited Stock
	UAKAJ-15C	CACP-JU19D3	CACR-JU042D	X008011	Limited Stock
	UAKAJ-19C				Limited Stock
	UAKAJ-22C				CACP-JU22D3

For details about custom-made spindle motors, converters, or SERVOPACKS, contact your Yaskawa representative.

Model Number Designation

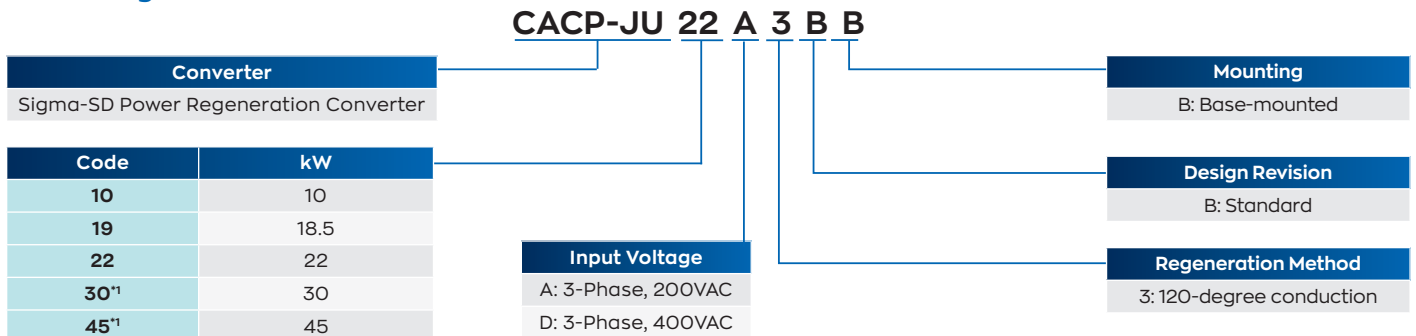
SPINDLE MOTOR



*1: Available only for three-phase 200 VAC models

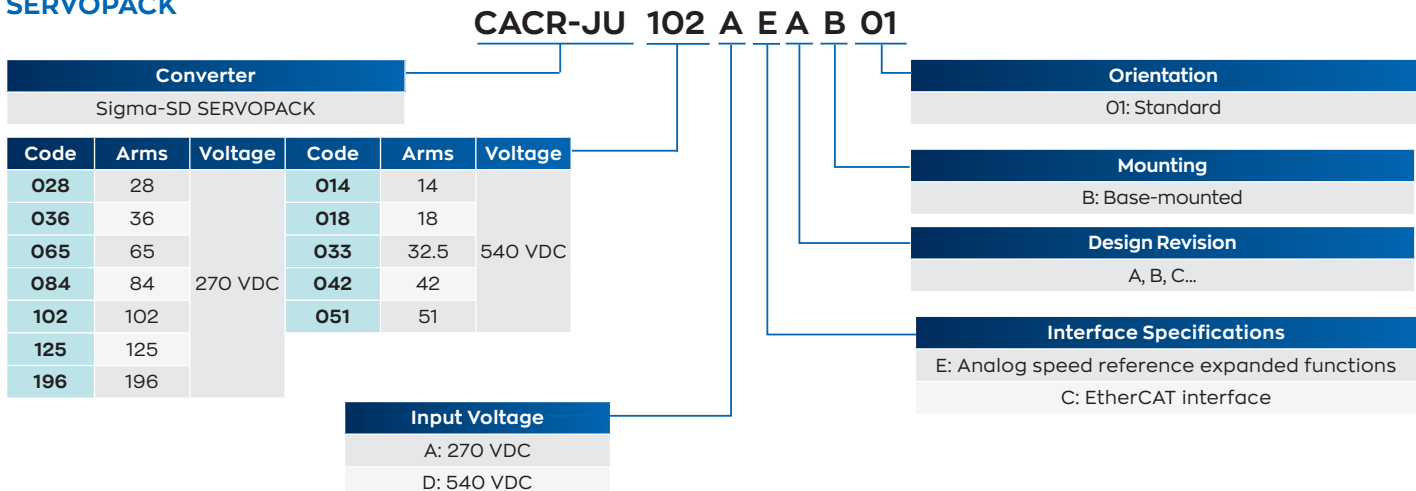
SIGMA-SD DRIVER

Power Regeneration Converter



*1: Available only for three-phase 200 VAC models

SERVOPACK



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Spindle Motor

Ratings and Specifications

Single-winding Motor

Items		Model: UAKAJ-□ □ C (200 V), -□ □ C□ □ □ □ E (400 V)										
		04	06	08	11	15	19	22	30*2	37*2	45*2	
50% ED Rating (S3)*1	kW	3.7	5.5	7.5	11	15	18.5	22	30	37	45	
Continuous Rating (S1)	kW	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	
Continuous Rated Torque	N·m	14	24	35	48	70	96	118	183	249	307	
Base Speed	min⁻¹	1500							1150			
Maximum Speed	min⁻¹	10000				7000			6000		5000	
Moment of Inertia	× 10⁻³ kg·m²	7.1	14.0	21.0	25.0	69.0	69.0	89.0	231	266	398	
Vibration		V5									V10	
Noise	dB (A)	75 or less							80 or less			
Cooling Method		Totally enclosed, external fan cooled										
Protection Class		IP44 (IEC34-5)										
Cooling Fan Motor		Equipped with thermostat (automatic reset) 200 V class: Three-phase 200 V 50/60 Hz, 220 V 50/60 Hz, 230 V 60 Hz 400 V class: Three-phase 400 V 50/60 Hz, 440 V 50/60 Hz, 460 V 60 Hz										
Encoder (Magnetic)		Pulse encoder (1024 p/r)										
Overheating Protection		NTC thermistor										
Installation		Flange type: IM B5, IM V1 (motor shaft from horizontal to vertically down)										
Overload Capacity		200% of continuous rated (S1) output for 10 s (UAKAJ-08, -37: 180% of continuous rated (S1) output for 10 s)										
Thermal Class		F										
Withstand Voltage		200 V class: 1500 VAC for one minute 400 V class: 1800 VAC for one minute										
Insulation Resistance		500 VDC 10 MΩ minimum										
Surrounding Air Temperature and Surrounding Air Humidity		0°C to 40°C, 20% to 80% RH (no condensation)										
Altitude		1000 m or less										
Bearing Lubrication		Grease										
Paint Color		Munsell N1.5										
Compliant Standards		JIS, JEC										
Applicable SERVOPACK CACR-JU□ □ □	Three-phase 200 VAC	028A	028A	036A	065A	065A	084A	102A	125A	196A	196A	
	Three-phase 400 VAC	014D	014D	018D	033D	033D	042D	051D	-	-	-	

*1. The 50% ED rating (S3) is for a 10 minute cycle consisting of 5 minutes of operation and 5 minutes stopped.

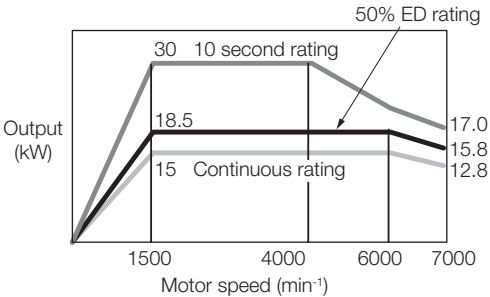
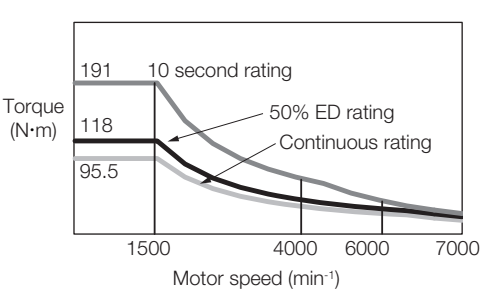
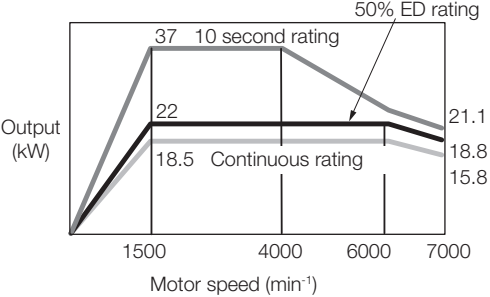
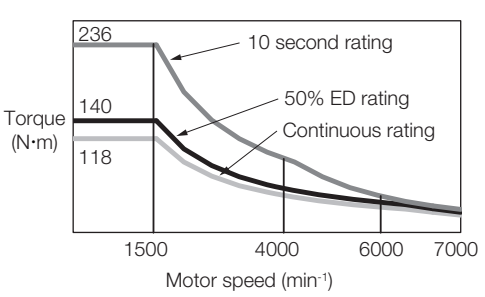
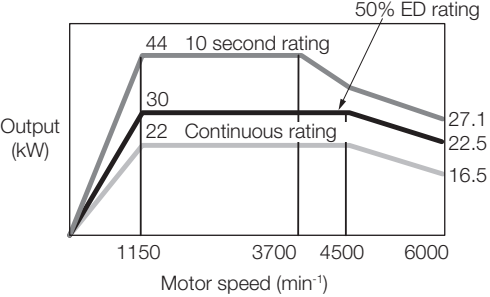
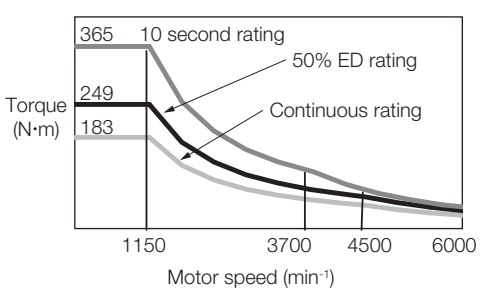
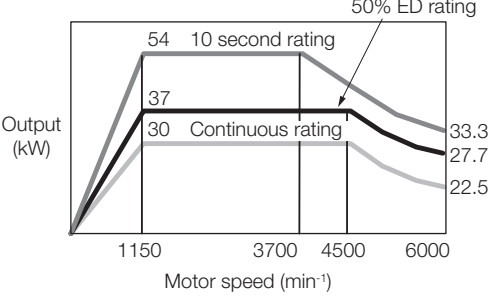
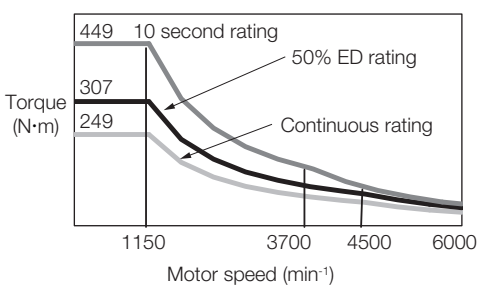
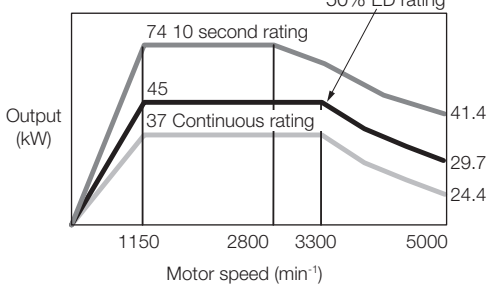
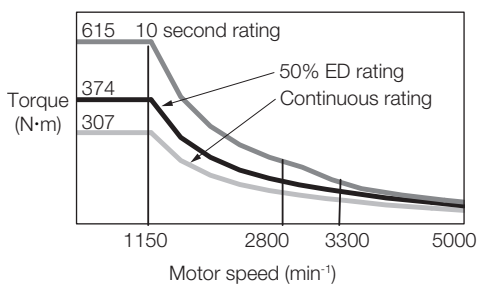
*2. Available only for three-phase, 200 VAC models.

Output and Torque Characteristics

Model UAKAJ-	Output Characteristics	Torque Characteristics
04C	<p>Output (kW) vs Motor speed (min⁻¹)</p> <p>1500 6400 8000 10000</p> <p>4.6 10 second rating 3.7 50% ED rating 2.2 Continuous rating</p> <p>3.0 1.8</p>	<p>Torque (N·m) vs Motor speed (min⁻¹)</p> <p>1500 6400 8000 10000</p> <p>29.3 10 second rating 23.6 50% ED rating 14.0 Continuous rating</p>
06C	<p>Output (kW) vs Motor speed (min⁻¹)</p> <p>1500 5000 6000 10000</p> <p>7.4 10 second rating 5.5 50% ED rating 3.7 Continuous rating</p> <p>3.7 3.3 2.2</p>	<p>Torque (N·m) vs Motor speed (min⁻¹)</p> <p>1500 5000 6000 10000</p> <p>47.1 10 second rating 35.0 50% ED rating 23.6 Continuous rating</p>
08C	<p>Output (kW) vs Motor speed (min⁻¹)</p> <p>1500 7000 8000 10000</p> <p>10 10 second rating 7.5 50% ED rating 5.5 Continuous rating</p> <p>7.0 6.0 4.4</p>	<p>Torque (N·m) vs Motor speed (min⁻¹)</p> <p>1500 7000 8000 10000</p> <p>63.7 10 second rating 47.8 50% ED rating 35.0 Continuous rating</p>
11C	<p>Output (kW) vs Motor speed (min⁻¹)</p> <p>1500 5000 6000 10000</p> <p>15 10 second rating 11 50% ED rating 7.5 Continuous rating</p> <p>7.5 6.6 4.5</p>	<p>Torque (N·m) vs Motor speed (min⁻¹)</p> <p>1500 5000 6000 10000</p> <p>95.5 10 second rating 70.0 50% ED rating 47.8 Continuous rating</p>
15C	<p>Output (kW) vs Motor speed (min⁻¹)</p> <p>1500 5000 6000 7000</p> <p>22 10 second rating 15 50% ED rating 11 Continuous rating</p> <p>15.7 12.8 9.4</p>	<p>Torque (N·m) vs Motor speed (min⁻¹)</p> <p>1500 5000 6000 7000</p> <p>140 10 second rating 95.5 50% ED rating 70.0 Continuous rating</p>

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Model UAKAJ-	Output Characteristics	Torque Characteristics
19C		
22C		
30C		
37C		
45C		

Note: The 50% ED rating is for a 10 minute cycle, consisting of 5 minutes of operation and 5 minutes stopped.

Tolerance Radial Loads

Model: UAKAJ-,	Rated Output (kW) 50%ED Rating/ Continuous Rating	Tolerance Radial Load (N)
		Single-winding Motor Model: UAKAJ-□ □ C
04	3.7/2.2	1180
06	5.5/3.7	1180
08	7.5/5.5	1470
11	11/7.5	1470
15	15/11	2940
19	18.5/15	2940
22	22/18.5	3530
30 ^{*1}	30/22	4410
37 ^{*1}	37/30	4900
45 ^{*1}	45/37	5200

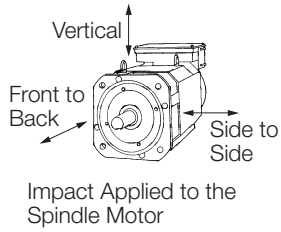
*1. Available only for three-phase, 200 VAC models.

Motor Total Indicator Readings

Flange Type

Item	Model	Accuracy
	Single-winding Motor: UAKAJ-□ □	
Perpendicularity of the flange face to the motor shaft	04 to 22	0.04 mm
	30, 37	0.06 mm
	45	0.072 mm
Concentricity of the flange mating part to the motor shaft	04 to 11	0.04 mm
	15 to 22	0.046 mm
	30, 37	0.048 mm
	45	0.070 mm
Axial runout of the motor shaft	04 to 08	0.02 mm
	11 to 22	0.022 mm
	30 to 45	0.028 mm

Vibration Resistance



The spindle motor will withstand the following vibration acceleration in three directions: Vertical, side to side, and front to back.

Spindle Motor		Vibration Acceleration at Flange	Vibration Frequency	
Winding System	Model		Constant Amplitude	Constant Acceleration
Single Winding	UAKAJ-04 to -22	24.5 m/s ²	10 Hz to 60 Hz	6 Hz to 2500 Hz
	UAKAJ-30, -37	19.6 m/s ²		
	UAKAJ-45	4.9 m/s ²		



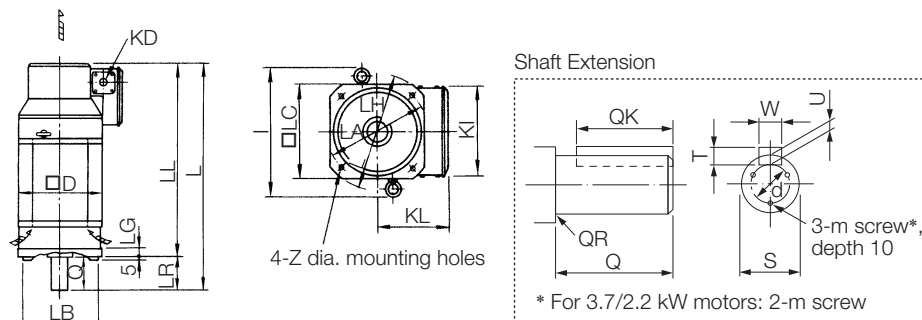
Important

The amount of vibration the spindle motor endures will vary depending on the application. Check the vibration acceleration being applied to your motor for each application.

External Dimensions

Single-winding Motors

◆ Flange type



Unit: mm

Model UAKAJ-	L	LA	LB	LC	LG	LH	LL	LR	Z	D	I	KD	KL	KI
04	375	185	150 ⁰ _{-0.04}	174	12	220	315	60	11	174	–	34	142	174
06	467	185	150 ⁰ _{-0.04}	174	12	220	407	60	11	174	–	34	142	174
08	496	215	180 ⁰ _{-0.04}	204	16	250	416	80	15	204	270	42.5	158	207
11	556	215	180 ⁰ _{-0.04}	204	16	250	446	110	15	204	270	42.5	158	207
15	568	265	230 ⁰ _{-0.046}	250	20	300	458	110	15	260	343	42.5	181	250
19	568	265	230 ⁰ _{-0.046}	250	20	300	458	110	15	260	343	42.5	181	250
22	632	265	230 ⁰ _{-0.046}	250	20	300	522	110	15	260	343	42.5	181	250
30	769	350	300 ⁰ _{-0.052}	320	20	385	629	140	19	320	440	61	227	320
37	809	350	300 ⁰ _{-0.052}	320	20	385	669	140	19	320	440	61	227	320
45	797	400	350 ⁰ _{-0.057}	370	22	450	657	140	24	380	504	61	315	388
Model UAKAJ-	Shaft End Dimensions										Approx. Mass kg			
	Q	QK	QR	S	T	U	W	d	m					
04	60	45	1	28 ^{0.009} _{-0.004}	7	4	8	16	M6	29				
06	60	45	1	28 ⁰ _{-0.013}	7	4	8	22	M4	47				
08	80	70	2	32 ⁰ _{-0.016}	8	5	10	22	M5	52				
11	110	90	0.5	48 ⁰ _{-0.016}	9	5.5	14	40	M5	59				
15	110	90	1	48 ⁰ _{-0.016}	9	5.5	14	40	M5	94				
19	110	90	1	48 ⁰ _{-0.016}	9	5.5	14	40	M5	94				
22	110	90	1	55 ^{0.030} _{0.011}	10	6	16	45	M5	120				
30	140	110	2	60 ^{0.030} _{0.011}	11	7	18	50	M6	220				
37	140	110	2	60 ^{0.030} _{0.011}	11	7	18	50	M6	250				
45	140	110	1	70 ^{0.030} _{0.011}	12	7.5	20	60	M6	310				

Note: 1. The shaft key and the keyway are standard JIS B 1301-1996 models.

2. The figures are provided only to explain the dimensions. Actual appearance of the spindle motor may vary.

Power Regeneration Converter

Basic Specifications

Item		Specifications					
Model: CACP-JU□ □ A3□, CACP-JU□ □ D3□		15	19	22	30 ^{*1}	45 ^{*1}	
50% ED Rating		kW	15	18.5	22	30	45
Continuous Rating		kW	11	15	18.5	22	37
Basic Specifications	Input Power	Main Circuits L1, L2, and L3	CACP-JU□□A3□: Three-phase 200 V to 230 V (50/60 Hz) CACP-JU□□D3□: Three-phase 380 V to 480 V (50/60 Hz) Allowable voltage fluctuation: +10% to -15% Allowable frequency fluctuation: ±5% Voltage unbalance (between U, V, or W phase): 5% max.				
		Control Power	24 VDC Allowable voltage fluctuation: ±15% Output holding time: 100 ms minimum				
		Power Supply for Fan^{*2}	24 VDC				
	Output Power	Main Circuit Power Output +/-	CACP-JU□□A3□: 270 to 310 VDC CACP-JU□□D3□: 520 to 650 VDC				
		Control Power Output	24 VDC ±15% (connector pass current: 10 A)				
	Input Signals	Sequence Input Signals	Emergency stop input signal Input power voltage: 24 VDC ±5% Required current per channel: 3 mA				
Functions	Regeneration Control Method		Power regeneration control (120-degree conduction)				
	Protective Functions		Main circuit fuse, overload, overvoltage, insufficient voltage, overcurrent, frequency error, heat sink overheating, etc.				
	Allowable Power Loss Time		5 ms (at 70% load)				
	Connections between SERVOPACKs		Local bus				
	Indications		CHARGE (orange), ALARM (red), and READY (green)				

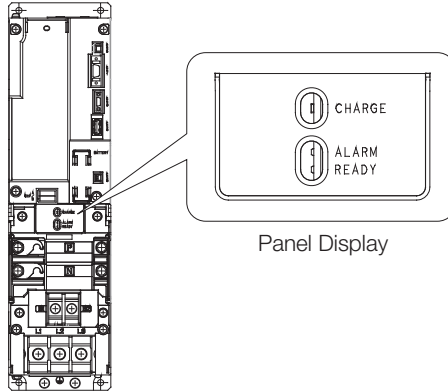
*1. Available only for three-phase 200 VAC models.

*2. Needed when using a base mounting unit. For details, refer to page 67.

Panel Display

The status of power regeneration converter can be checked on the panel display.

Name	LED Color	Meaning
CHARGE	Orange	Lit when main circuit power is on. Not lit when main circuit power is off.
ALARM	Red	Lit when alarm occurs. Not lit when no alarm occurs.
READY	Green	Lit when CPU of power regeneration converter works normally. Not lit when CPU of power regeneration converter not working.

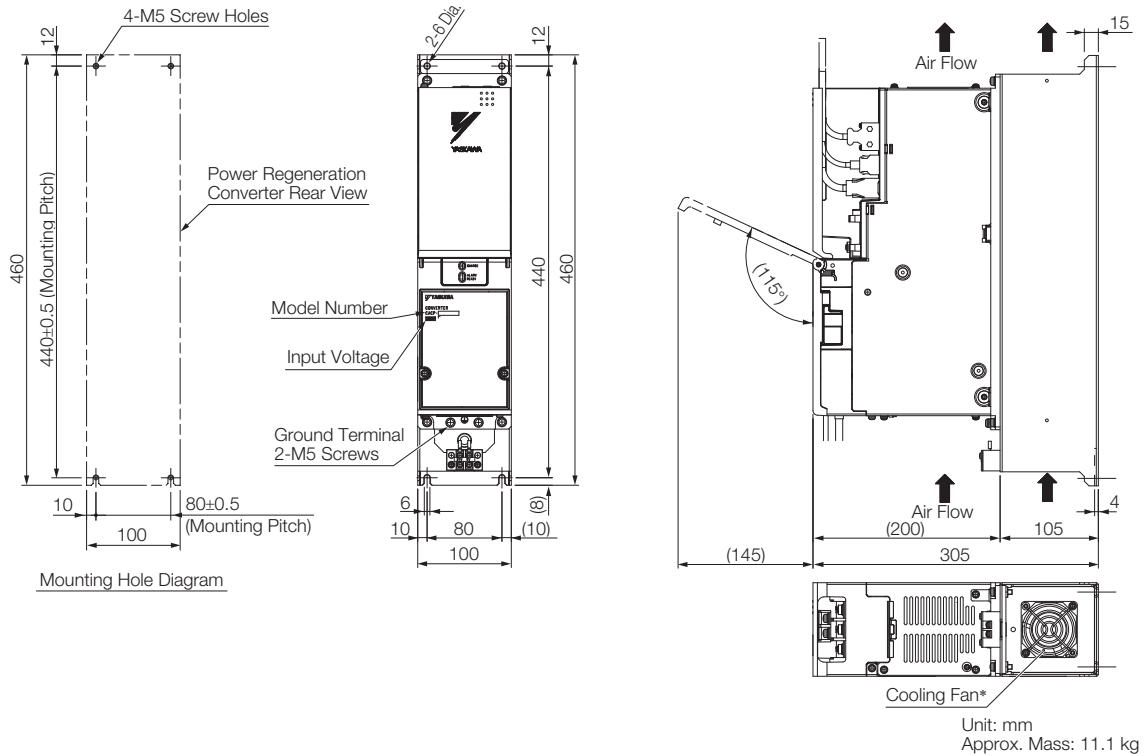


Power Regeneration Converter

External Dimensions

Converter Dimensions

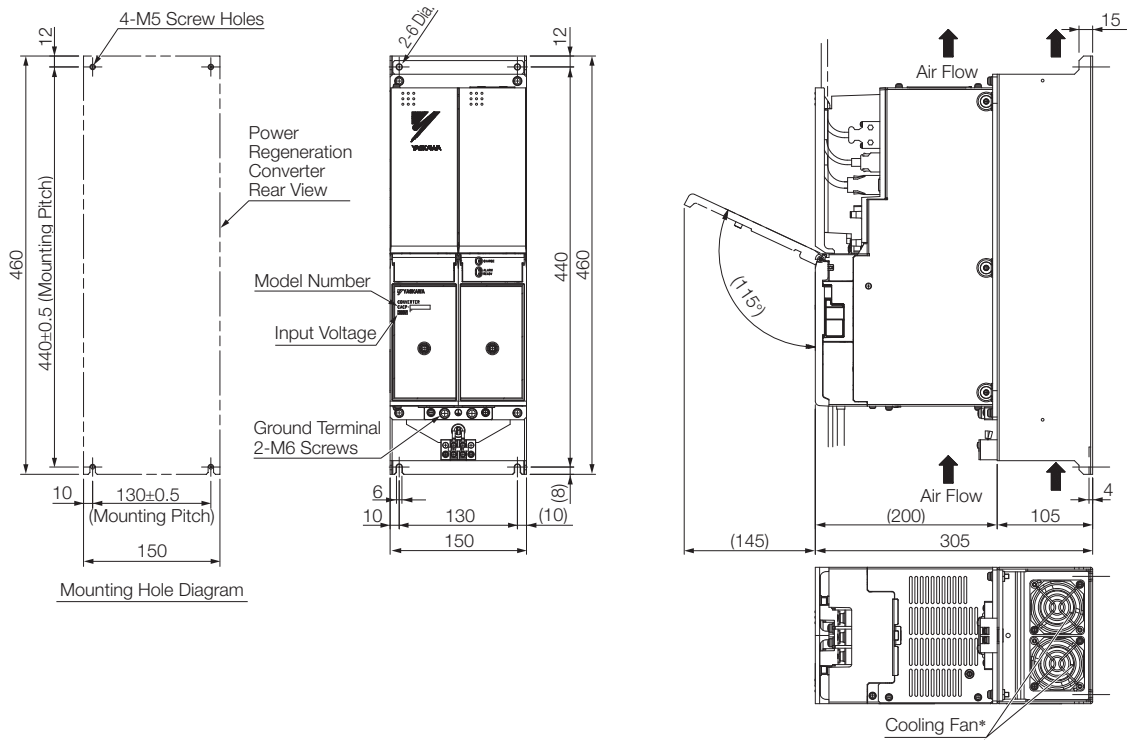
◆ **Model: CACP-JU15□ 3BB, -JU19□ 3BB, -JU22□ 3BB**



* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

Note: Available only for three-phase 200 VAC models.

◆ Model: CACP-JU30A3BB

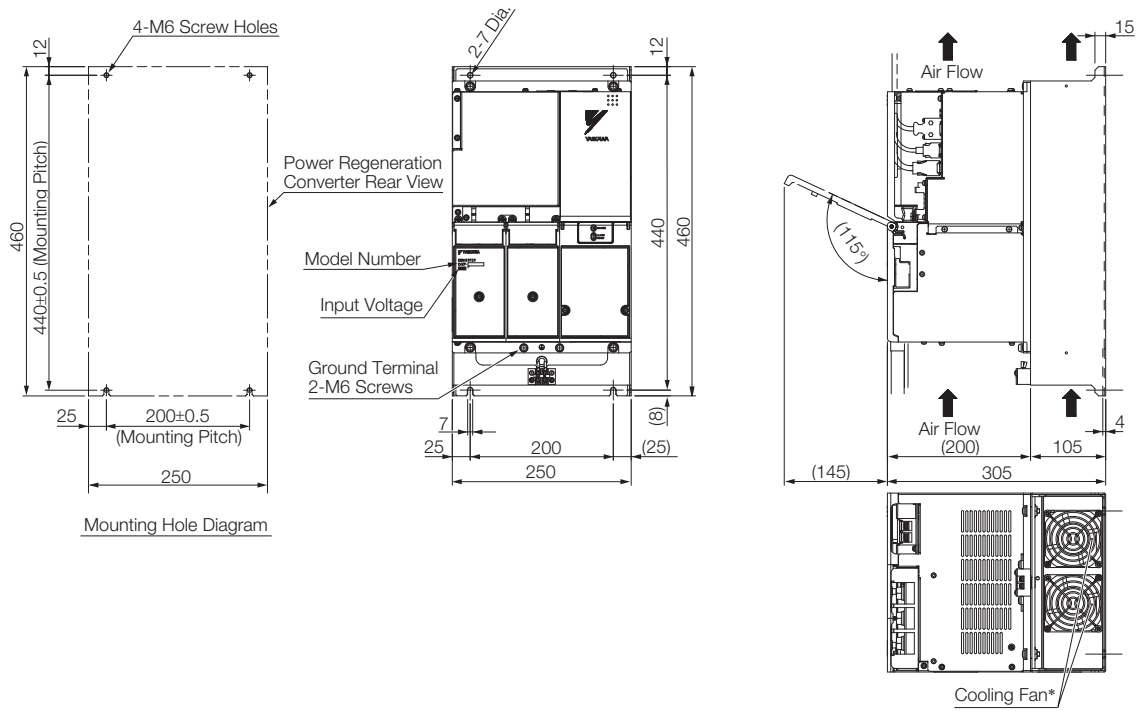


Unit: mm
Approx. Mass: 14.6 kg

* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.
Note: Available only for three-phase 200 VAC models.

Power Regeneration Converter
 External Dimensions

◆ Model: CACP-JU45A3BB



Unit: mm
 Approx. Mass: 24.9 kg

* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.
 Note: Available only for three-phase 200 VAC models.

Basic Specifications: Analog Interface Spindle Drive

Item		Specifications		
Basic Specifications	Input Power	Main Circuits + / - CACR-JU□ □ □ AE□ : 270 V to 310 VDC CACR-JU□ □ □ DE□ : 520 V to 650 VDC		
		Control Power Supply 24 VDC Allowable voltage fluctuation: ± 15% Output holding time: 100 ms minimum		
		Power Supply for Fan *1 24 VDC		
	Feedback *2		Pulse encoder (phases A, B, and Z)	
	Fuses		Main circuit power: Not available (built into power regeneration converter) Control power: Built in	
	Analog Monitor (Built-in) *3	Number of Channels	2 for each axis	
		Output Power Range	±10 V (linear range: ±8 V)	
		Response Frequency	1 kHz	
	USB Communications	Connected Device	Personal computer (application: SigmaWin+ version 5.70 or later, Σ-V-SD component version 1.00 or later)	
		Communication Standard	USB 1.1 compliant, 12 Mbps (full speed support)	
Functions		Status displays, parameter setting, and adjustment function		
Sequence Signal	External Input Power	Input Power Voltage	24 VDC ±5%	
		Current Required per Channel	4 mA	
	Output Signals	Input Signals	Number of Channels	14 for each axis (isolated)
			Number of Channels	14 for each axis (isolated)
			Maximum Output Current	50 mA
			Maximum Applicable Voltage	30 V
			Delay	Depends on relay circuit.
		Error Signals (Relays)	Number of Channels	1 channel (SPDT contacts)
	Maximum Load Current		1 A	
	Maximum Applicable Voltage		30 V	

Continued on next page.

Basic Specifications: Analog Interface Spindle Drive

Continued from previous page.

Item		Specifications	
Basic Specifications (cont'd)	External Input Power	Input Power Voltage	24 VDC $\pm 5\%$
		Current Required per Channel	4 mA
	Input Signals	Number of Channels	2 for each axis (isolated)
		Output Signal	Number of Channels
	Maximum Output Current		50 mA
	Maximum Applicable Voltage		30 V
	When an HWBB signal is input		Output ON when inputs of two channels are OFF.
	Load Factor Meter Output, Speed Meter Output	Output Voltage Range	0 V to 10 V
		Maximum Output Current	2 mA
	Analog Speed Reference Input	Maximum Input Voltage	± 12 V
		Input Impedance	60 k Ω
		Internal Power Supply	+15 VDC $\pm 5\%$
	12-bit Digital Reference Input	Input Power Voltage	24 VDC $\pm 5\%$
		Current Required per Channel	4 mA
	Motor Winding Temperature Detection	Number of Channels	1 for each axis
		Temperature Sensor	NTC thermistor
	Motor Winding Selection	Number of Channels	1ch
		Output Voltage	+24 V
		Allowable Output Current	50 mA
		Answerback Function	Supported
Speed Control Range	40 min ⁻¹ to Maximum motor speed		
Drive Method	Sine-wave current drive with PWM control of IGBT		
Applicable Motor Model	UAK□J		
Protective Functions	Overcurrent, overload, main circuit voltage error, heat sink overheating, overspeed, encoder error, CPU error, etc.		
Control	Speed Loop	PI control (proportional control), torque limit	
Orientation	<ul style="list-style-type: none"> Standard: Orientation control with a motor encoder Orientation control with an external encoder: <ul style="list-style-type: none"> Orientation with an external encoder Orientation control with a magnetic sensor: <ul style="list-style-type: none"> Orientation with a magnetic sensor 		
Speed Control Range	40 min ⁻¹ to motor peak speed		
Connections between Power Regeneration Converters	Local bus		
Indications	CHARGE (orange), RDY (green), ALM (red), one 7-segment LED		

*1. Needed when using a base mounting unit. For details, refer to page 67.

*2. Not available for serial encoder.

*3. Do not use an analog monitor signal for system control. Use an analog monitor signal only for adjusting the motor or obtaining data for maintenance purpose.

Basic Specifications: EtherCAT Interface Spindle Drive

Item		Specifications		
Input Power	Main Circuits + / -	CACR-JU□ □ □ AC□ : 270 V to 310 VDC CACR-JU□ □ □ DC□ : 520 V to 650 VDC		
Control Method		Sine-wave current drive with PWM control of IGBT		
Applicable Motor Models		UAKAJ		
Functions	Feedback	Motor	Pulse encoder (phases A, B, and Z), serial encoder: 17 bits	
	Indications		CHARGE (orange), RDY (green), and ALM (red)	
	Fuses		Main circuit power: Not available (built into power regeneration converter) Control power: Built in	
	Protective Functions		Overcurrent, overload, main circuit voltage error, heat sink overheating, overspeed, encoder error, CPU error, PG disconnection detected, parameter error, etc.	
	Compensation Functions		Quadrant projection compensation and predictive control	
	Fuses	Position Loop		Proportional control
		Speed Loop		Integral-proportional control and torque control
	Fully-Closed Loop Control		Standard feature (A motor encoder-external encoder branch conversion unit is required)	
	Analog Monitor (Built-in)**1	Number of Channels		2 for each axis
		Output Power Range		±10 V (linear range: ±8 V)
		Response Frequency		1kHz
	USB Communications	Connected Device		Personal computer (application: SigmaWin for Sigma-SD (MT) compatible)
		Communication Standard		USB 1.1 compliant, 12 Mbps (full speed support)
		Functions		Status displays, parameter setting, and adjustment function
	Sequence Input Signal	External Input Power	Input Power Voltage	24 VDC ±5%
			Current Required per Channel	3 mA for normal input, 10 mA for latch input
Input Signals		Number of Channels		Normal inputs: 2 for each axis (isolated). Latch inputs: 3 for SERVOPACK for 1 axis (isolated), 4 for SERVOPACK for 2 axes (isolated)
		Output Signals (Brake)	Maximum Output Current	1 for each axis (isolated)
Maximum Output Current			50mA	
Maximum Output Voltage			30 V	
		Delay	Depends on brake or relay circuit	
HWBB Signal	External Input Power	Input Power Voltage	24 VDC ±5%	
		Current Required per Channel	3 mA	
	Input Signals	Number of Channels		2 for each axis (isolated)
		Number of Channels		1 for each axis (isolated)
	Output Signal	Maximum Output Current	50mA	
		Maximum Applicable Voltage	30 V	
When HWBB signal is input		Output ON when inputs of two channels are OFF		
Motor Winding Temperature Detection	Number of channels		1 for each axis	
	Temperature Sensor		NTC thermistor	

Continued from previous page.

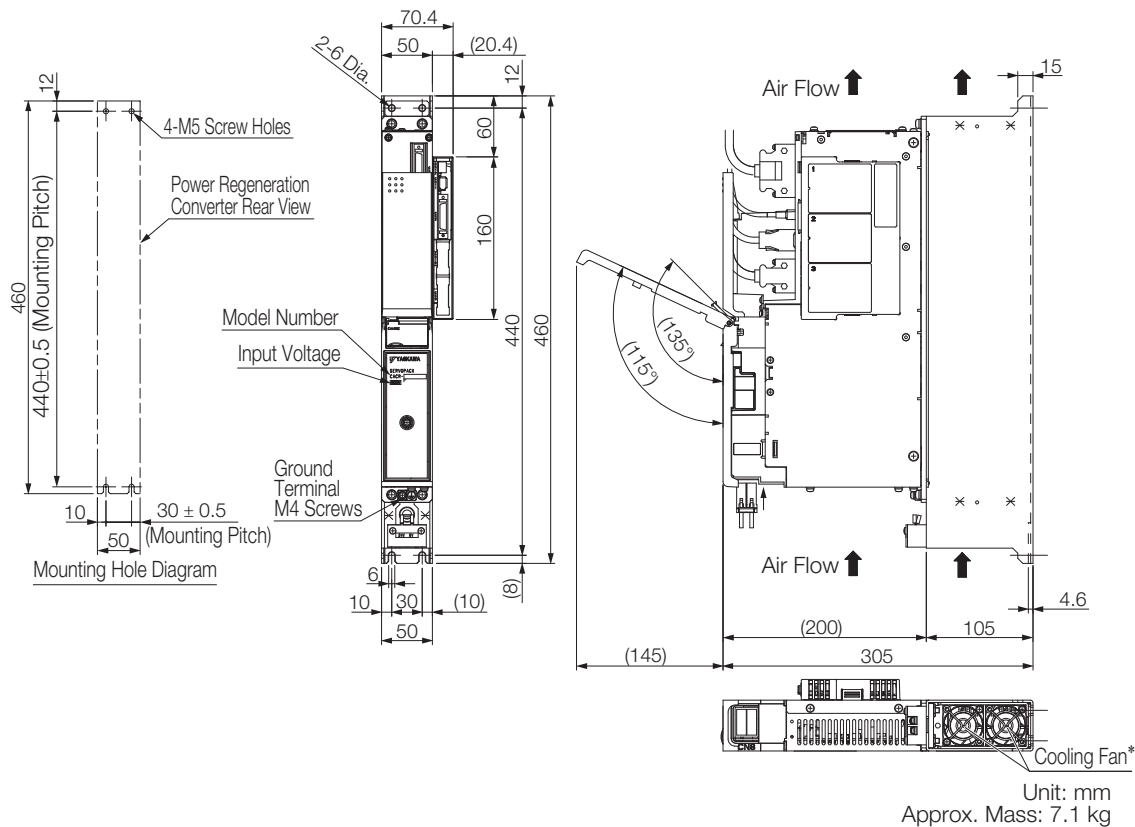
Item		Specifications	
Functions (cont'd)	Motor Winding Selection	Number of Channels	1 channel
		Output Voltage	24 V
		Allowable Output Current	50 mA
		Answerback Function	Supported
	Speed Control Range	40 RPM to motor maximum speed	
EtherCAT Communication	Applicable Communication Standards	IEC 61158 Type12, IEC 61800-7 CiA402 Drive Profile	
	Physical Layer	100BASE-TX (IEEE802.3)	
	Connector	CN9A (RJ45): EtherCAT Signal IN CN9B (RJ45): EtherCAT Signal OUT	
	Cable	CAT5 STP 4 pair Note: Cables are automatically recognized by the AUTO MDIX function	
	SyncManager	SM0: Mailbox output, SM1: Mailbox input SM2: Process data outputs, SM3: Process data inputs	
	FMMU	FMMU0: Mapped to the process data output (RxPDO) area. FMMU1: Mapped to the process data input (TxPDO) area. FMMU2: Mapped to the mailbox status	
	EtherCAT Commands (Data Link Layer)	APRD, FPRD, BRD, LRD, APWR, FPWR, BWR, LWR, ARMW, FRMW Note: APRW, FPRW, BRW, LRW Commands are not supported	
	Process Data	Configurations can be changed with PDO mapping	
	Mailbox (CoE)	Emergency Message, SDO Request, SDO Response, SDO information Note: TxPDO/RxPDO and Remote TxPDO/RxPDO are not supported	
	Distributed Clocks	Free-run, DC mode (Can be selected.) Supported DC cycle: 250 is to 4 ms (every 250-is cycle)	
	Slave Information IF	256 bytes (For reading only)	
		LED Indicator	EtherCAT Link/Activity indicator (L/A) × 2 EtherCAT RUN indicator (RUN) × 1 EtherCAT ERR indicator (ERR) × 1
	CiA402 Drive Profile	<ul style="list-style-type: none"> • Homing mode • Profile position mode • Interpolated position mode • Profile velocity mode • Profile torque mode • Cyclic synchronous position mode • Cyclic synchronous velocity mode • Cyclic synchronous torque mode • Touch probe function • Torque limit function 	

*1. Do not use an analog monitor signal for system control. Use an analog monitor signal only for adjusting the motor or obtaining data for maintenance purpose.External Dimensions

External Dimensions

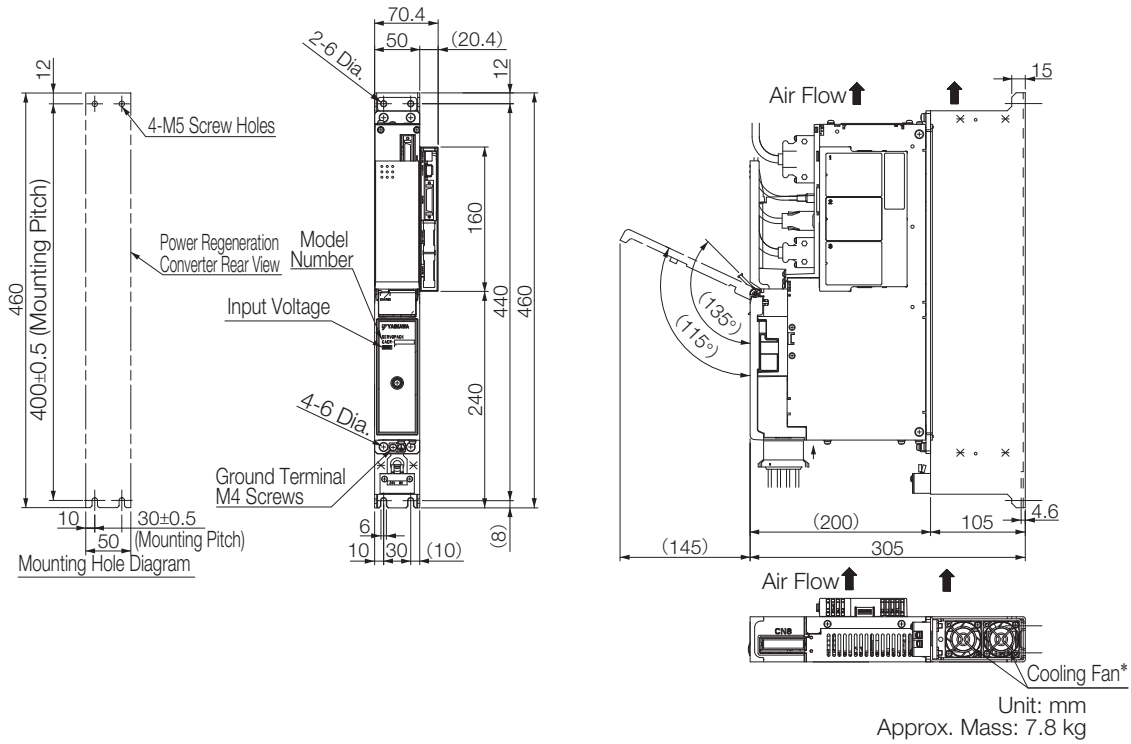
Analog Interface

◆ **Model: CACR-JU028AEAB01, -JU014DEAB01**



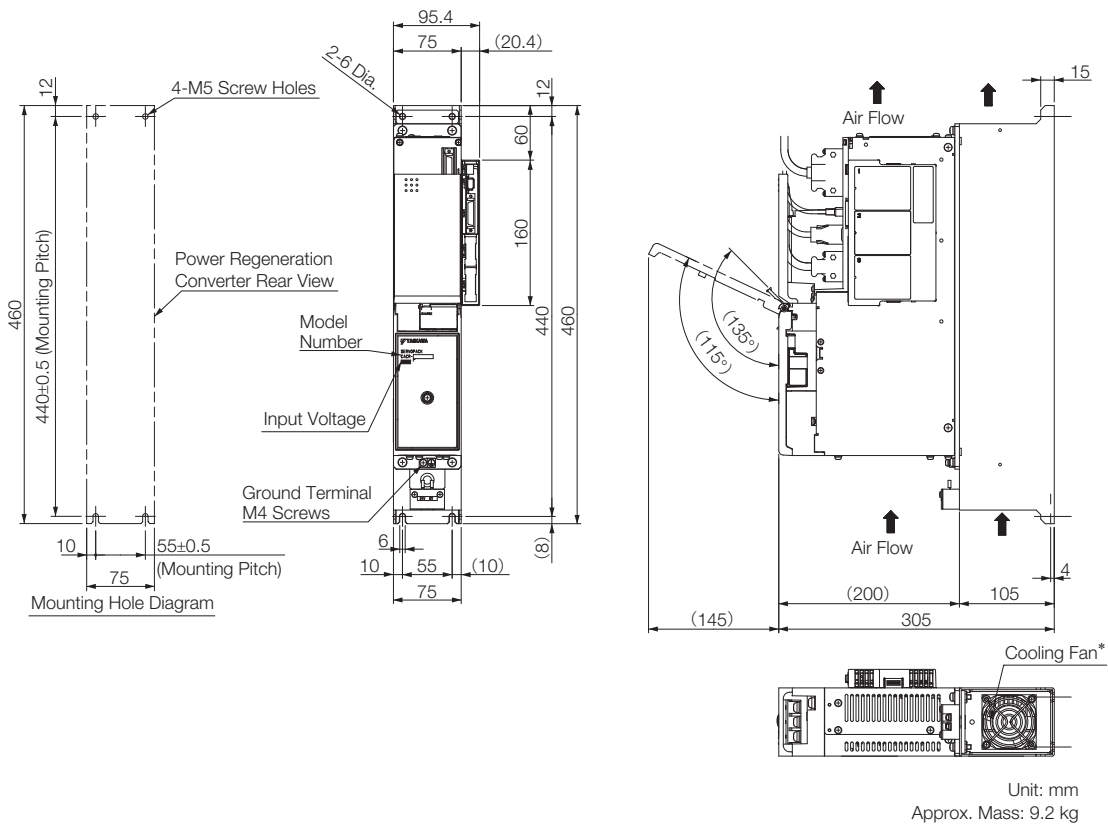
* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ Model: CACR-JU036AEAB01, -JU018DEAB01



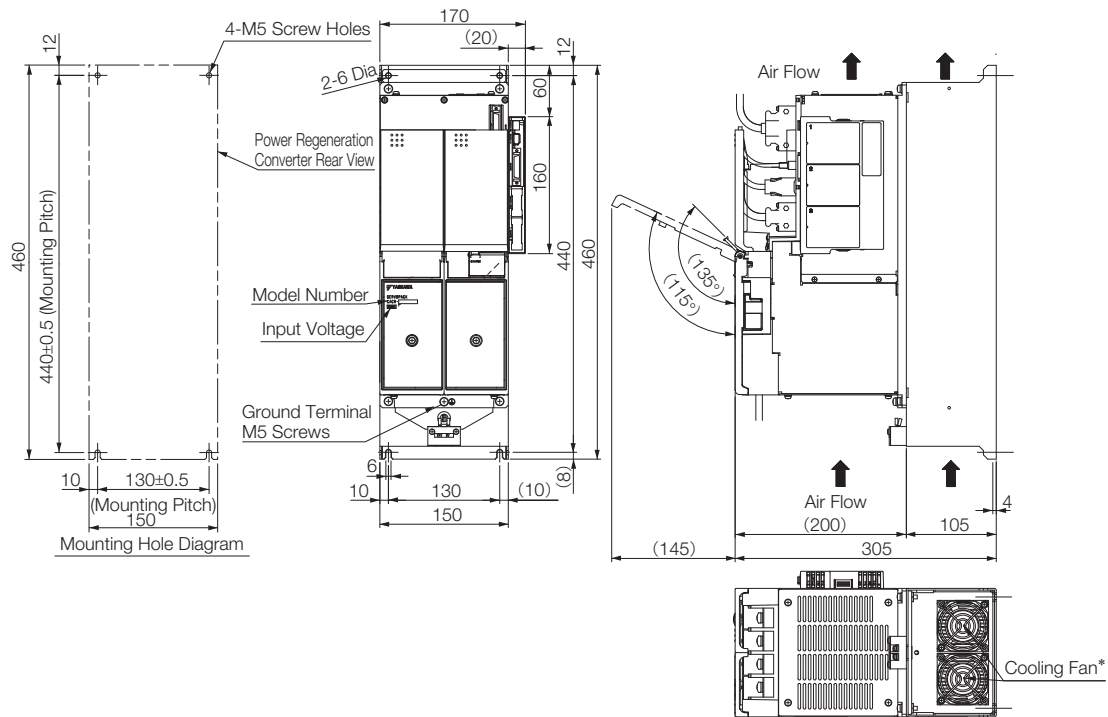
* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ Model: CACR-JU065AEAB01, -JU033DEAB01



* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

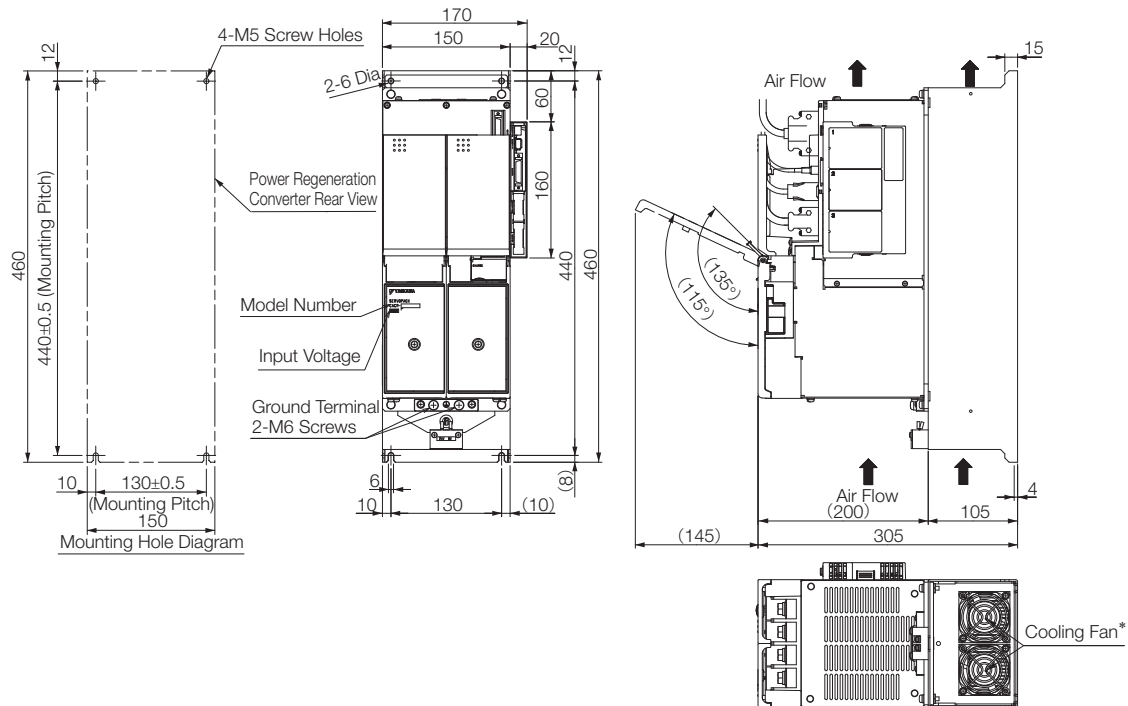
◆ **Model: CACR-JU084AEAB01, -JU102AEAB01, -JU042DEAB01, -JU051DEAB01**



Unit: mm
Approx. Mass: 15.4 kg

* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ **Model: CACR-JU125AEAB01**

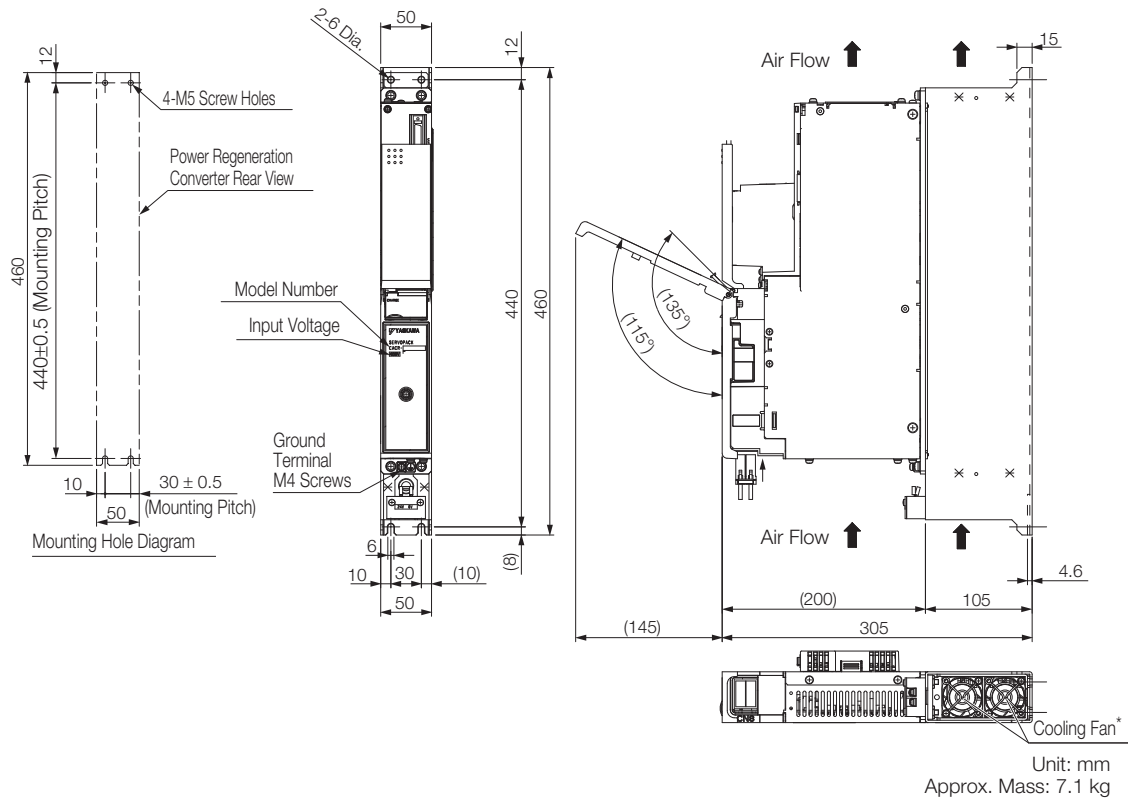


Unit: mm
Approx. Mass: 15.6 kg

* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

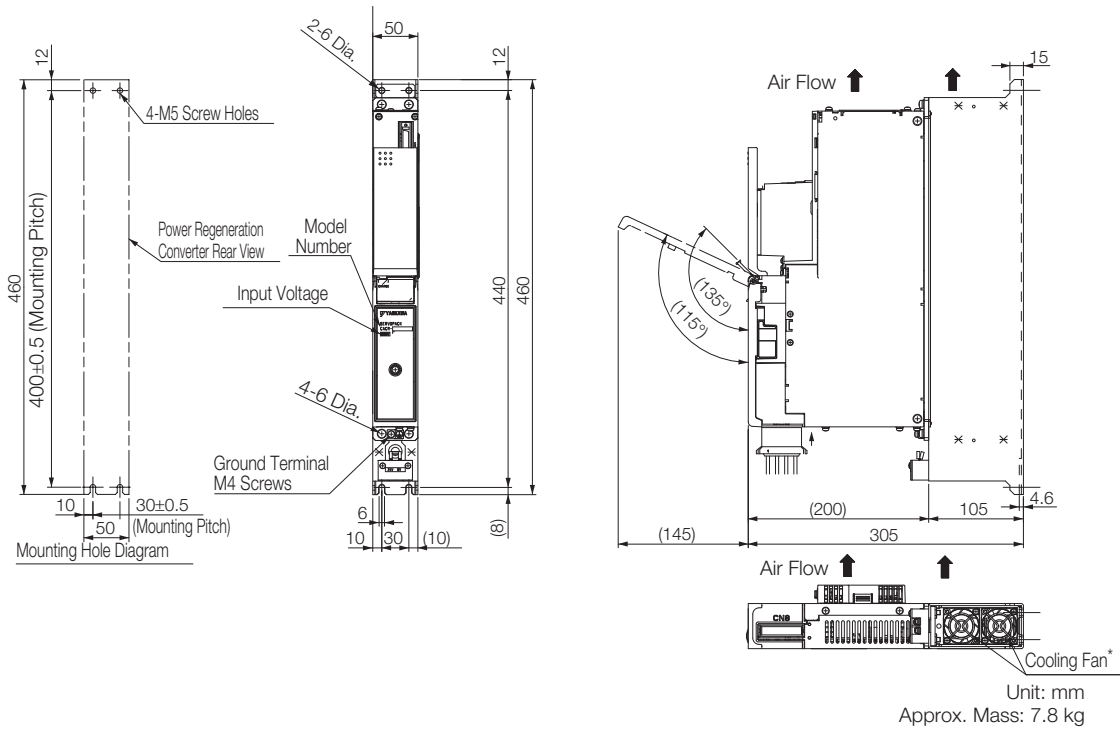
EtherCAT Interface

◆ Model: CACR-JU028ACAB, -JU014DCAB



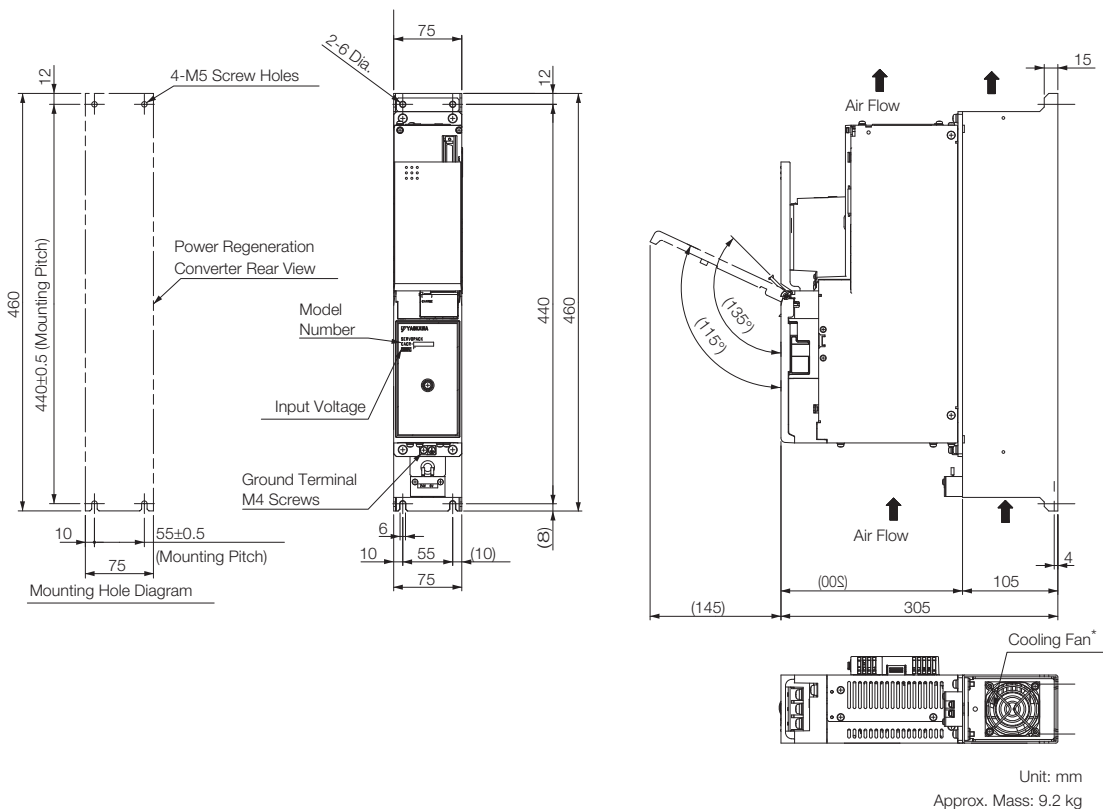
* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ Model: CACR-JU036ACAB, -JU018DCAB



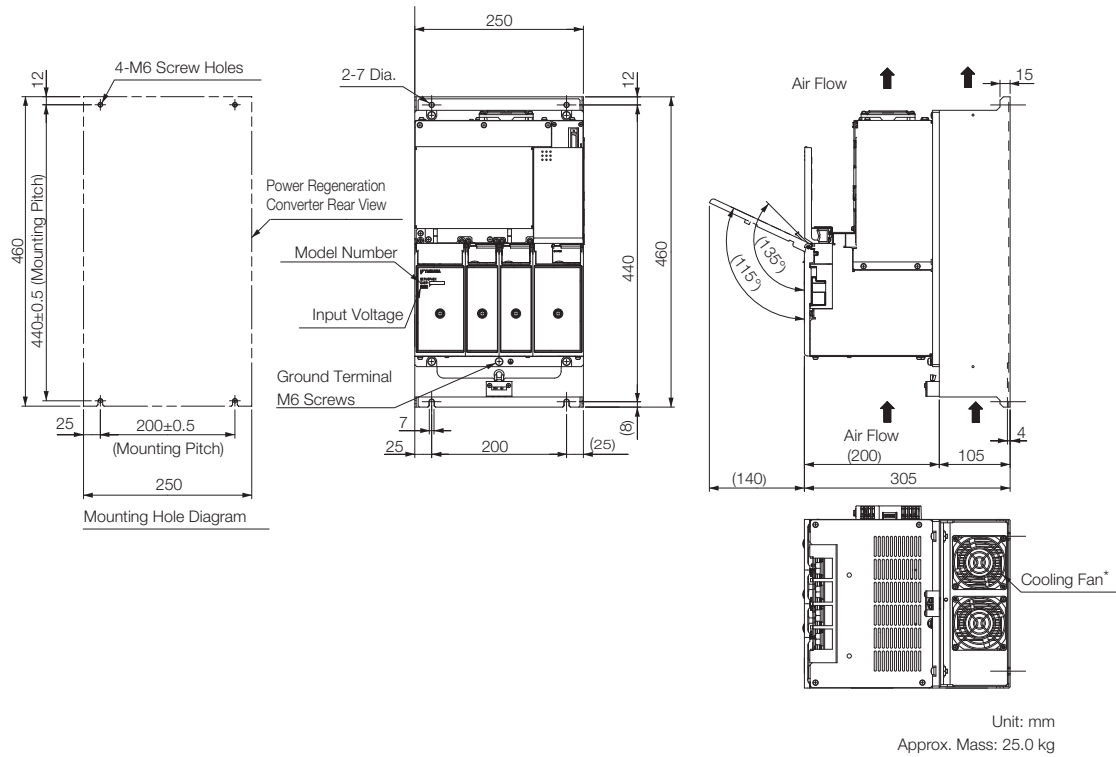
* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ Model: CACR-JU065ACAB, -JU033DCAB



* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ Model: CACR-JU196ACAB



* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

Installation

Spindle Motor

The service life of the spindle motor will be shortened or unexpected problems will occur if the spindle motor is installed incorrectly or in an inappropriate location. Always observe the following installation instructions.

Installation Environment

Item	Condition
Surrounding Air Temperature	0°C to 40°C (no freezing)
Surrounding Air Humidity	20% to 80%RH (no condensation)
Installation Site	<ul style="list-style-type: none">• Indoor, free of corrosive or explosive gases• Well-ventilated and free of dust and moisture• Facilitates inspection and cleaning.• Elevation: 1,000 m max.• Free of high magnetic field• Free of oil
Storage Environment	Store the motor in the following environment if it is stored with the power cable disconnected. Ambient temperature during storage: -20°C to 60°C (no freezing) Ambient humidity during storage: 20% to 80%RH (no condensation)

CAUTION

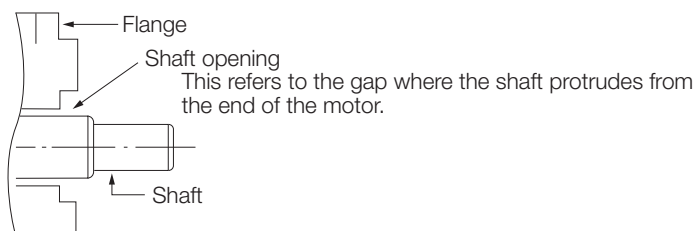
- **Provide sufficient space so that cooling air will be provided to the cooling fan. Keep a space of at least 100 mm between the machine and the ventilation outlet of the motor.**
If ventilation is not proper, the motor temperature fault protective function will work regardless of whether or not the load is at the rated value or not.
- **Install the motor in a clean location free from oil mist and water drops. If the motor is likely to come in contact with water or oil, protect the motor with a cover.**
The intrusion of water or dirty oil into the interior of the motor will decrease the insulation resistance, which may result in a ground fault.
- **Check that the mounting bed, base, or stand of the motor is of robust construction because the weight of the motor as well as the dynamic load of the motor in operation will be imposed on it, possibly causing vibration.**
- **Use seal connectors, conduits, or similar devices to seal the cable openings of the motor terminal box.**
Failure to observe this caution may result in cuttings, cutting oil mist, or other foreign matter entering the motor through the cable opening, possibly causing malfunction.
- **When vertically mounting the motor with the shaft on the bottom, the motor shaft must not touch the stand, the ground, or other surfaces.**
If the shaft touches these surfaces, the shaft is pushed into the motor and the bearing may be damaged.

Enclosure

The protective structure of the spindle motor when the special cable is used provides IP44 protection.

However, this does not apply to the shaft opening. (Refer to the following figure.)

If you need to use the motor in a location where oil will come into contact with the shaft opening, contact a Yaskawa sales representative.



Installation Orientation

◆ Flange type

- Mount the motor with the motor shaft on the load side at any angle between horizontal and the downward vertical direction. If the motor shaft is facing up, excessive force will be imposed on the motor shaft.

As a result, the service life of the motor will be adversely affected.

- Use the spindle motor UAKAJ-45 or UAKBJ-30 (outer diameter □ 380) with the terminal box facing upward and the motor shaft facing horizontal. If the terminal box is in the horizontal or downward direction, dust may intrude from the ventilation mouth on the bottom of the load-side bracket.


As a result, the motor may fail to operate or unexpected accidents may occur.

Coupling Motor and Machinery

Consider the following conditions when coupling the spindle motor with the machinery.

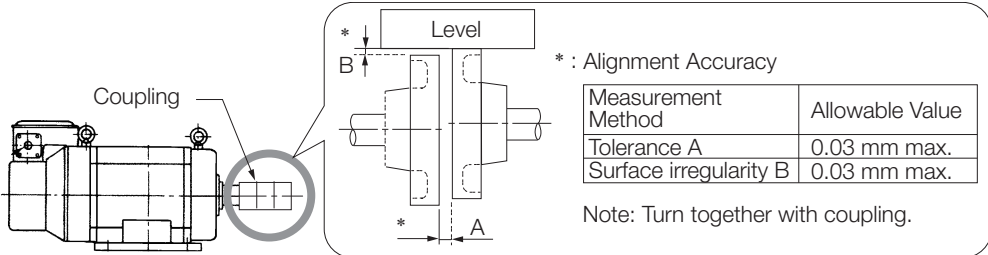
◆ Direct Coupling

Couple the motor with the machinery so that the center of the motor shaft and that of the machinery shaft are on a straight line. Insert a liner for adjustment, if necessary.



Important

- Install the motor so that alignment accuracy falls within the following range. Vibration that will damage the bearings and encoders if the shafts are not properly aligned.

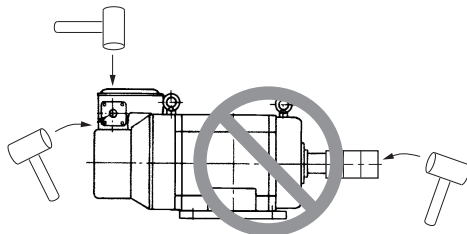


* : Alignment Accuracy

Measurement Method	Allowable Value
Tolerance A	0.03 mm max.
Surface irregularity B	0.03 mm max.

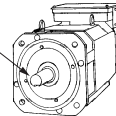
Note: Turn together with coupling.

- Do not allow any direct impact to the shafts when installing the couplings. Do not hit the area near encoders with a hammer etc., as impacts may damage the encoders.



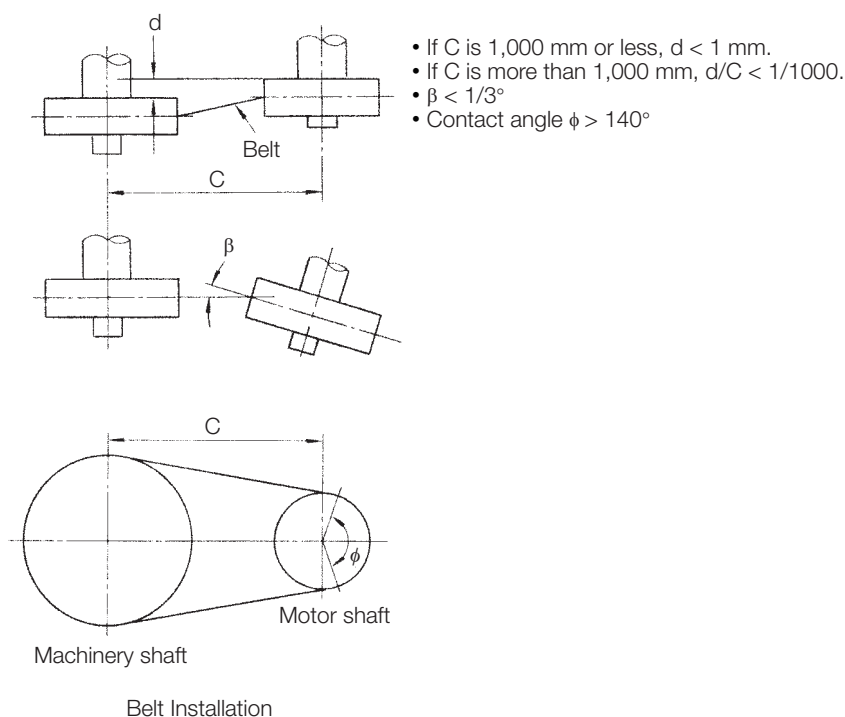
- Before installation, thoroughly remove the anticorrosive paint from the flange surface and the end of the motor shaft. Only after removing the paint can motors be installed on the machines.

Anticorrosive paint is coated here.



◆ Belt Coupling

- Check that the motor shaft is parallel to the machinery shaft and that the line connecting the centers of the pulleys and the shafts are at right angles to each other. If the angularity of the belt is improper, the belt will vibrate or slip.
- The radial load imposed on the motor shaft edge must not exceed the permissible value. If an excessive radial load is imposed on the motor shaft, the motor bearings will be adversely affected and the service life of the bearings will be decreased. For details, refer to Tolerance Radial Loads (page 14).
- Be sure that no axial load is imposed on the motor shaft.
- Make sure that the contact angle of the belt with the pulley is 140° or more. If not, the belt may slip.



◆ Gear Coupling

Check that the motor shaft is parallel to the machinery shaft and that the centers of the gears are engaged properly. Refer to Tolerance Radial Loads (page 14) for the precision of the peripheral parts connecting to the motor shaft. The gears may grate if they do not engage properly.

Be sure that no axial load is imposed on the motor shaft.

◆ Mounting a Pulley or Gear to the Motor Shaft

When mounting a pulley or gear to the motor shaft, consider the mounting balance of the motor. The dynamic balance of the motor is kept with a half key (for motors with a keyway), which is a half as thick as the key (T) specified in the motor shaft dimensional drawing. The motor rotates at high speed and a little imbalance in the mechanism may cause the motor to vibrate.

Σ -SD Driver (Power Regeneration Converter and SERVOPACK)

Installation Requirements

Item	Specifications	
Surrounding Air Temperature	0°C to 40°C: at 100% load 0°C to 55°C: at 70% load	
Storage Temperature	-20°C to 85°C	
Surrounding Air Humidity and Storage Humidity	90%RH or less (with no freezing or condensation)	
Vibration Resistance	4.9 m/s ²	
Shock Resistance	19.6 m/s ²	
Protection Class	IP10	An environment that satisfies the following conditions. • Free of corrosive or flammable gases • Free of exposure to water, oil, or chemicals • Free of dust, salts, or iron dust
Pollution Degree	2	
Altitude	1000 m or less	
Others	Free of static electricity, strong electromagnetic fields, magnetic fields or exposure to radioactivity	

Thermal Design of Control Panel

Install the Σ -SD drivers, host controllers, and other units in a control panel.

Use a control panel with an enclosed structure that provides protection against corrosive gases, water, and oil. Also, design the system so that the temperature rise in the control panel does not cause the temperature to exceed the surrounding air temperature.

◆ Calorific Value

■ Power Regeneration Converter

Model	Calorific Value at Continuous Rated Operation				
	Total (W)	Loss of Control Block (W)	Loss of Power Block (W)		
			Total	Inside	Duct
CACP-JU15A3□	116.4	13.1	103.3	10.3	93.0
CACP-JU19A3□	154.3	13.1	141.2	14.1	127.1
CACP-JU22A3□	183.8	13.1	170.7	17.1	153.6
CACP-JU30A3□	247.2	14.7	232.5	23.2	209.3
CACP-JU45A3B	394.7	14.7	380	38.0	342.0
CACP-JU15D3□	66.8	13.1	53.7	5.4	48.4
CACP-JU19D3□	90.5	13.1	77.4	7.7	69.7
CACP-JU22D3□	104.8	13.1	91.7	9.1	82.6

■ SERVOPACK

Model	Calorific Value at Continuous Rated Operation				
	Total (W)	Loss of Control Block (W)	Loss of Power Block (W)		
			Total	Inside	Duct
CACR-	154.1	19.0	135.1	27.0	108.1
CACR- JU036□ □ □ □	181.0	19.0	162.0	32.4	129.6
CACR- JU065□ □ □ □	324.2	18.9	305.3	30.5	274.8
CACR- JU084□ □ □ □	424.6	21.6	403.0	40.3	362.7
CACR- JU102□ □ □ □	478.8	21.6	457.2	45.7	411.5
CACR- JU125□ □ □ □	614.5	28.6	585.9	58.6	527.3
CACR- JU196□ □ □ □	1322.4	29.8	1292.6	129.3	1163.3
CACR-	142.1	19.6	122.5	24.5	98.0
CACR- JU018□ □ □ □	168.6	19.6	149.0	29.8	119.2
CACR- JU033□ □ □ □	308.4	19.0	289.4	28.9	260.5
CACR- JU042□ □ □ □	368.5	21.6	346.9	34.7	312.2
CACR- JU051□ □ □ □	424.9	21.6	403.3	40.3	363.0

Installation Precautions

Precautions for installing the Σ -V-SD driver are given below.

- Always secure the Σ -V-SD driver on a vertical surface using screws or bolts.
- Provide the specified space on the left, right, top, and bottom of the driver to enable maintenance and ventilation. For details, refer to Installation Orientation and Space (page 36).

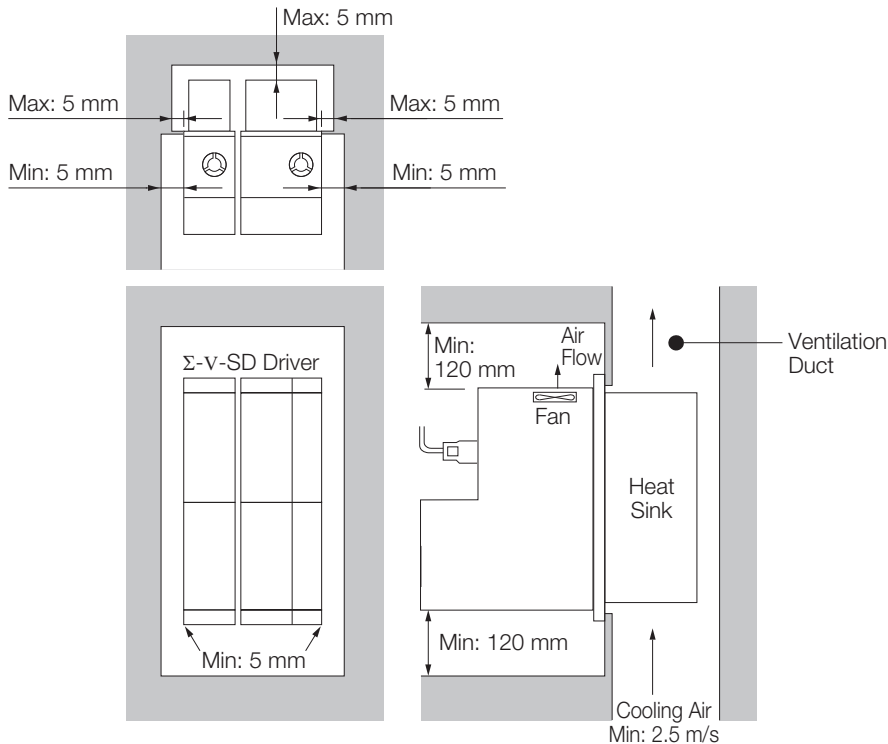
◆ Base-mounted Type

Since the duct is inside in the control panel, refer to the column containing total values for the Loss of Power Block in the Power Regeneration Converter and SERVOPACK tables on pages 34-35.

Installation Orientation and Space

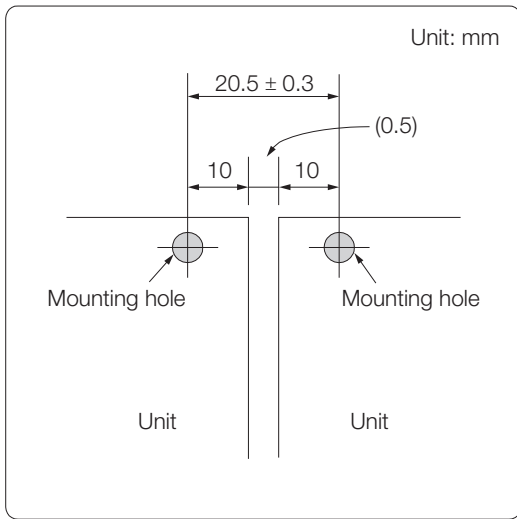
Precautions for the mounting the Σ -V-SD driver, including the mounting orientation and mounting space, are given below.

Note: The figure is an example of a duct-ventilated type driver. Dimensions for base-mounted type drivers are the same (ventilation duct is not required).



Installation Orientation and Space for Σ -V-SD Driver

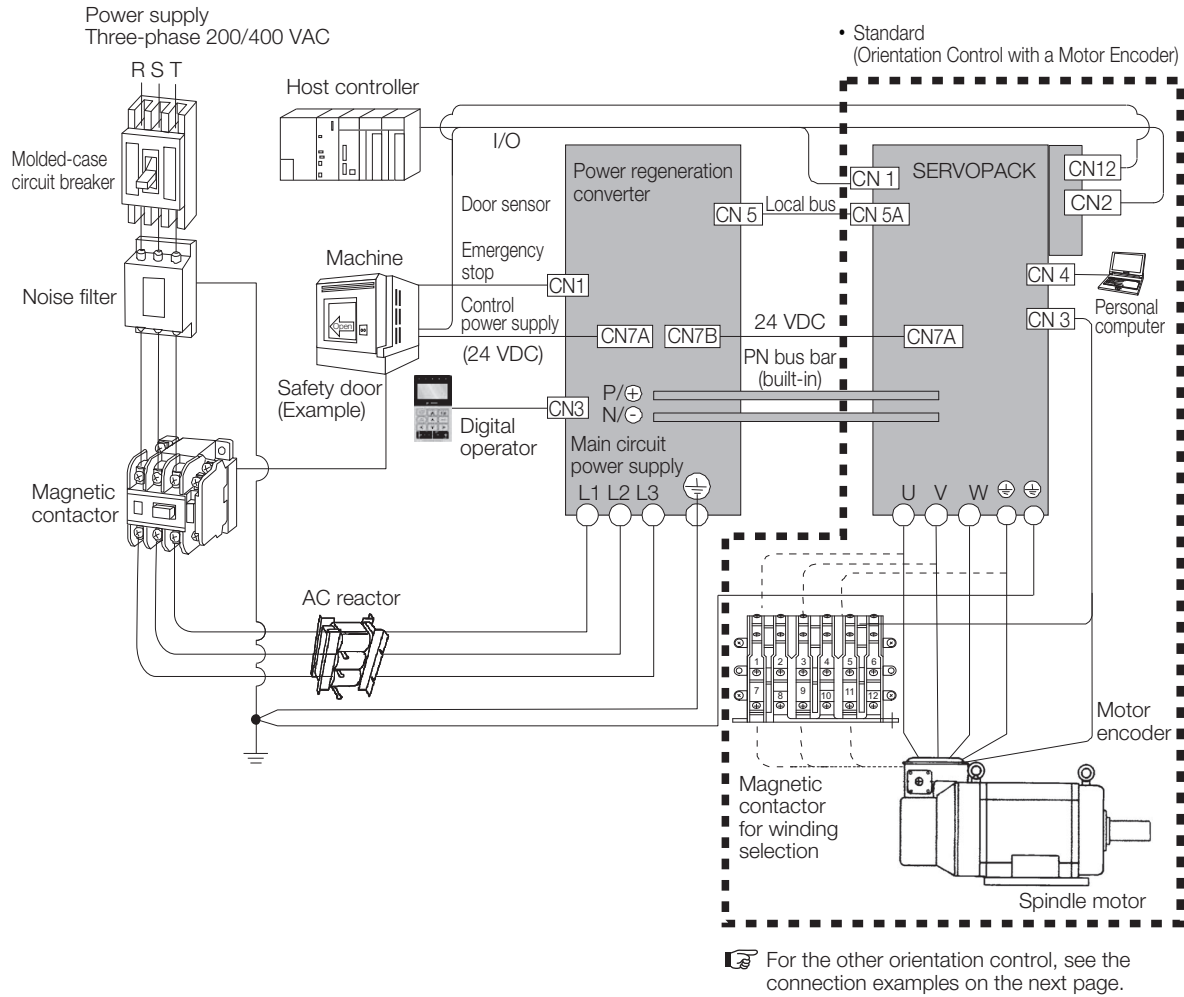
- Always install the power regeneration converter on the left side of the SERVOPACK.
- Refer to the external dimension diagrams for external dimensions and mounting dimensions of the products.
- Make sure that the ambient air temperature of the Σ -V-SD driver is 0°C to 55°C near the heat sink and inside the control panel at a 70% load, and 0°C to 40°C near the heat sink and inside the control panel at a 100% load.
- To prevent oil penetration, seal the mounting screw sections of the power regeneration converter and the SERVOPACK.
- Always install the Σ -V-SD driver with the fan at the top to ensure efficient cooling.
- When mounting the Σ -V-SD driver, allow space above and below it to prevent heat buildup.
- When stirring the air inside the control panel, do not allow the airflow to fall directly on the Σ -V-SD driver to prevent dirt from collecting on the Σ -V-SD driver.
- Provide the following spaces between the units.



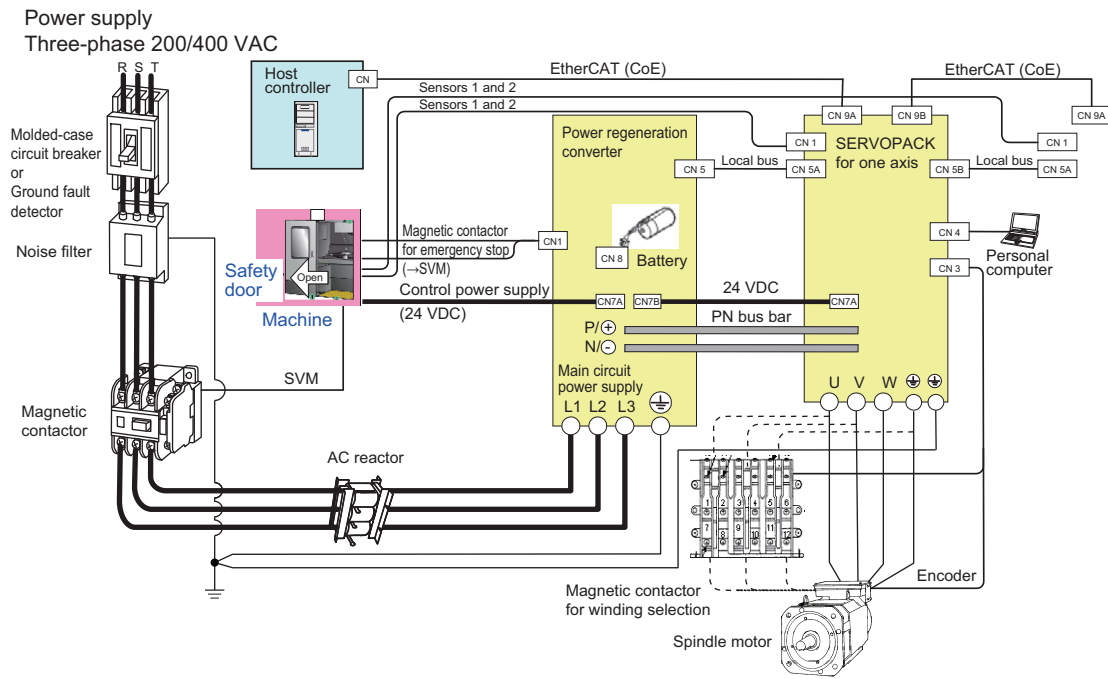
Selecting Cables

System Configurations

Analog Interface



EtherCAT Interface



Spindle Motor

Main Circuit Cable

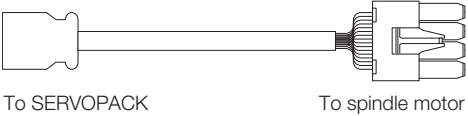
The main circuit cable for the spindle motor must be assembled by the customer. The following SERVOPACKs are connected to spindle motors with cable-end connectors. Other SERVOPACKs use screw terminals.

For details, refer to the User's Manual (manual no. SIEPS80000139).

◆ Specifications for Cable-end Connectors to SERVOPACKs

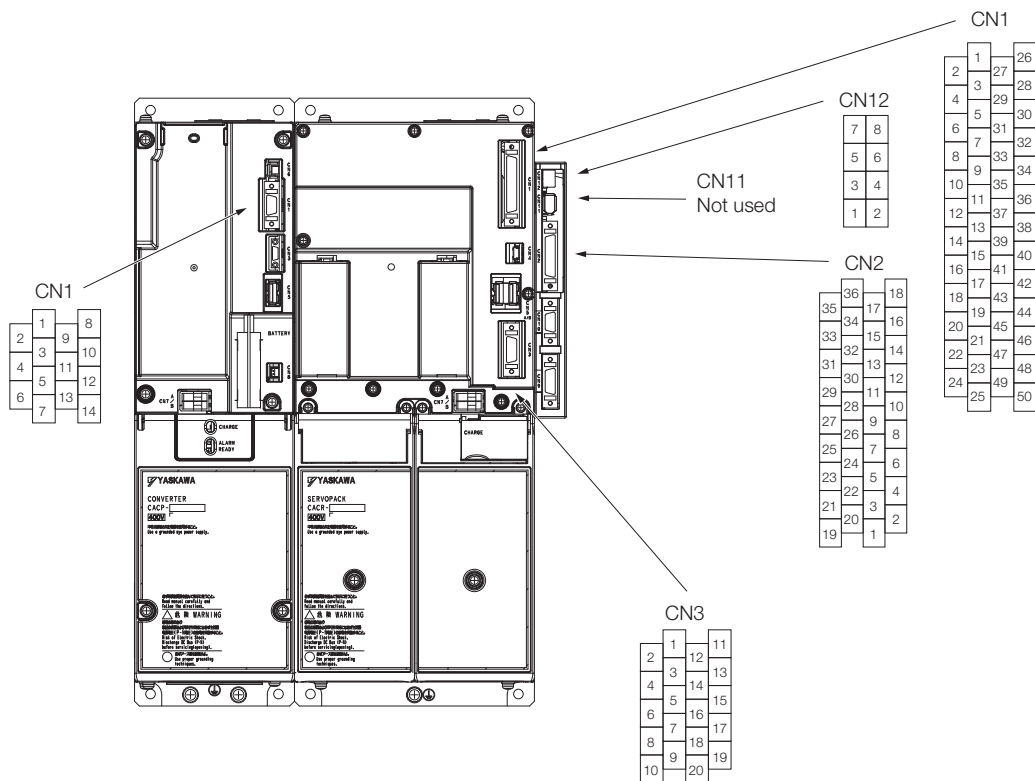
SERVOPACK Model	Connector Housing Model	Electrical Contact Model	Wire Size	Manufacturer
CACR-JU028AEA	1-917807-2	1318697-6	AWG8	Tyco Electronics Japan G.K.
CACR-JU036AEA	DK-5200S-04R	DK-5RECLLP1 (D3)	AWG8	DDK Ltd.
CACR-JU014DEA	1-917807-2	316041-6	AWG12	Tyco Electronics Japan G.K.
CACR-JU018DEA	DK-5200S-04R	DK-5RECMLP1-100	AWG10	DDK Ltd.

Pulse Encoder Cable

Name	Length	Order No.	External Appearance
Pulse Encoder Cable for Spindle Motor (CN3) Amplifier or SERVOPACK	2 m	JZSP-CJP00-02-E	
	3 m	JZSP-CJP00-03-E	
	5 m	JZSP-CJP00-05-E	
	10 m	JZSP-CJP00-10-E	
	15 m	JZSP-CJP00-15-E	
	20 m	JZSP-CJP00-20-E	

Refer to the User's Manual (manual no. SIEPS80000139) if the pulse encoder cable will be assembled by the customer.

I/O Signals for Analog Amplifier



Standard

The connector numbers and connector pin arrangement are shown below.

◆ Connector Pin Arrangement (CN1) for I/O Signals of the Power Regeneration Converter

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	(NC)	–	–	8	(NC)	–	–
2	(NC)	–	–	9	(NC)	–	–
3	(NC)	–	–	10	(NC)	–	–
4	(NC)	–	–	11	ESP+	I	Emergency stop input
5	(NC)	–	–	12	ESP–	I	Emergency stop input
6	(NC)	–	–	13	(NC)	–	–
7	(NC)	–	–	14	(NC)	–	–

◆ Connector Pin Arrangement (CN1) for I/O Signals of the SERVOPACK

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	+15V	–	+15 V output	26	FC0	O	Error code signal 0
2	(NC)	–	–	27	FC1	O	Error code signal 1
3	SCOM	I	Analog speed reference input	28	FC2	O	Error code signal 2

Selecting Cables

I/O Signals for Analog Amplifier

Continued from previous page.

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
4	0V	-	Analog speed reference 0 V	29	FC3	O	Error code signal 3
5	/DAS	I	Speed reference digital/analog selection	30	COM2	-	Common for error code signal
6	/RDY	I	Operation ready signal	31	(NC)	-	-
	EMG2		Emergency stop signal 2				
7	EMG	I	Emergency stop signal	32	(NC)	-	-
8	/FWD	I	Forward signal	33	/ZSPD	O	Zero speed signal
9	/REV	I	Reverse signal	34	/AGR	O	Speed coincidence signal
10	/TLH	I	Torque limit signal H	35	/SDET	O	Speed detection signal
11	/TLL	I	Torque limit signal L	36	/TDET	O	Torque detection signal
	/INC	I	Incremental signal				
12	/SSC	I	Soft start cancel signal	37	/TLE	O	Torque limit signal
	/SV	I	Servo mode signal				
13	/RST	I	Error reset signal	38	/ORG	O	Load shaft origin signal
14	/CHW	I	Winding selection signal	39	/ORE	O	Orientation completed signal
15	/PPI	I	P control / PI signal selection signal	40	/CHWE	O	Winding selection completed signal
	/LM10	I	Load ratio meter 10 times change signal				
16	/ORT	I	Orientation signal	41	FLTL	O	Error signal (OFF for error)
17	/LGR	I	L gear selection signal	42	COM1	-	Sequence output signal common
18	/MGR	I	M gear selection signal	43	FLTNO	O	Error contact output (ON for error)
19	EXTCOM ₀	-	Common for power supply for sequence input signal	44	FLTNC	O	Error contact output (OFF for error)
20	EXTCOM ₀	-	Common for power supply for sequence input signal	45	FLTCOM	-	Error contact output common
21	EXTCOM ₀	-	Common for power supply for sequence input signal	46	/TALM	O	Minor failure signal
22	24VCOM	-	Power supply for sequence input signal 24 V	47	SM	O	Speed meter signal output
23	24VCOM	-	Power supply for sequence input signal 24 V	48	0V	-	Speed meter signal 0 V
24	0VCOM	-	Power supply for sequence input signal 0 V	49	0V	-	Load ratio meter signal 0 V

Continued from previous page.

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
25	0VCOM	–	Power supply for sequence input signal 0 V	50	LM	O	Load ratio meter signal output

◆ **Connector Pin Arrangement (CN2) for I/O Signals of the SERVOPACK**

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	(NC)	–	–	19	D1	I	12-bit digital reference 1
2	(NC)	–	–	20	D2	I	12-bit digital reference 2
3	(NC)	–	–	21	D3	I	12-bit digital reference 3
4	(NC)	–	–	22	D4	I	12-bit digital reference 4
5	(NC)	–	–	23	D5	I	12-bit digital reference 5
6	(NC)	–	–	24	D6	I	12-bit digital reference 6
7	(NC)	–	–	25	D7	I	12-bit digital reference 7
8	(NC)	–	–	26	D8	I	12-bit digital reference 8
9	(NC)	–	–	27	D9	I	12-bit digital reference 9
10	(NC)	–	–	28	D10	I	12-bit digital reference 10
11	PCO	O	Motor encoder phase C signal output	29	D11	I	12-bit digital reference 11
12	/PCO	O		30	D12	I	12-bit digital reference 12
13	PAO	O	Motor encoder phase A signal output	31	EXTCOM	–	12-bit digital reference common
14	/PAO	O		32	24VCOM	–	Power supply for 12-bit digital reference +24 V
15	PBO	O	Motor encoder phase B signal output	33	0VCOM	–	Power supply for 12-bit digital reference 0 V
16	/PBO	O		34	(NC)	–	–
17	(NC)	–	–	35	(NC)	–	–
18	GND	–	Control ground	36	(NC)	–	–

◆ **Connector Pin Arrangement (CN3) for Encoder Feedback to the SERVOPACK**

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	PG0V	–	Power supply for encoder 0 V	11	CC	O	Winding selection signal 0 V
2	PG0V	–	Power supply for encoder 0 V	12	CA1	I	Winding selection status signal
3	PG0V	–	Power supply for encoder 0 V	13	CA2	I	
4	PG5V	–	Power supply for encoder +5 V	14	PC	I	Motor encoder phase C signal input
5	PG5V	–	Power supply for encoder +5 V	15	/PC	I	
6	PG5V	–	Power supply for encoder +5 V	16	PA	I	Motor encoder phase A signal input
7	(NC)	–	–	17	/PA	I	
8	THSA	I	Motor winding temperature detection	18	PB	I	Motor encoder phase B signal input
9	THSB	I		19	/PB	I	
10	C24V	O	Winding selection signal +24 V	20	(NC)	–	–




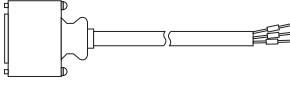
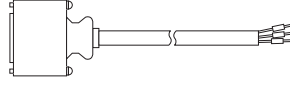
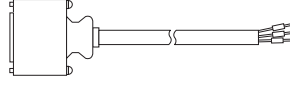


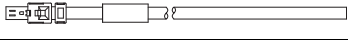

◆ **Connector Pin Arrangement (CN12) for I/O Signals of the SERVOPACK**

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	(NC)	–	–	2	(NC)	–	–
3	/HWBB1-	I	HWBB signal input 1	4	/HWBB1+	I	HWBB signal input 1
5	/HWBB2-	I	HWBB signal input 2	6	/HWBB2+	I	HWBB signal input 2
7	EDM1-	O	HWBB circuit status output	8	EDM1+	O	HWBB circuit status output

Note: If you do not use the HWBB function, attach the enclosed safety jumper connector to CN12.

Σ-SD Driver for Analog

Cables for Σ-V-SD Drivers

Name	Length	Order No.	External Appearance	CN#
Cable for 24-volt control power supply • With loose leads on one end • Connects one Σ-V-SD driver to 24-volt control power supply	1 m	JZSP-CNG00-01-E		CN7A
	2 m	JZSP-CNG00-02-E		
	3 m	JZSP-CNG00-03-E		
Cable for 24-volt control power supply • With connectors on both ends • Connects two Σ-V-SD drivers	0.2 m	JZSP-CNG01-A2-E		CN7B to CN7A
	0.3 m	JZSP-CNG01-A3-E		
Cables for local bus communications	0.5 m	JUPIT-W6004-A5		CN5 to CN5A
Cable for converter I/O	1 m	JZSP-CJI01-1-E	To converter	CN1 Converter
	2 m	JZSP-CJI01-2-E		
	3 m	JZSP-CJI01-3-E		
Cable for SERVOPACK CN1 I/O	1 m	JZSP-CJI103-1-E		To SERVOPACK
	2 m	JZSP-CJI103-2-E		
	3 m	JZSP-CJI103-3-E		
Cable for SERVOPACK CN2 I/O	1 m	JZSP-CJI203-1-E		To SERVOPACK
	2 m	JZSP-CJI203-2-E		
	3 m	JZSP-CJI203-3-E		
Cable for analog monitor	1 m	JZSP-CA01-E		To SERVOPACK To measuring device 
Cable for personal computer connection	2.5 m	JZSP-CVS06-02-E	To computer To SERVOPACK 	CN4 Amplifier
HWBB cable	Cable with connector	1 m	To SERVOPACK	CN12 Amplifier
		3 m		
	Connector kit	Contact Tyco Electronics Japan G.K. Product name: INDUSTRIAL MINI I/O D-SHAPE TYPE1 PLUG CONNECTOR KIT Model: 2013595-1		-
Digital operator		JJUSP-OP05A-1-E	With connector cable (1 m) 	CN3 Converter

Connector Kits for SERVOPACK cable assembling

Connector No.	Purpose	SERVOPACK -side Model	Connector*	Manufacturer	Connector Kit Model
CN1	I/O	10250-52A2PL	Plug: 10150-3000PE	Sumitomo 3M Ltd.	JZSP-CSI9-1-E
			Shell: 10350-52A0-008		
CN2	I/O	10236-52A2PL	Plug: 10136-3000PE	Sumitomo 3M Ltd.	JZSP-VAI09-E
			Shell: 10336-52A0-008		
CN9	External encoder input signal	10220-52A2PL	Plug: 10120-3000PE	Sumitomo 3M Ltd.	JZSP-VEP02-E
			Shell: 10320-52A0-008		
CN10	Magnetic sensor signal output and external encoder pulse output	10214-52A2PL	Plug: 10114-3000PE	Sumitomo 3M Ltd.	JZSP-CHI9-1
			Shell: 10314-52A0-008		

* Soldered type

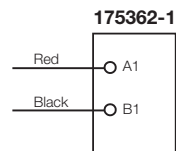
◆ Cable Specifications for 24-V Control Power Supply (With loose leads at one end and connects a Σ -V-SD driver to a 24-V control power supply)

Items	Specifications
Order No. *	JZSP-CNG00-□□-E
Cable Length	1 m, 2 m, 3 m
Cable and Connector	Cable : UL1015 AWG14 Cable-end connector to driver : 175362-1 (PIN : 353717-2)

* Specify the cable length in □□ of the order number.
 Example: JZSP-CNG00-Q1-E (1 m)

◆ Cable Specifications for 24-V Control Power Supply (With connectors on both ends and connects two Σ -V-SD drivers)

Items	Specifications	
Order No.	JZSP-CNG01-A2-E	JZSP-CNG01-A3-E
Cable Length*	0.2 m	0.3 m
Cable and Connector	Cable : UL1015 AWG14 Connector : 175362-1 (PIN : 353717-2) Connector manufacturer : Tyco Electronics Japan G.K.	



* When using CACP-JU45A3B converter, use 0.3 m-cable.

◆ Cable Specifications for Local Bus Communications

Items	Specifications
Order No.	JUPIT-W6004-A5
Cable Length	0.5 m
Cable	HRZFWV-ESB (20276)
Remarks	Used for communication between the Converter and the SERVOPACK.

◆ Cable Specifications for Converter I/O Signals

Items	Specifications
Order No. *	JZSP-CJI01-□-E
Cable Length	1 m, 2 m, 3 m
Cable and Connector	Cable : HP-SB/20276SR AWG28 × 7P Cable-end connector : 10114-6000EL (crimping type)
Remarks	Used for emergency stop.

* Specify the cable length in □ of the order number.
Example: JZSP-CJI01-1-E (1 m)

◆ I/O Cable Specifications (SERVOPACK CN1)

Items	Specifications																																																																																																																																																																																																																																																																										
Order No. *	JZSP-CJI103-□-E																																																																																																																																																																																																																																																																										
Cable Length	1 m, 2 m, 3 m																																																																																																																																																																																																																																																																										
Cable and connector	Cable : AWG24 × 25P (shielded) Shell : 10350-52A0-008 Plug : 10150-3000PE (soldered type)																																																																																																																																																																																																																																																																										
Remarks	Used for I/O signals	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="5">JZSP-CJI103-□-E</th> </tr> <tr> <th>Pin No.</th> <th>Wire Color</th> <th>Dot Mark Color</th> <th>Dot Mark</th> <th>Mark Tube Print No.</th> </tr> </thead> <tbody> <tr><td>1</td><td>Orange</td><td>Black</td><td>-</td><td>1</td></tr> <tr><td>2</td><td>Gray</td><td>Black</td><td>-</td><td>3</td></tr> <tr><td>3</td><td>Gray</td><td>Red</td><td>-</td><td>4</td></tr> <tr><td>4</td><td>White</td><td>Black</td><td>-</td><td>5</td></tr> <tr><td>5</td><td>White</td><td>Red</td><td>-</td><td>6</td></tr> <tr><td>6</td><td>Yellow</td><td>Black</td><td>-</td><td>7</td></tr> <tr><td>7</td><td>Yellow</td><td>Red</td><td>-</td><td>8</td></tr> <tr><td>8</td><td>Pink</td><td>Black</td><td>-</td><td>9</td></tr> <tr><td>9</td><td>Pink</td><td>Red</td><td>-</td><td>10</td></tr> <tr><td>10</td><td>Orange</td><td>Black</td><td>--</td><td>11</td></tr> <tr><td>11</td><td>Orange</td><td>Red</td><td>--</td><td>12</td></tr> <tr><td>12</td><td>Gray</td><td>Black</td><td>--</td><td>13</td></tr> <tr><td>13</td><td>Gray</td><td>Red</td><td>--</td><td>14</td></tr> <tr><td>14</td><td>White</td><td>Black</td><td>--</td><td>15</td></tr> <tr><td>15</td><td>White</td><td>Red</td><td>--</td><td>16</td></tr> <tr><td>16</td><td>Yellow</td><td>Black</td><td>--</td><td>17</td></tr> <tr><td>17</td><td>Yellow</td><td>Red</td><td>--</td><td>18</td></tr> <tr><td>18</td><td>Pink</td><td>Black</td><td>--</td><td>19</td></tr> <tr><td>19</td><td>Pink</td><td>Red</td><td>--</td><td>20</td></tr> <tr><td>20</td><td>Orange</td><td>Black</td><td>---</td><td>21</td></tr> <tr><td>21</td><td>Orange</td><td>Red</td><td>---</td><td>22</td></tr> <tr><td>22</td><td>Gray</td><td>Black</td><td>---</td><td>23</td></tr> <tr><td>23</td><td>Gray</td><td>Red</td><td>---</td><td>24</td></tr> <tr><td>24</td><td>White</td><td>Black</td><td>---</td><td>25</td></tr> <tr><td>25</td><td>White</td><td>Red</td><td>---</td><td>26</td></tr> <tr><td>26</td><td>Yellow</td><td>Black</td><td>---</td><td>27</td></tr> <tr><td>27</td><td>Yellow</td><td>Red</td><td>---</td><td>28</td></tr> <tr><td>28</td><td>Pink</td><td>Black</td><td>---</td><td>29</td></tr> <tr><td>29</td><td>Pink</td><td>Red</td><td>---</td><td>30</td></tr> <tr><td>30</td><td></td><td></td><td></td><td></td></tr> <tr><td>31</td><td></td><td></td><td></td><td></td></tr> <tr><td>32</td><td></td><td></td><td></td><td></td></tr> <tr><td>33</td><td>Orange</td><td>Black</td><td>----</td><td>33</td></tr> <tr><td>34</td><td>Orange</td><td>Red</td><td>----</td><td>34</td></tr> <tr><td>35</td><td>Gray</td><td>Black</td><td>----</td><td>35</td></tr> <tr><td>36</td><td>Gray</td><td>Red</td><td>----</td><td>36</td></tr> <tr><td>37</td><td>White</td><td>Black</td><td>----</td><td>37</td></tr> <tr><td>38</td><td>White</td><td>Red</td><td>----</td><td>38</td></tr> <tr><td>39</td><td>Yellow</td><td>Black</td><td>----</td><td>39</td></tr> <tr><td>40</td><td>Yellow</td><td>Red</td><td>----</td><td>40</td></tr> <tr><td>41</td><td>Pink</td><td>Black</td><td>----</td><td>41</td></tr> <tr><td>42</td><td>Pink</td><td>Red</td><td>----</td><td>42</td></tr> <tr><td>43</td><td>Orange</td><td>Black</td><td>-----</td><td>43</td></tr> <tr><td>44</td><td>Orange</td><td>Red</td><td>-----</td><td>44</td></tr> <tr><td>45</td><td>Gray</td><td>Black</td><td>-----</td><td>45</td></tr> <tr><td>46</td><td>Gray</td><td>Red</td><td>-----</td><td>46</td></tr> <tr><td>47</td><td>White</td><td>Black</td><td>-----</td><td>47</td></tr> <tr><td>48</td><td>White</td><td>Red</td><td>-----</td><td>48</td></tr> <tr><td>49</td><td>Yellow</td><td>Black</td><td>-----</td><td>49</td></tr> <tr><td>50</td><td>Yellow</td><td>Red</td><td>-----</td><td>50</td></tr> <tr><td>Shield</td><td></td><td>Shield</td><td></td><td></td></tr> </tbody> </table>	JZSP-CJI103-□-E					Pin No.	Wire Color	Dot Mark Color	Dot Mark	Mark Tube Print No.	1	Orange	Black	-	1	2	Gray	Black	-	3	3	Gray	Red	-	4	4	White	Black	-	5	5	White	Red	-	6	6	Yellow	Black	-	7	7	Yellow	Red	-	8	8	Pink	Black	-	9	9	Pink	Red	-	10	10	Orange	Black	--	11	11	Orange	Red	--	12	12	Gray	Black	--	13	13	Gray	Red	--	14	14	White	Black	--	15	15	White	Red	--	16	16	Yellow	Black	--	17	17	Yellow	Red	--	18	18	Pink	Black	--	19	19	Pink	Red	--	20	20	Orange	Black	---	21	21	Orange	Red	---	22	22	Gray	Black	---	23	23	Gray	Red	---	24	24	White	Black	---	25	25	White	Red	---	26	26	Yellow	Black	---	27	27	Yellow	Red	---	28	28	Pink	Black	---	29	29	Pink	Red	---	30	30					31					32					33	Orange	Black	----	33	34	Orange	Red	----	34	35	Gray	Black	----	35	36	Gray	Red	----	36	37	White	Black	----	37	38	White	Red	----	38	39	Yellow	Black	----	39	40	Yellow	Red	----	40	41	Pink	Black	----	41	42	Pink	Red	----	42	43	Orange	Black	-----	43	44	Orange	Red	-----	44	45	Gray	Black	-----	45	46	Gray	Red	-----	46	47	White	Black	-----	47	48	White	Red	-----	48	49	Yellow	Black	-----	49	50	Yellow	Red	-----	50	Shield		Shield		
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* Specify the cable length in □ of the order number.
Example: JZSP-CJI103-1-E (1 m)

◆ I/O Cable Specifications (SERVOPACK CN2)

Items	Specifications	
Order No. *	JZSP-CJI203-□-E	
Cable Length	1 m, 2 m, 3 m	
Cable and connector	Cable : AWG24 to AWG30 × 18P (shielded) Shell : 10336-52A0-008 Plug : 10136-3000PE (soldered type)	
Remarks	Used for I/O signals	

JZSP-CJI203-□-E				
Pin No.	Wire Color	Dot Mark Color	Dot Mark	Mark Tube Print No.
1	Orange	Black	-	1
2	Orange	Red	-	2
3	Gray	Black	-	3
4				
5				
6				
7				
8				
9				
10				
11	White	Black	-	11
12	White	Red	-	12
13	Yellow	Black	-	13
14	Yellow	Red	-	14
15	Pink	Black	-	15
16	Pink	Red	-	16
17				
18	Orange	Black	--	18
19	Gray	Black	--	19
20	Gray	Red	--	20
21	White	Black	--	21
22	White	Red	--	22
23	Yellow	Black	--	23
24	Yellow	Red	--	24
25	Pink	Black	--	25
26	Pink	Red	--	26
27	Orange	Black	---	27
28	Orange	Red	---	28
29	Gray	Black	---	29
30	Gray	Red	---	30
31	White	Black	---	31
32	White	Red	---	32
33	Yellow	Black	---	33
34				
35				
36				

* Specify the cable length in □ of the order number.
 Example: JZSP-CJI203-1-E (1 m)

◆ Cable Specifications for Use with an Analog Monitor

Items	Specifications
Order No.	JZSP-CA01-E
Cable length	1 m
Connectors	Cable : STYLE 1007 AWM E74037 AWG24 VW-1 Connector : DF11-4DS-2C
Remarks	Used for analog output signals, such as speed reference and torque reference.

◆ Cable Specifications for Use with a Computer

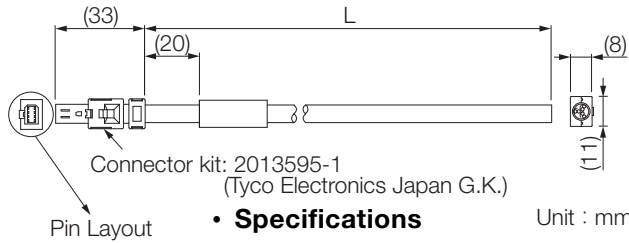
Items	Specifications
Order No.	JZSP-CVS06-02-E
Cable length	2.5 m
Connectors	Cable-end connector to SERVOPACK : USB Type miniB Cable-end connector to computer : USB Type A
Remarks	Used to connect a SERVOPACK with a personal computer in which SigmaWin+ is installed.

◆ HWBB Cable (Model JZSP-CVH03-□□ -E)

When using the HWBB function, connect this cable to the safety devices.

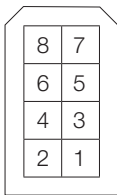
Even when not using the HWBB function, use SERVOPACKs with the Safe Jumper Connector.

• External Dimensions



Model	Cable Length (L)
JZSP-CVH03-01-E	1 m
JZSP-CVH03-03-E	3 m

Pin Layout



• Specifications

Pin No.	Signal	Lead Color	Making Color
1	Not used	-	-
2	Not used	-	-
3	/HWBB1-	White	Black
4	/HWBB1+	White	Red
5	/HWBB2-	Gray	Black
6	/HWBB2+	Gray	Red
7	EDM1-	Orange	Black
8	EDM1+	Orange	Red

Note: A jumper for CN12 ships with the product. Spare safety jumper part number is JZSP-CVH05-E

I/O Signals for EtherCAT Amplifier

Connector Pin Arrangement (CN1) for I/O Signals of the Power Regeneration Converter

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	/MCON+	O	Main circuit connector ON output	8*	(NC)	–	–
2	/MCON–	O	Main circuit connector ON output	9*	(NC)	–	–
3*	(NC)	–	–	10*	(NC)	–	–
4*	(NC)	–	–	11	/ESP+	I	Emergency stop input
5*	(NC)	–	–	12	/ESP–	I	Emergency stop input
6*	(NC)	–	–	13*	(NC)	–	–
7*	(NC)	–	–	14*	(NC)	–	–

* Do not use NC signal.

Note: Connect the shielded wires to the CN1 connector shell.

Connector Pin Arrangement (CN1) for I/O Signals of the SERVOPACK for One Axis

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	COM24V	I	+24V external power supply input	14*1	(NC)	–	–
2	/Probe1	I	Probe 1 latch signal input	15*3	(NC)	–	–
3	/Probe2	I	Probe 2 latch signal input	16*3	(NC)	–	–
4	/Home	I	Home switch input	17	/HWBB1–	I	Baseblock input 1
5*1	(NC)	–	–	18	/HWBB1+	I	Baseblock input 1
6	P-OT1	I	Forward overtravel	19	/HWBB2–	I	Baseblock input 2
7	N-OT1	I	Reverse overtravel	20	/HWBB2+	I	Baseblock input 2
8*1	(NC)	–	–	21	EDM1–	O	Baseblock monitoring signal
9	/BK1+	O	Brake	22	EDM1+	O	Baseblock monitoring signal
10	/BK1–	O	Brake	23	DBA1	I	External dynamic brake answer signal
11*2	THM1+	I	Motor winding temperature detection	24	DBA2	I	External dynamic brake answer signal
12*2	THM1–	I	Motor winding temperature detection	25	DBON	O	External dynamic brake
13*1	(NC)	–	–	26	DB24V	O	External dynamic brake

*1. Do not use NC signal.

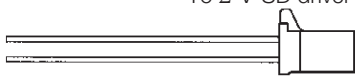
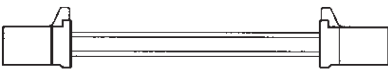

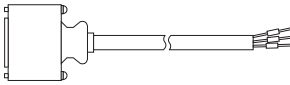
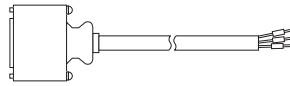

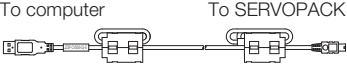

*2. Use CN1 or CN3 for motor winding temperature detection.

*3. Do not normally connect these terminals. However, you can connect CN1-15 and CN1-16 when you do not use the HWBB.

Note: Connect the shielded wires to the CN1 connector shell.

Σ-SD Driver for EtherCAT

Cables for Σ-V-SD Drivers

Name	Length	Order No.	External Appearance	CN#
Cable for 24-volt control power supply • With loose leads on one end • Connects one Σ-V-SD driver to 24-volt control power supply	1 m	JZSP-CNG00-01-E		CN7A Converter
	2 m	JZSP-CNG00-02-E		
	3 m	JZSP-CNG00-03-E		
Cable for 24-volt control power supply • With connectors on both ends • Connects two Σ-V-SD drivers	0.2 m	JZSP-CNG01-A2-E		CN7B to CN7A
	0.3 m	JZSP-CNG01-A3-E		
Cables for local bus communications	0.5 m	JUPIT-W6004-A5		CN5 to CN5A
Cable for converter I/O	1 m	JZSP-CJI01-1-E		CN1 Converter
	2 m	JZSP-CJI01-2-E		
	3 m	JZSP-CJI01-3-E		
Cable for SERVOPACK CN1 I/O	1 m	JZSP-CSI02-1-E		CN1 SERVO PACK
	2 m	JZSP-CSI02-2-E		
	3 m	JZSP-CSI02-3-E		
Cable for analog monitor	1 m	JZSP-CA01-E		CN6 SERVO PACK
Cable for personal computer connection	2.5 m	JZSP-CVS06-02-E		CN4 Amplifier
Digital operator		JJSP-OP05A-1-E		CN3 Converter

◆ Connector Kit for CN1

Use the following connector and cable to assemble the cable. The CN1 connector kit includes one case and one connector.

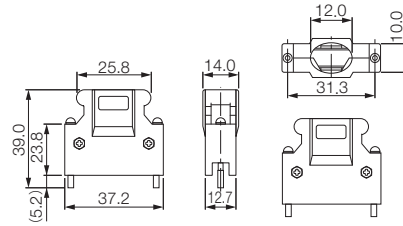
Connector Kit Model	Case		Connector	
	Model	Qty	Model	Qty
JZSP-CSI9-2-E	10326-52A0-008*	1 set	10126-3000PE* (Soldered)	1

* : Manufactured by Sumitomo 3M Ltd.

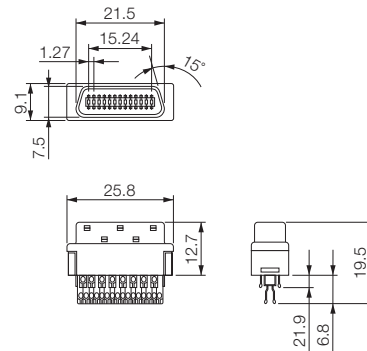
· Cable Size

Item	Specifications
Cable	Use twisted-pair or twisted-pair shielded wire.
Applicable Wires	AWG24, 26, 28, 30
Cable Finished Diameter	16 dia. max.

· Dimensional Drawings of Case

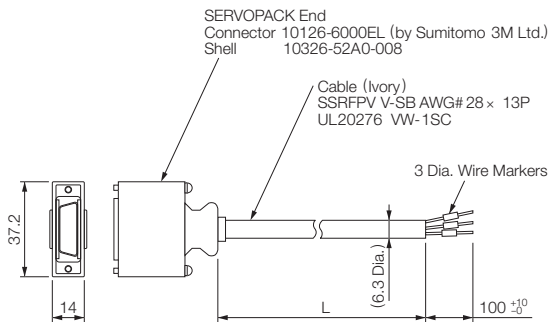


· Dimensional Drawings of Connector



◆ Cable with Loose Wires at One End for CN1

Dimensional Drawings of Cable



Model	Cable Length
JZSP-CSI02-1-E	1 m
JZSP-CSI02-2-E	2 m
JZSP-CSI02-3-E	3 m

● Cable with Loose Wires at One End for CN1 Connection Diagram of JZSP-CSI02-□-E Cable

Pin No.	Signal	Wire Color	Marking		Host Controller End Lead Marker
			Color	Dots	
1	COM24V	Blue	Red	1	1
2	/Probe1	Blue	Black	1	2
3	/Probe2	Pink	Red	1	3
4	/Home	Pink	Black	1	4
5	-	Green	Red	1	5
6	P-OT1	Green	Black	1	6
7	N-OT1	Orange	Red	1	7
8	-	Orange	Black	1	8
9	/BK1+	Gray	Red	1	9
10	/BK1-	Gray	Black	1	10
11	THM1+	Blue	Red	2	11
12	THM1-	Blue	Black	2	12
13	-	Pink	Red	2	13
14	-	Green	Red	2	14
15	-	Green	Black	2	15
16	-	Pink	Black	2	16
17	/HWBB1-	Orange	Red	2	17
18	/HWBB1+	Orange	Black	2	18
19	/HWBB2-	Gray	Red	2	19
20	/HWBB2+	Gray	Black	2	20
21	EDM1-	Blue	Red	3	21
22	EDM1+	Blue	Black	3	22
23	DBA1	Pink	Red	3	23
24	DBA2	Pink	Black	3	24
25	DBON	Green	Red	3	25
26	DB24V	Green	Black	3	26

△ : Represents twisted-pair wires.

AC Reactor

Specifications

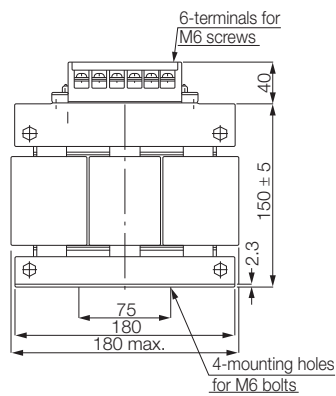
Power Regeneration Converter Model: CACP-	AC Reactor Model	Rated Voltage (V)	Frequency (Hz)	Rated Current (A)	Inductance (mH)	Insulation Class (class)	Watt Data Loss (W)	Surrounding Air Temperature	Storage Temperature	Approx. Mass (kg)
JU15A3□	X008017	230	50/60	56	0.21	H	55	-10°C to 55°C	-20°C to 85°C	8
JU19A3□	X008018	230	50/60	73	0.17	H	70			8
JU22A3□	X008019	230	50/60	90	0.14	H	80			12
JU30A3□	X008020	230	50/60	107	0.1	H	85			12
JU45A3B	X008022	230	50/60	179	0.07	H	130			25
JU15D3□	X008010* ¹ X008023* ²	480	50/60	27	0.82	H	70			7.3
JU19D3□	X008011	480	50/60	36	0.67	H	80			7.3
JU22D3□	X008012	480	50/60	45	0.56	H	120			11.2

*1. Not compliant with UL standards

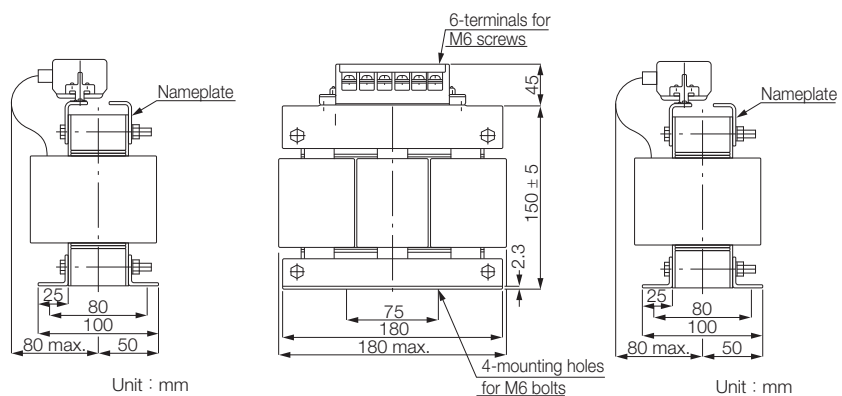
*2. Compliant with UL standards

External Dimensions

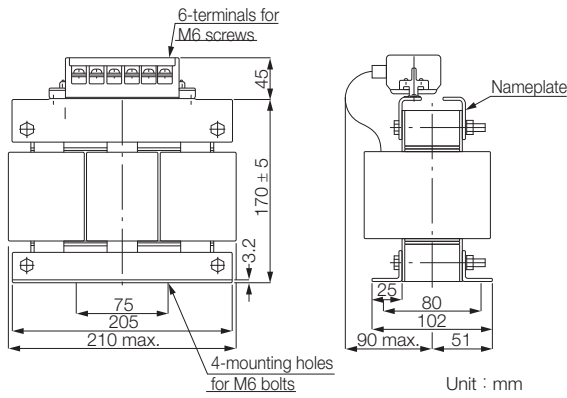
◆ Model: X008017



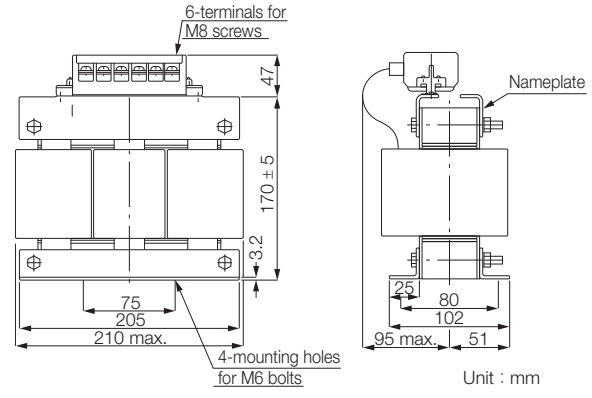
◆ Model: X008018



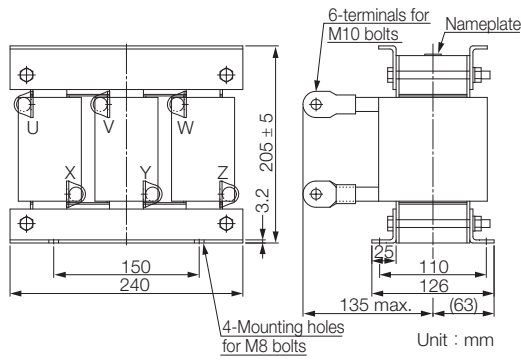
◆ Model: X008019



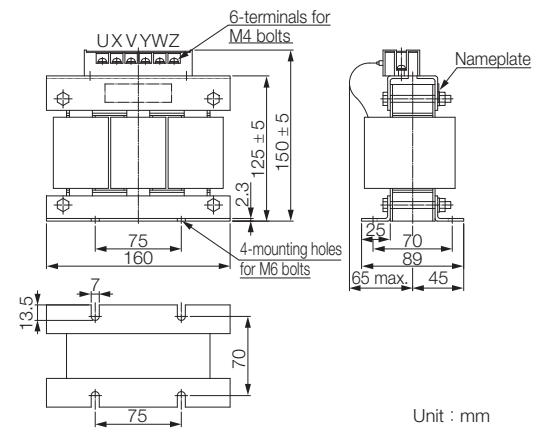
◆ Model: X008020



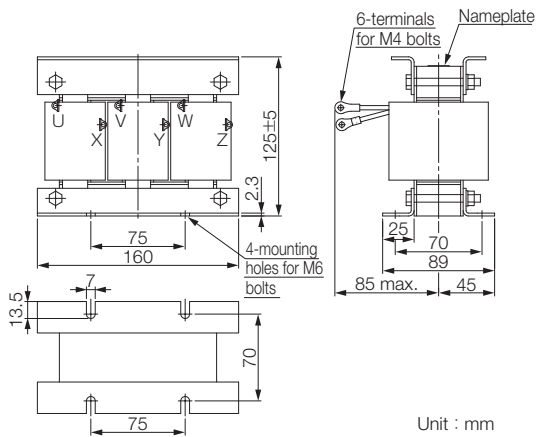
◆ Model: X008022



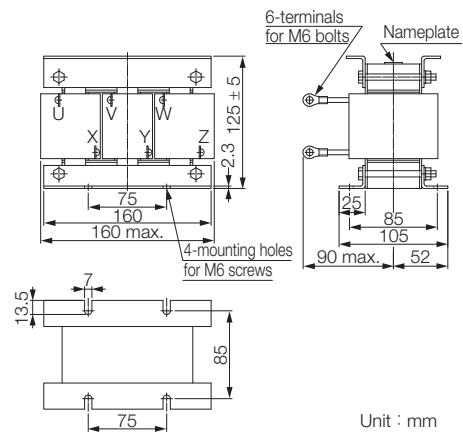
◆ Model: X008010



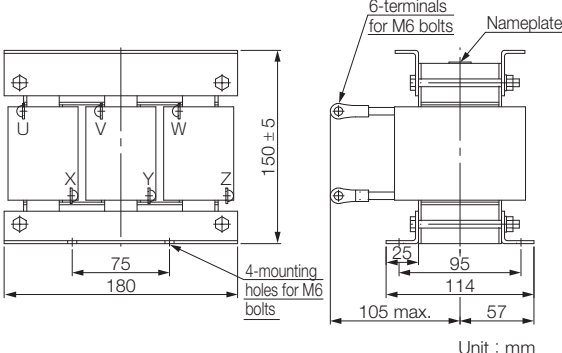
◆ Model: X008023



◆ Model: X008011



◆ Model: X008012



Magnetic Contactors

The magnetic contactor for the control circuit power supply turns the control circuit power supply ON and OFF. The magnetic contactor for the main circuit power supply turns the main circuit power supply ON and OFF. Use a magnetic contactor (MC) to turn OFF the control power supply or main circuit power supply sequence.

Note: If the magnetic contactor on the main circuit power supply input is turned ON and OFF frequently, the Σ -V-SD servo driver may be damaged. Do not turn the power supply ON and OFF with the magnetic contactor more than one time every 30 minutes.

Select the magnetic contactor based on the information of power supply capacity per power regeneration converter, input current (50%ED, continuous ratings), and inrush current in Converter Input Current and Inrush Current (page 57).

Converter Input Current and Inrush Current

Voltage	Capacity (50%ED) (kW)	Capacity (Continuous Ratings) (kW)	Power Regeneration Converter Model	Power Supply Capacity per Power Regeneration Converter (kVA)	Input Current (50%ED) (Arms)	Input Current (Continuous Ratings) (Arms)	Inrush Current (Main Circuit) (A _{0-p})
200 V	15	11	CACP-JU15A3□	22.5	73	54	83
	18.5	15	CACP-JU19A3□	30.5	90	73	83
	22	18.5	CACP-JU22A3□	37.5	107	90	83
	30	22	CACP-JU30A3□	45.0	145	107	178
	45	37	CACP-JU45A3B	75.0	218	179	178
400 V	15	11	CACP-JU15D3□	22.5	36	27	173
	18.5	15	CACP-JU19D3□	30.5	45	36	173
	22	18.5	CACP-JU22D3□	37.5	53	45	173

Warranty

◆ Details of Warranty

■ Warranty Period

The warranty period for a product that was purchased (hereinafter called "delivered product") is one year from the time of delivery to the location specified by the customer or 18 months from the time of shipment from the Yaskawa factory, whichever is sooner.

■ Warranty Scope

Yaskawa shall replace or repair a defective product free of charge if a defect attributable to Yaskawa occurs during the above warranty period. This warranty does not cover defects caused by the delivered product reaching the end of its service life and replacement of parts that require replacement or that have a limited service life.

This warranty does not cover failures that result from any of the following causes.

- Improper handling, abuse, or use in unsuitable conditions or in environments not described in product catalogs or manuals, or in any separately agreed-upon specifications
- Causes not attributable to the delivered product itself
- Modifications or repairs not performed by Yaskawa
- Use of the delivered product in a manner in which it was not originally intended
- Causes that were not foreseeable with the scientific and technological understanding at the time of shipment from Yaskawa
- Events for which Yaskawa is not responsible, such as natural or human-made disasters

◆ Limitations of Liability

- Yaskawa shall in no event be responsible for any damage or loss of opportunity to the customer that arises due to failure of the delivered product.
- Yaskawa shall not be responsible for any programs (including parameter settings) or the results of program execution of the programs provided by the user or by a third party for use with programmable Yaskawa products.
- The information described in product catalogs or manuals is provided for the purpose of the customer purchasing the appropriate product for the intended application. The use thereof does not guarantee that there are no infringements of intellectual property rights or other proprietary rights of Yaskawa or third parties, nor does it construe a license.
- Yaskawa shall not be responsible for any damage arising from infringements of intellectual property rights or other proprietary rights of third parties as a result of using the information described in catalogs or manuals.

◆ Suitability for Use

- It is the customer's responsibility to confirm conformity with any standards, codes, or regulations that apply if the Yaskawa product is used in combination with any other products.
- The customer must confirm that the Yaskawa product is suitable for the systems, machines, and equipment used by the customer.
- Consult with Yaskawa to determine whether use in the following applications is acceptable. If use in the application is acceptable, use the product with extra allowance in ratings and specifications, and provide safety measures to minimize hazards in the event of failure.
 - Outdoor use, use involving potential chemical contamination or electrical interference, or use in conditions or environments not described in product catalogs or manuals
 - Nuclear energy control systems, combustion systems, railroad systems, aviation systems, vehicle systems, medical equipment, amusement machines, and installations subject to separate industry or government regulations
 - Systems, machines, and equipment that may present a risk to life or property
 - Systems that require a high degree of reliability, such as systems that supply gas, water, or electricity, or systems that operate continuously 24 hours a day
 - Other systems that require a similar high degree of safety
- Never use the product for an application involving serious risk to life or property without first ensuring that the system is designed to secure the required level of safety with risk warnings and redundancy, and that the Yaskawa product is properly rated and installed.
- The circuit examples and other application examples described in product catalogs and manuals are for reference. Check the functionality and safety of the actual devices and equipment to be used before using the product.
- Read and understand all use prohibitions and precautions, and operate the Yaskawa product correctly to prevent accidental harm to third parties.

◆ Specifications Change

The names, specifications, appearance, and accessories of products in product catalogs and manuals may be changed at any time based on improvements and other reasons. The next editions of the revised catalogs or manuals will be published with updated code numbers. Consult with your Yaskawa representative to confirm the actual specifications before purchasing a product.

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