YASKAWA

AC Spindle Motor Drives with Power Regeneration, AC Servo Drives

Σ-V-SD Series

Speed Reference with Analog Voltage Expanded Functions

Certified for ISO9001 and ISO14001

JQA-0422 JQA-EM0202 JQA-EM0924

ENERGY SAVING

AC Spindle Motor Drives with Power Regeneration
AC Servo Drives Σ-V-SD Series

Power Regeneration Converter and SERVOPACK

- Block configuration with unified heights and depths to help optimize control panel designs.
- Two mounting methods:
  Duct ventilated (external heat sink cooling) and base mounting (in-panel mounting).
- SERVOPACKs are available with three orientation methods:
  Motor encoder, external encoder, or magnetic sensor.
- Digital speed references with contact inputs (12 bits).
- Front covers make cables easy to organize.

Power Regeneration Converter

Power supply regeneration helps save energy.

SERVOPACK for AC Spindle Motor Drive

Servo drive control technology has been applied to spindle drives to increase amplifier response characteristics.
High-precision speed control is achieved.

RoHS compliant

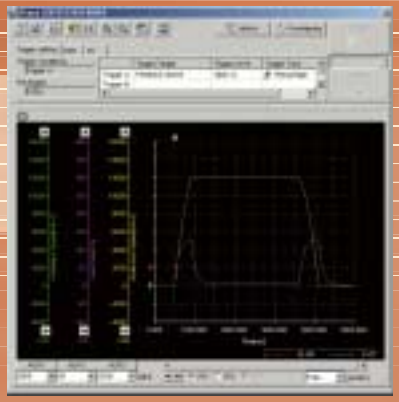
c UL us LISTED

CE

KC*

* : Ask your Yaskawa representative for information on the KC Mark.

You can use Yaskawa's SigmaWin+ Engineering Tool*1 to easily motor constant settings*2, trace data, check I/O signals, and edit parameters.



*1 : SigmaWin+ Ver.5.70 or later
(Please be used with Σ-V-SD component Ver.1.00 or later)
*2 : Be sure to set the Motor constant settings by using SigmaWin+.
(Visit the desingnated Yaskawa Electric website for your area.
Use the inquiry form to request the SigmaWin+, Σ-V-SD component, motor constant files.)

POWERFUL

Spindle Motor

- Optimum electromagnetic design and improved cooling structure for high efficiency, downsizing, and reduced weight.
- High acceleration/deceleration rates with maximum output power of 200% to help improve productivity when used as high-speed, high-power output spindle motors.
- Downsizing for low moment of inertia and instantaneous power that approach servo performance.
- Minimal loss of cooling capacity in adverse environments for high reliability.

Maximum Output Power:

200%

CE

- Winding selection for wide-range constant output power of 1:12. This increases processing capacity, simplifies gear structure, and reduces the capacity of the applicable drives.

Wide-range Constant Output Power:

1:12

Model Designation

Spindle Motor

UAKAJ-22CZ1OOE

- AC Spindle Motor
- Cooling Method
  - K : External fan cooled
- Winding System
  - A : Single winding
  - B : Winding selection
- Series
  - J : Σ-V-SD Series
- 50% ED Rating (S3)

Code	Specifications (kW)
04*1	3.7
06	5.5
08	7.5
11	11
15	15
19	18.5
22	22
30*2	30
37*1*2	37
45*1*2	45

- Design Revision Order
  - C : Standard
- Encoder Specifications
  - Z : Pulse encoder
- Mounting
  - 1 : Flange type
  - 3 : Foot-mounted type
- Shaft End
  - Blank : Straight with key and tap (for 200-VAC input spindle motor)
  - O : Straight with key and tap (for 400-VAC input spindle motor)
  - N : Straight without key and tap
- Lead Wire Orientation
  - Blank : Left when viewed from the load side (for 200-VAC input spindle motor)
  - O : Left when viewed from the load side (for 400-VAC input spindle motor)
- Input Voltage
  - Blank : Three-phase 200 VAC
  - E : Three-phase 400 VAC

*1 : Available only for single winding models.
*2 : Available only for three-phase 200 VAC models.

Σ-V-SD Driver

■ Power Regeneration Converter

CACP-JU22A3□□□□□□□

- Σ-V-SD Series Power Regeneration Converter
- 50% ED Rating

Code	Specifications (kW)
15	15
19	18.5
22	22
30*1	30
45*1	45

- Input Voltage
  - A : Three-phase 200 VAC
  - D : Three-phase 400 VAC
- Regeneration Method
  - 3 : 120-degree conduction
- Design Revision Order
  - A : Corresponds to the UL standard
  - B : Not correspond to the UL standard
- Mounting
  - Blank : Duct-ventilated
  - B*2 : Base-mounted
- Custom-made
  - Blank : Standard

*1 : Available only for three-phase 200 VAC models.
*2 : Available only for CACP-JU□□A3BB model.

■ SERVOPACK

CACR-JU102AEA□□□□□□

- Σ-V-SD Series SERVOPACK
- Rated Output Current

Code	Specifications (Arms)	Input Voltage
028	28	270 VDC
036	36	
065	65	
084	84	
102	102	
125	125	
196	196	
014	14	540 VDC
018	18	
033	32.5	
042	42	
051	51	

- Input Voltage
  - A : 270 VDC
  - D : 540 VDC
- Interface Specifications
  - E : Analog speed reference expanded functions
- Design Revision Order
  - A, B, C···
- Mounting
  - Blank : Duct-ventilated
  - B* : Base-mounted
- Custom-made
  - Blank : Standard
  - 01 : Orientation control with an external encoder
  - 02 : Orientation control with a magnetic sensor

* : Available only for CACR-JU□□□AEAB model.

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

200 VAC-input Spindle Motor		Power Regeneration Converter Model CACP-	SERVOPACK Model CACR-	AC Reactor	Magnetic Contactor for Winding Selection*
Single Winding	UAKAJ-04C□□□□	JU15A3□	JU028AEA□□□	X008017	
	UAKAJ-06C□□□□				
	UAKAJ-08C□□□□		JU036AEA□□□		
	UAKAJ-11C□□□□		JU065AEA□□□		
	UAKAJ-15C□□□□				
	UAKAJ-19C□□□□	JU19A3□	JU084AEA□□□	X008018	
	UAKAJ-22C□□□□	JU22A3□	JU102AEA□□□	X008019	
	UAKAJ-30C□□□□	JU30A3□	JU125AEA□□□	X008020	
	UAKAJ-37C□□□□	JU45A3B	JU196AEA□□□	X008022	
	UAKAJ-45C□□□□				
Winding Selection	UAKBJ-06C□□□□	JU15A3□	JU028AEA□□□	X008017	HV-75AP4
	UAKBJ-08C□□□□		JU036AEA□□□		
	UAKBJ-11C□□□□		JU065AEA□□□		
	UAKBJ-15C□□□□				
	UAKBJ-19C□□□□	JU19A3□	JU084AEA□□□	X008018	HV-150AP4
	UAKBJ-22C□□□□	JU22A3□	JU102AEA□□□	X008019	
	UAKBJ-30C□□□□	JU30A3□	JU125AEA□□□	X008020	

400 VAC-input Spindle Motor		Power Regeneration Converter Model CACP-	SERVOPACK Model CACR-	AC Reactor	Magnetic Contactor for Winding Selection*
Single Winding	UAKAJ-04C□□□□E	JU15D3□	JU014DEA□□□	X008010	
	UAKAJ-06C□□□□E				
	UAKAJ-08C□□□□E		JU018DEA□□□		
	UAKAJ-11C□□□□E		JU033DEA□□□		
	UAKAJ-15C□□□□E				
	UAKAJ-19C□□□□E	JU19D3□	JU042DEA□□□	X008011	
	UAKAJ-22C□□□□E	JU22D3□	JU051DEA□□□	X008012	
Winding Selection	UAKBJ-06C□□□□E	JU15D3□	JU014DEA□□□	X008010	HV-75AP4
	UAKBJ-08C□□□□E		JU018DEA□□□		
	UAKBJ-11C□□□□E		JU033DEA□□□		
	UAKBJ-15C□□□□E				
	UAKBJ-19C□□□□E	JU19D3□	JU042DEA□□□	X008011	HV-150AP4
	UAKBJ-22C□□□□E	JU22D3□	JU051DEA□□□	X008012	

∗ : For the Magnetic Contactor of UL-compliant type or with safety cover, refer to page 60.

CONTENTS

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	$\times 10^{-3}$ $kg{\cdot}m^2$	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) Foot-mounted type: IM B3 (installed on floor)									
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.

Winding Selection Motor

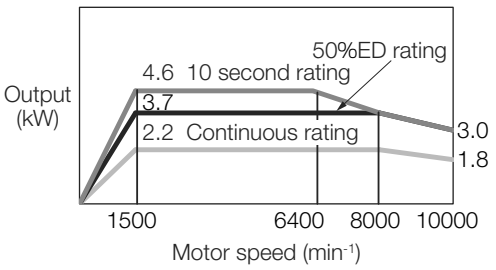
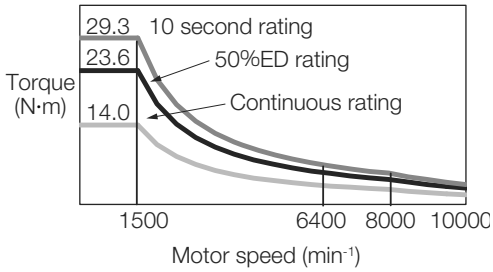
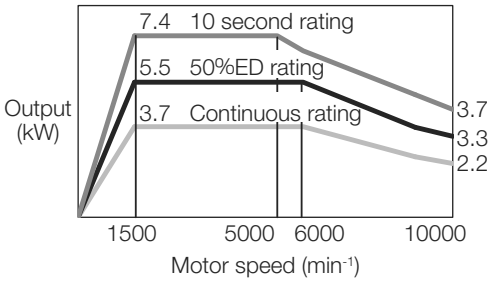
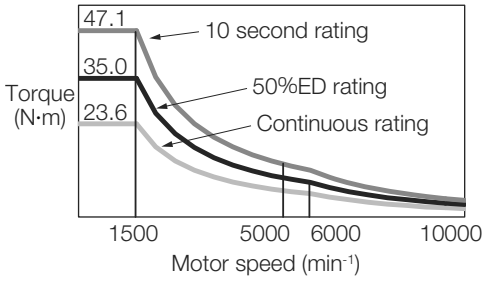
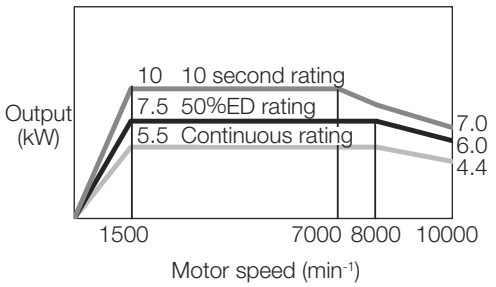
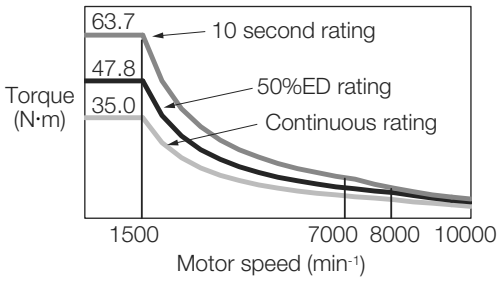
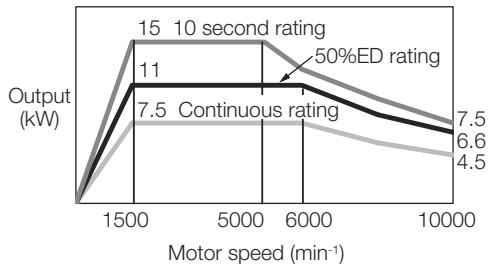
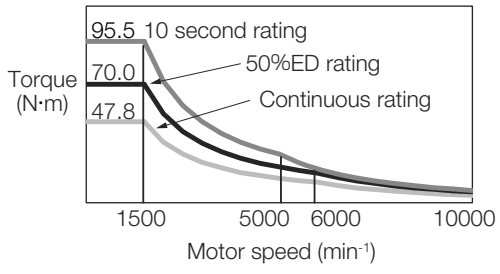
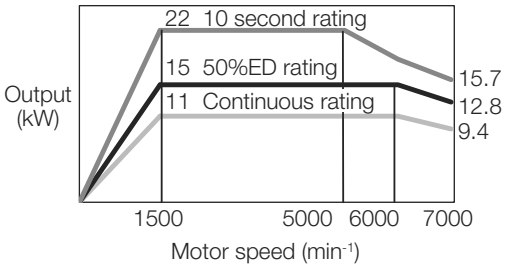
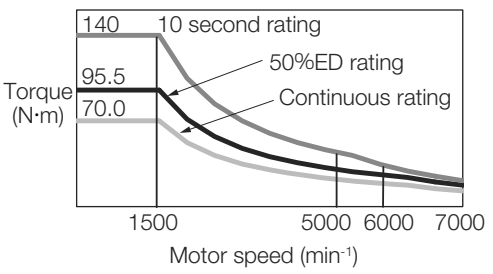
Items		Model: UAKBJ-□□C (200 V), -□□C□□□□E (400 V)						
		06	08	11	15	19	22	30*2
50% ED Rating (S3)*1	kW	5.5	7.5	11	15	18.5	22	30
Continuous Rating (S1)	kW	3.7	5.5	7.5	11	15	18.5	20
Continuous Rated Torque	N·m	71	105	143	263	249	307	332
Base Speed	min^{-1}	500			400	575		
Maximum Speed	min^{-1}	7000			6000			5000
Moment of Inertia	$\times 10^{-3}$ kg·m^2	69.0	69.0	89.0	231.0	231.0	266.0	398.0
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) Foot-mounted type: IM B3 (installed on floor)						
Overload Capacity		200% 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 min.						
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	036A	065A	065A	084A	102A	125A
	Three-phase 400 VAC	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

Single-winding Motors

Model UAKAJ-	Output Characteristics	Torque Characteristics
04C		
06C		
08C		
11C		
15C		

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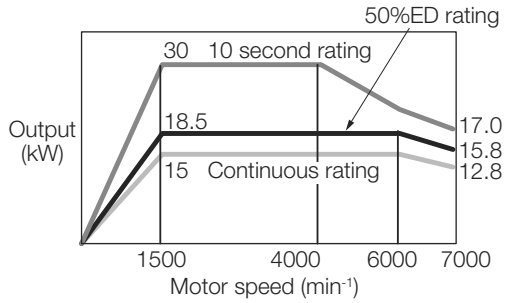
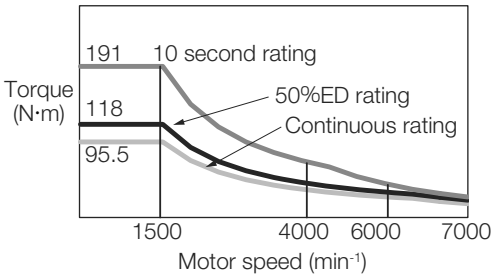
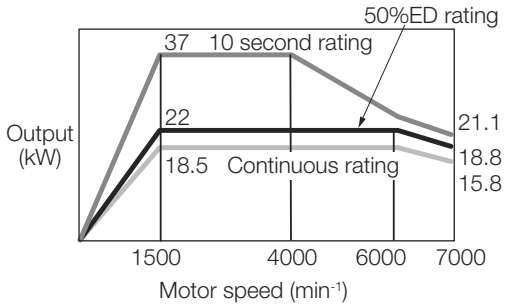
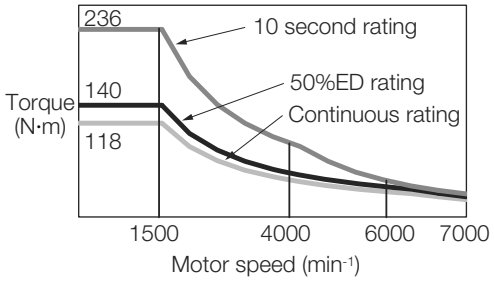
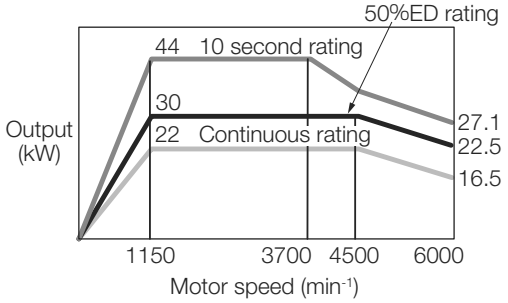
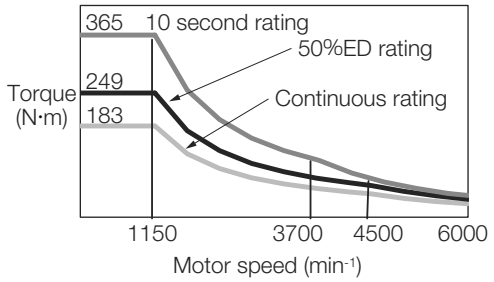
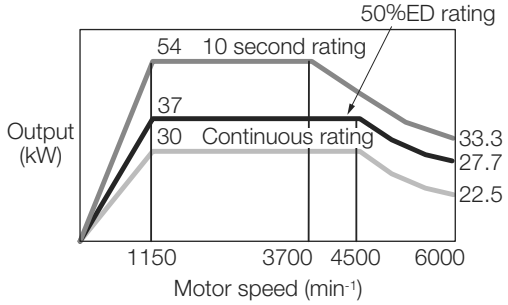
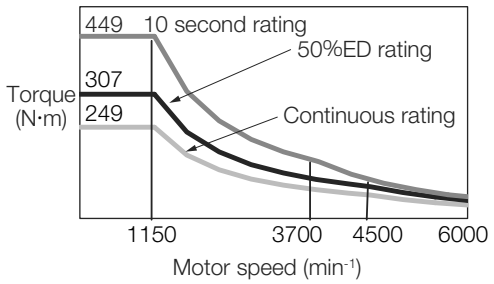
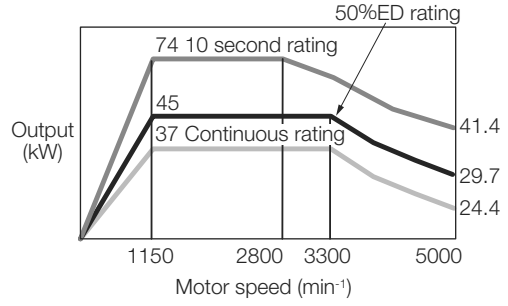
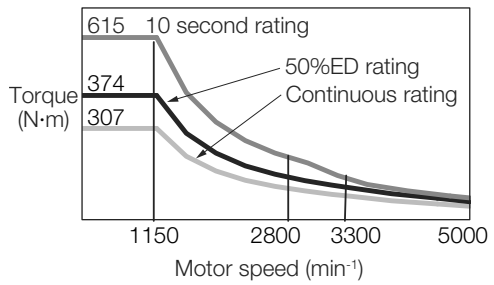
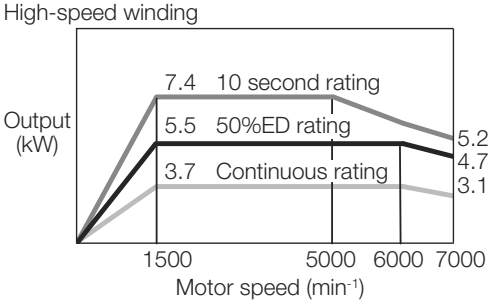
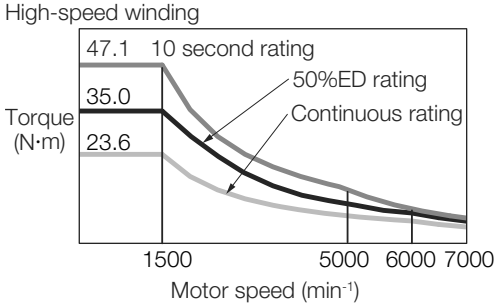
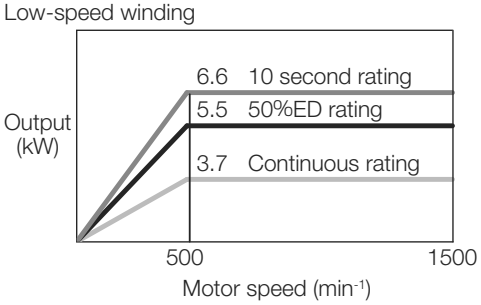
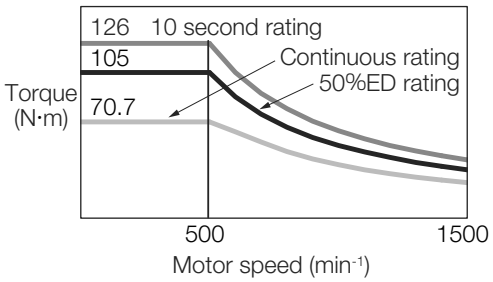
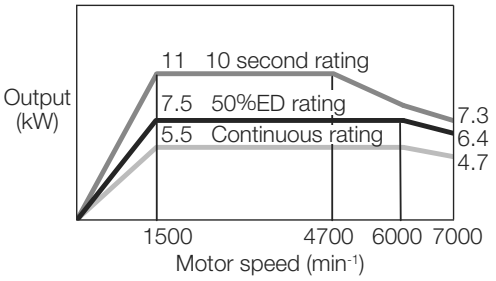
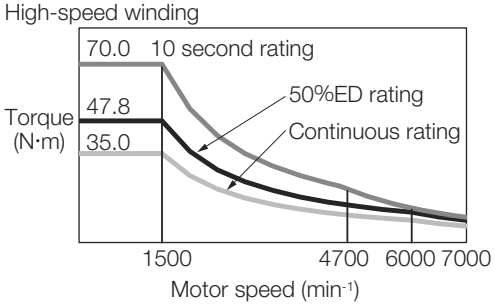
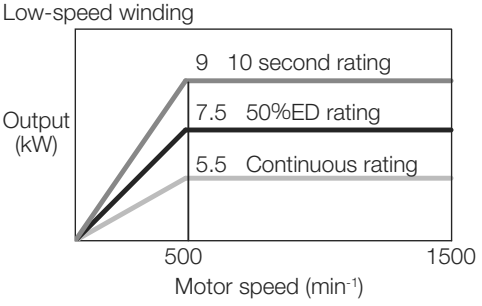
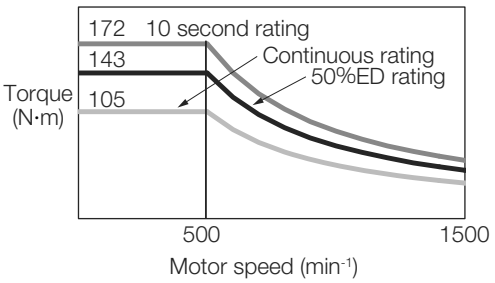
Model UAKAJ-	Output Characteristics	Torque Characteristics
19C		
22C		
30C		
37C		
45C		

Winding Selection Motors

Model UAKBJ-	Output Characteristics	Torque Characteristics
06C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 
08C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 

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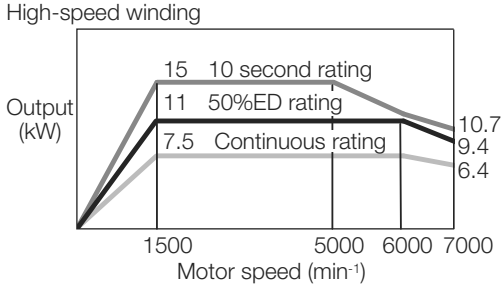
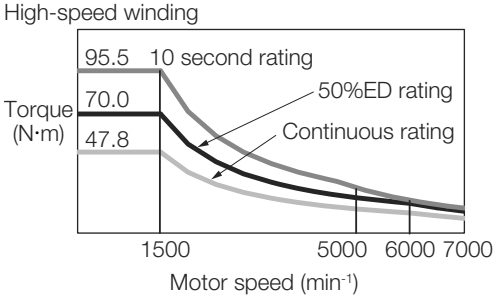
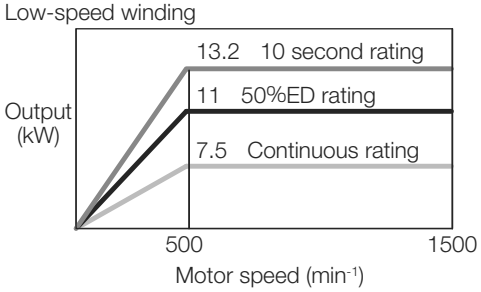
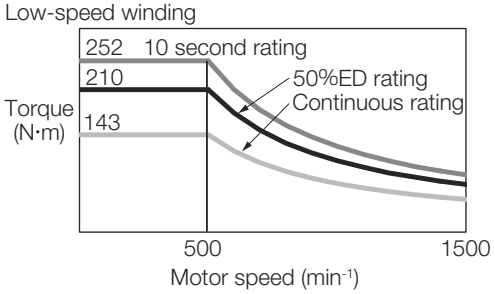
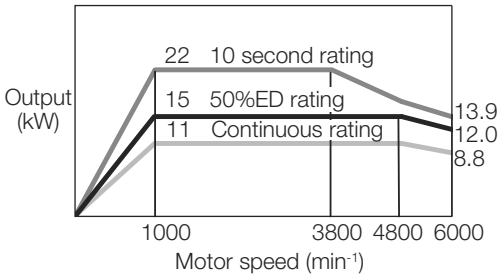
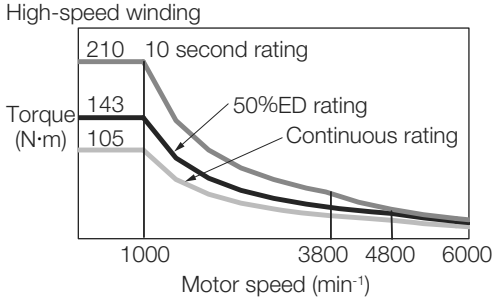
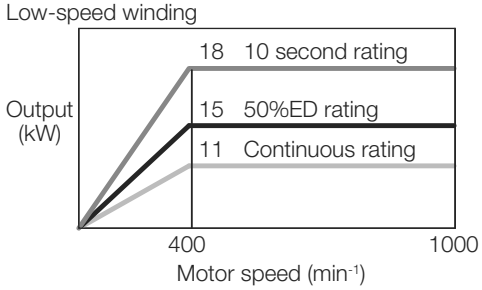
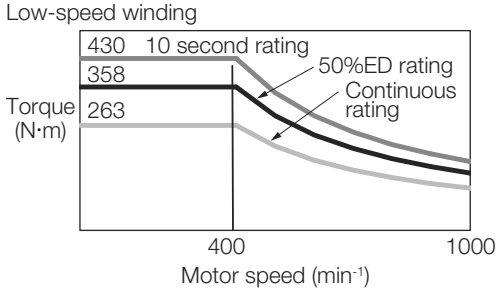
Model UAKBJ-	Output Characteristics	Torque Characteristics
11C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 
15C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 

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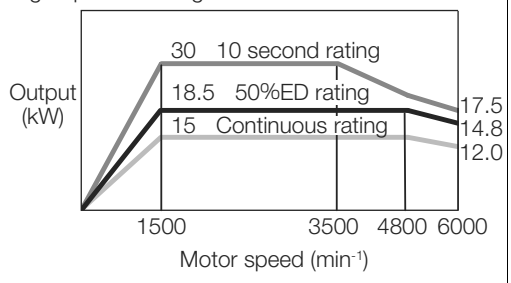
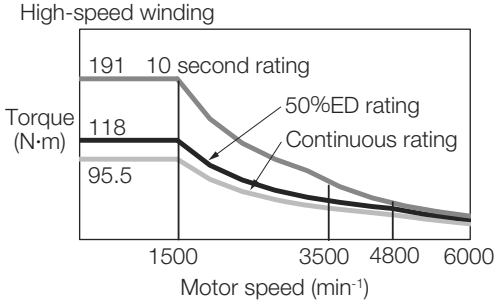
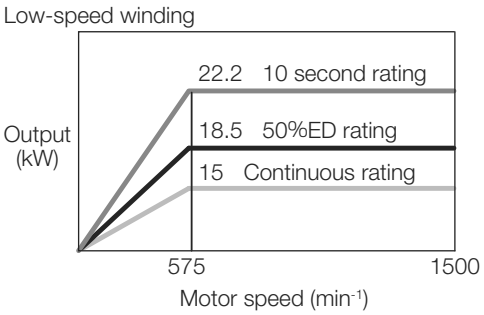
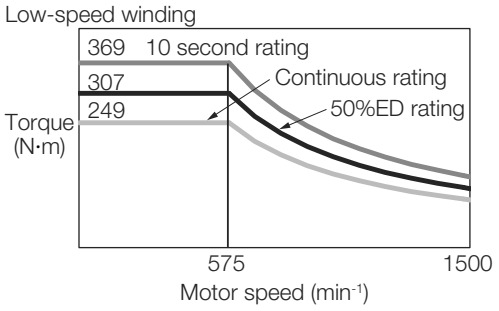
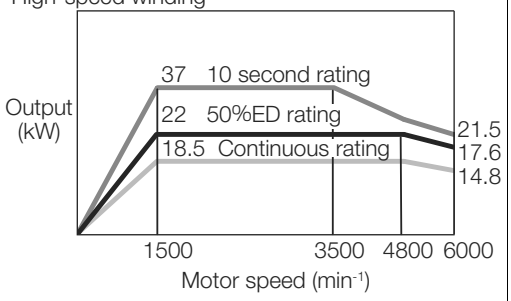
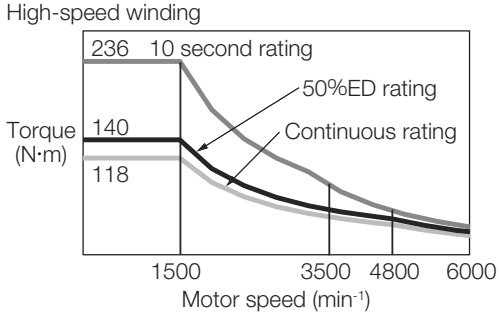
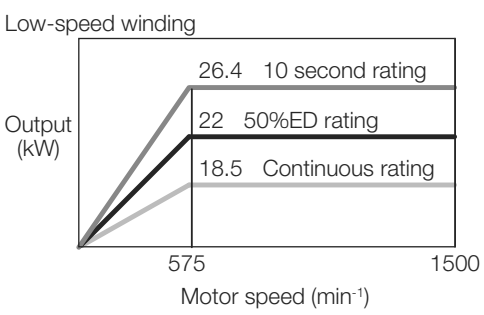
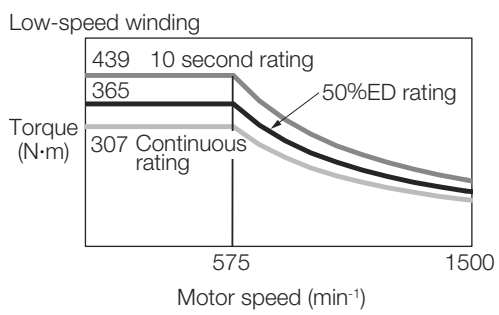
Model UAKBJ-	Output Characteristics	Torque Characteristics
19C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 
22C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 

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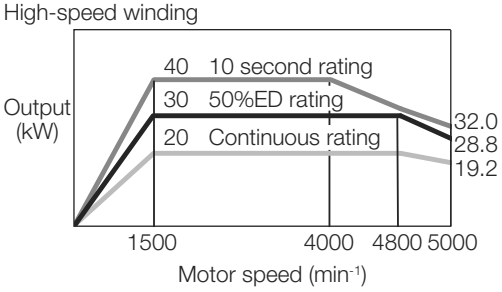
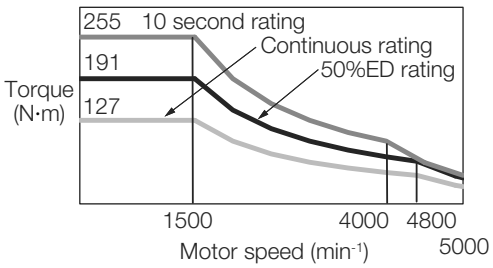
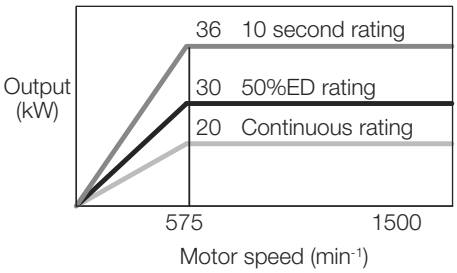
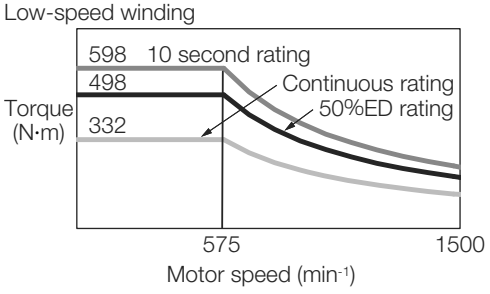
Model UAKBJ-	Output Characteristics	Torque Characteristics
30C	High-speed winding 	High-speed winding 
	Low-speed winding 	Low-speed winding 

Tolerance Radial Loads

Model: UAKAJ-, UAKBJ-	Rated Output (kW) 50%ED Rating/ Continuous Rating	Tolerance Radial Load (N)	
		Single-winding Motor Model: UAKAJ-□□C	Winding Selection Motor Model: UAKBJ-□□C
04	3.7/2.2	1180	–
06	5.5/3.7	1180	2940
08	7.5/5.5	1470	2940
11	11/7.5	1470	3530
15	15/11	2940	4410
19	18.5/15	2940	4410
22	22/18.5	3530	4900
30*1	30/22*2	4410	5200
37*1	37/30	4900	–
45*1	45/37	5200	–

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

*2. The rated output for the winding selection motor is 30/20 kW.

Motor Total Indicator Readings

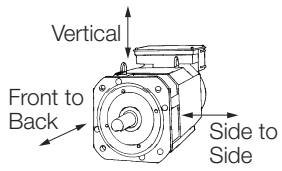
Flange Type

Item	Model		Accuracy
	Single-winding Motor: UAKAJ-□□	Winding Selection Motor: UAKBJ-□□	
Perpendicularity of the flange face to the motor shaft	04 to 22	06 to 11	0.04 mm
	30, 37	15	0.06 mm
	45	19 to 30	0.072 mm
Concentricity of the flange mating part to the motor shaft	04 to 11	–	0.04 mm
	15 to 22	06 to 11	0.046 mm
	30, 37	15	0.048 mm
	45	19 to 30	0.070 mm
Axial runout of the motor shaft	04 to 08	–	0.02 mm
	11 to 22	06 to 11	0.022 mm
	30 to 45	15 to 30	0.028 mm

Foot-mounted Type

Item	Model		Accuracy
	Single-winding Motor: UAKAJ-□□	Winding Selection Motor: UAKBJ-□□	
Shaft Parallelism	04 to 08	–	0.03 mm
	11 to 22	06 to 11	0.033 mm
	30 to 45	15 to 30	0.042 mm
Axial runout of the motor shaft	04 to 08	–	0.02 mm
	11 to 22	06 to 11	0.022 mm
	30 to 45	15 to 30	0.028 mm

Vibration Resistance



Impact Applied to the Spindle Motor

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		
Winding Selection	UAKBJ-06, -08, -11	24.5 m/s^2		
	UAKBJ-15 to -22	19.6 m/s^2		
	UAKBJ-30	4.9 m/s^2		

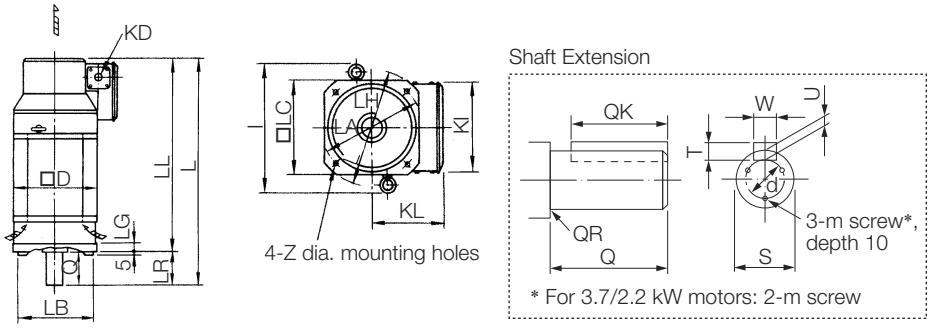
Important

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

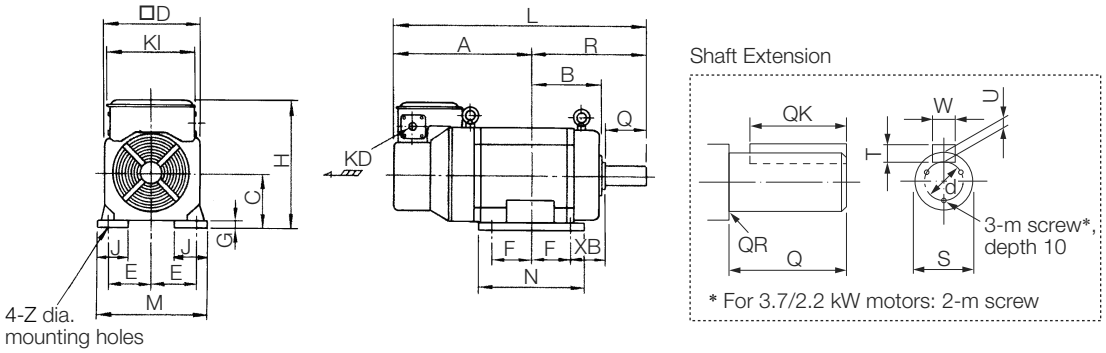
Model UAKAJ-	L	LA	LB	LC	LG	LH	LL	LR	Z	D	I	KD	KL	KI
04	375	185	$150^{0}_{-0.04}$	174	12	220	315	60	11	174	–	34	142	174
06	467	185	$150^{0}_{-0.04}$	174	12	220	407	60	11	174	–	34	142	174
08	496	215	$180^{0}_{-0.04}$	204	16	250	416	80	15	204	270	42.5	158	207
11	556	215	$180^{0}_{-0.04}$	204	16	250	446	110	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. The actual appearance of the spindle motor may vary.

◆ Foot-mounted type



Unit: mm

Model UAKAJ-	A	B	C	D	E	F	G	H	J	KD	L	M	N	R
04	230	83	$100^{0}_{-0.5}$	174	80	40	9	242	34	34	375	188	106	145
06	292	113	$100^{0}_{-0.5}$	174	80	70	9	242	34	34	467	188	168	175
08	286	117	$112^{0}_{-0.5}$	204	95	50	10	269	75	42.5	486	220	129	200
11	296	137	$112^{0}_{-0.5}$	204	95	70	10	269	75	42.5	546	220	177	250
15	261	196	$160^{0}_{-0.5}$	260	127	89	16	341	55	42.5	568	290	223	307
19	261	196	$160^{0}_{-0.5}$	260	127	89	16	341	55	42.5	568	290	223	307
22	307	212	$160^{0}_{-0.5}$	260	127	105	16	341	55	42.5	630	290	255	323
30	381	246	$180^{0}_{-0.5}$	320	139.5	127	16	407	55	61	769	320	298	388
37	421	246	$180^{0}_{-0.5}$	320	139.5	127	16	407	55	61	809	320	298	388
45	377	273	$225^{0}_{-0.5}$	380	178	127	21	540	75	61	793	420	370	416

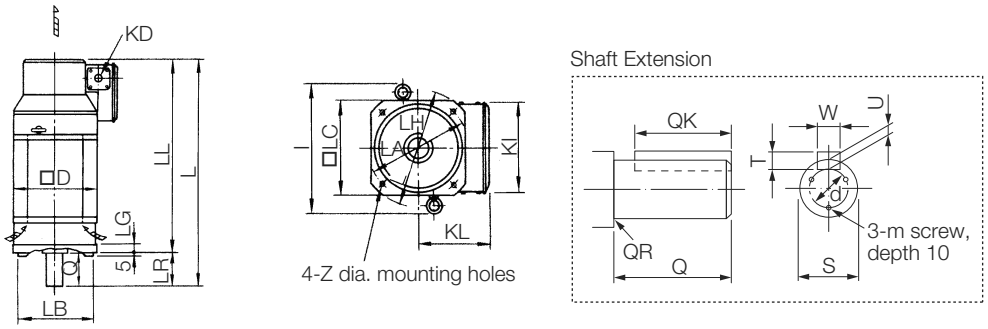
Model UAKAJ-	XB	Z	KI	Shaft End Dimensions									Approx. Mass kg
				Q	QK	QR	S	T	U	W	d	m	
04	45	12	174	60	45	1	$28^{0.009}_{-0.004}$	7	4	8	16	M6	30
06	45	12	174	60	45	1	$28^{0}_{-0.013}$	7	4	8	22	M4	49
08	70	12	207	80	70	2	$32^{0}_{-0.016}$	8	5	10	22	M5	56
11	70	12	207	110	90	0.5	$48^{0}_{-0.016}$	9	5.5	14	40	M5	64
15	108	15	250	110	90	1	$48^{0}_{-0.016}$	9	5.5	14	40	M5	110
19	108	15	250	110	90	1	$48^{0}_{-0.016}$	9	5.5	14	40	M5	110
22	108	15	250	110	90	1	$55^{0.030}_{0.011}$	10	6	16	45	M5	130
30	121	19	320	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	230
37	121	19	320	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	260
45	149	24	388	140	110	1	$70^{0.030}_{0.011}$	12	7.5	20	60	M6	320

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. The actual appearance of the spindle motor may vary.

Winding Selection Motors

◆ Flange type



Unit: mm

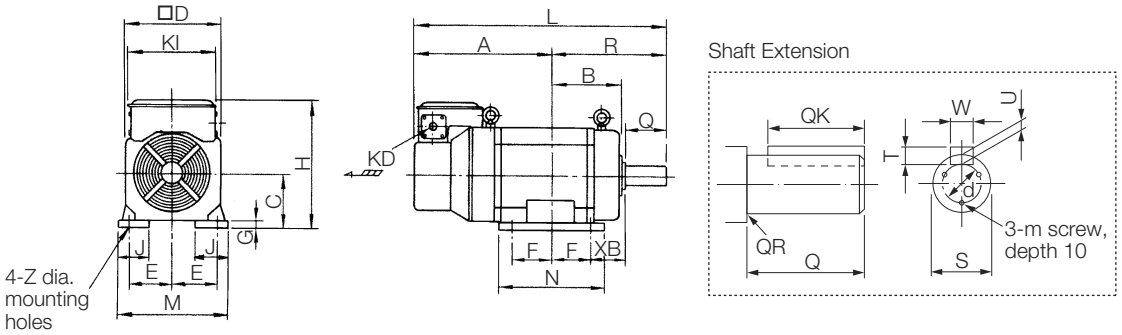
Model UAKBJ-	L	LA	LB	LC	LG	LH	LL	LR	Z	D	I	KD	KL	KI
06	568	265	$230^{0}_{-0.046}$	250	20	300	458	110	15	260	343	42.5	181	250
08	568	265	$230^{0}_{-0.046}$	250	20	300	458	110	15	260	343	42.5	181	250
11	632	265	$230^{0}_{-0.046}$	250	20	300	522	110	15	260	343	42.5	181	250
15	769	350	$300^{0}_{-0.052}$	320	20	385	629	140	19	320	440	61	227	320
19	769	350	$300^{0}_{-0.052}$	320	20	385	629	140	19	320	440	61	227	320
22	809	350	$300^{0}_{-0.052}$	320	20	385	669	140	19	320	440	61	227	320
30	797	400	$350^{0}_{-0.057}$	370	22	450	657	140	24	380	504	61	315	388

Model UAKBJ-	Shaft End Dimensions									Approx. Mass kg
	Q	QK	QR	S	T	U	W	d	m	
06	110	90	1	$48^{0}_{-0.016}$	9	5.5	14	40	M5	94
08	110	90	1	$48^{0}_{-0.016}$	9	5.5	14	40	M5	94
11	110	90	1	$55^{0.030}_{0.011}$	10	6	16	45	M5	120
15	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	220
19	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	220
22	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	250
30	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. The actual appearance of the spindle motor may vary.

◆ Foot-mounted type



Unit: mm

Model UAKBJ-	A	B	C	D	E	F	G	H	J	KD	L	M	N	R
06	261	196	$160^{0}_{-0.5}$	260	127	89	16	341	55	42.5	568	290	223	307
08	261	196	$160^{0}_{-0.5}$	260	127	89	16	341	55	42.5	568	290	223	307
11	307	212	$160^{0}_{-0.5}$	260	127	105	16	341	55	42.5	630	290	255	323
15	381	246	$180^{0}_{-0.5}$	320	139.5	127	16	407	55	61	769	320	298	388
19	381	246	$180^{0}_{-0.5}$	320	139.5	127	16	407	55	61	769	320	298	388
22	421	246	$180^{0}_{-0.5}$	320	139.5	127	16	407	55	61	809	320	298	388
30	376.5	273	$225^{0}_{-0.5}$	380	178	127	21	540	75	61	792.5	420	370	416

Model UAKBJ-	XB	Z	KI	Shaft End Dimensions									Approx. Mass kg
				Q	QK	QR	S	T	U	W	d	m	
06	108	15	250	110	90	1	$48^{0}_{-0.016}$	9	5.5	14	40	M5	110
08	108	15	250	110	90	1	$48^{0}_{-0.016}$	9	5.5	14	40	M5	110
11	108	15	250	110	90	1	$55^{0.030}_{0.011}$	10	6	16	45	M5	130
15	121	19	320	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	230
19	121	19	320	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	230
22	121	19	320	140	110	2	$60^{0.030}_{0.011}$	11	7	18	50	M6	260
30	149	24	388	140	110	1	$70^{0.030}_{0.011}$	12	7.5	20	60	M6	320

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. The actual appearance of the spindle motor may vary.

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)				

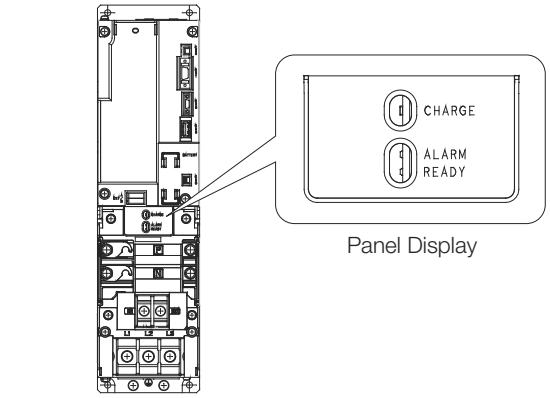
*1. Available only for three-phase 200 VAC models.

*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.

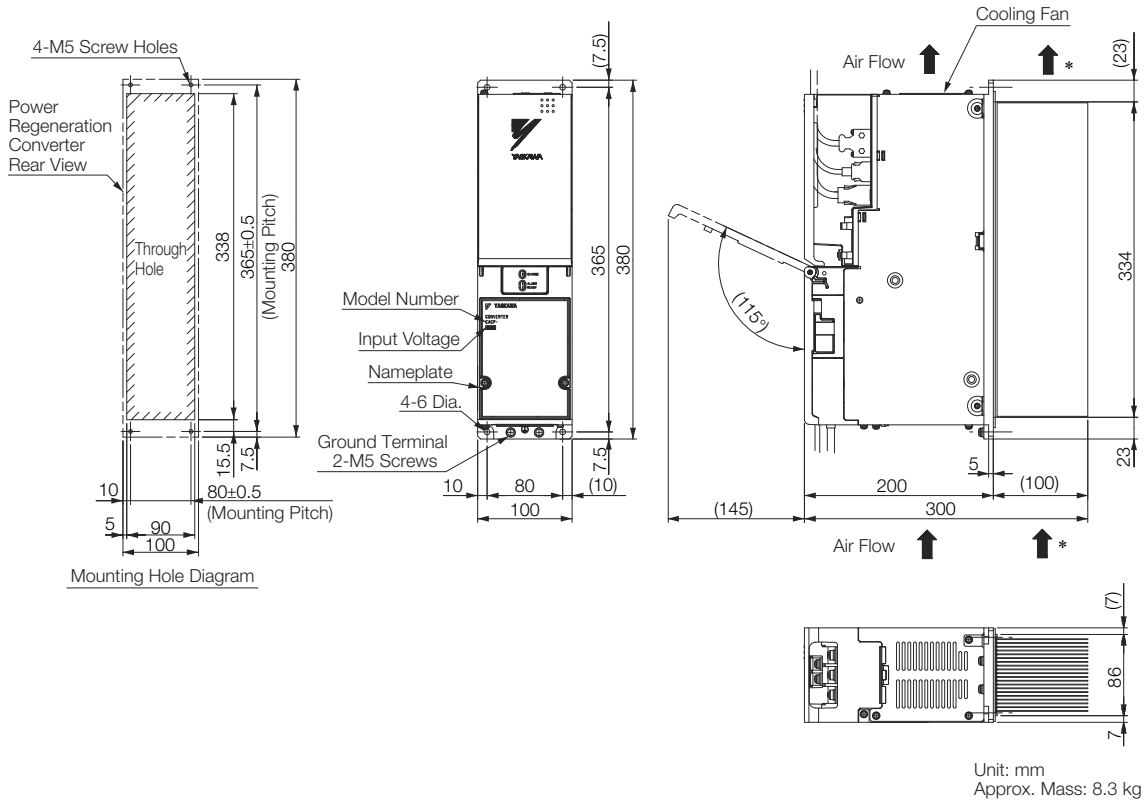


Power Regeneration Converter

External Dimensions

Duct-ventilated Type

◆ Model: CACP-JU15☐3☐, -JU19☐3☐, -JU22☐3☐

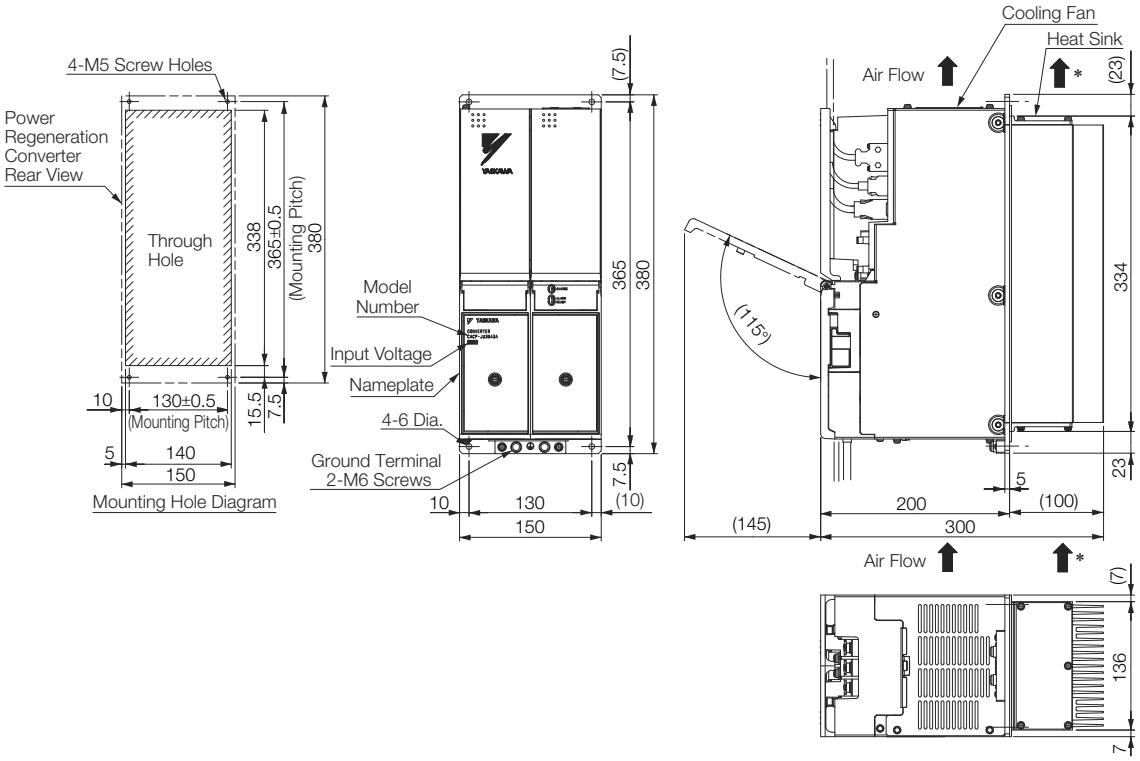


Unit: mm
Approx. Mass: 8.3 kg

* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

Note: Ten digit of ☐: A = Three-phase 200 VAC, D = Three-phase 400 VAC

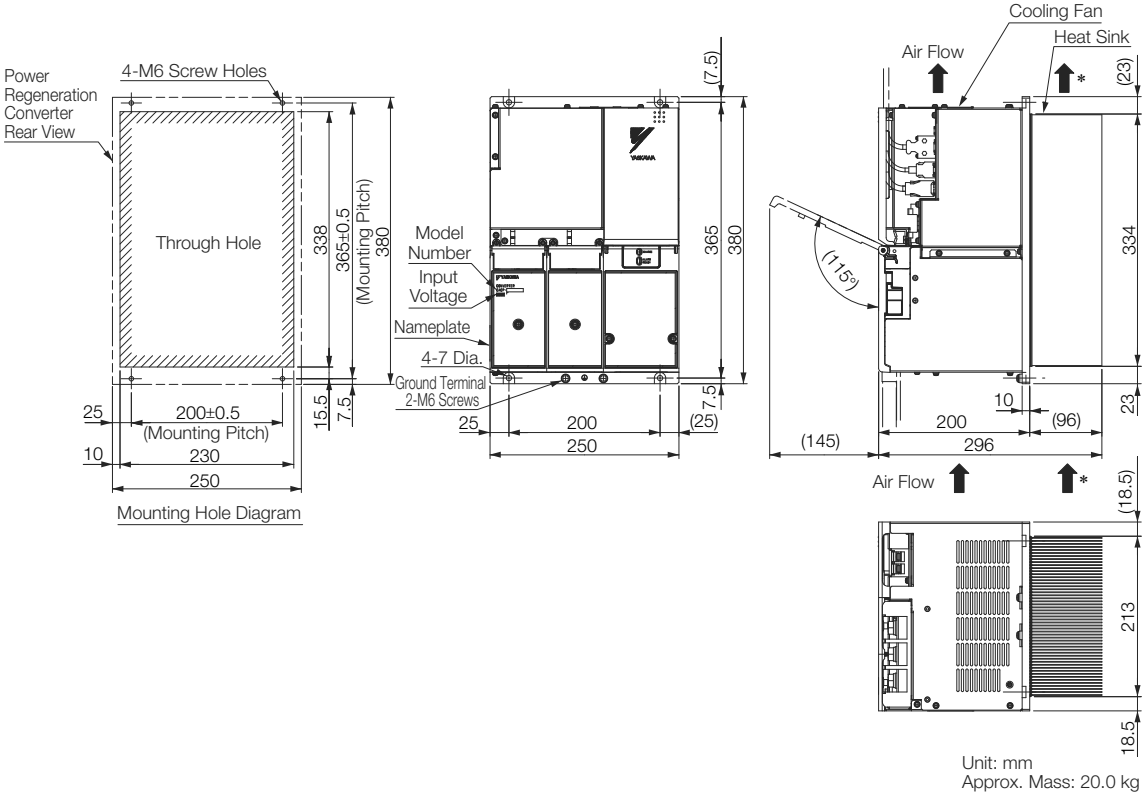
◆ Model: CACP-JU30A3☐



Unit: mm
Approx. Mass: 11.5 kg

* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.
Note: Available only for three-phase 200 VAC models.

◆ Model: CACP-JU45A3B

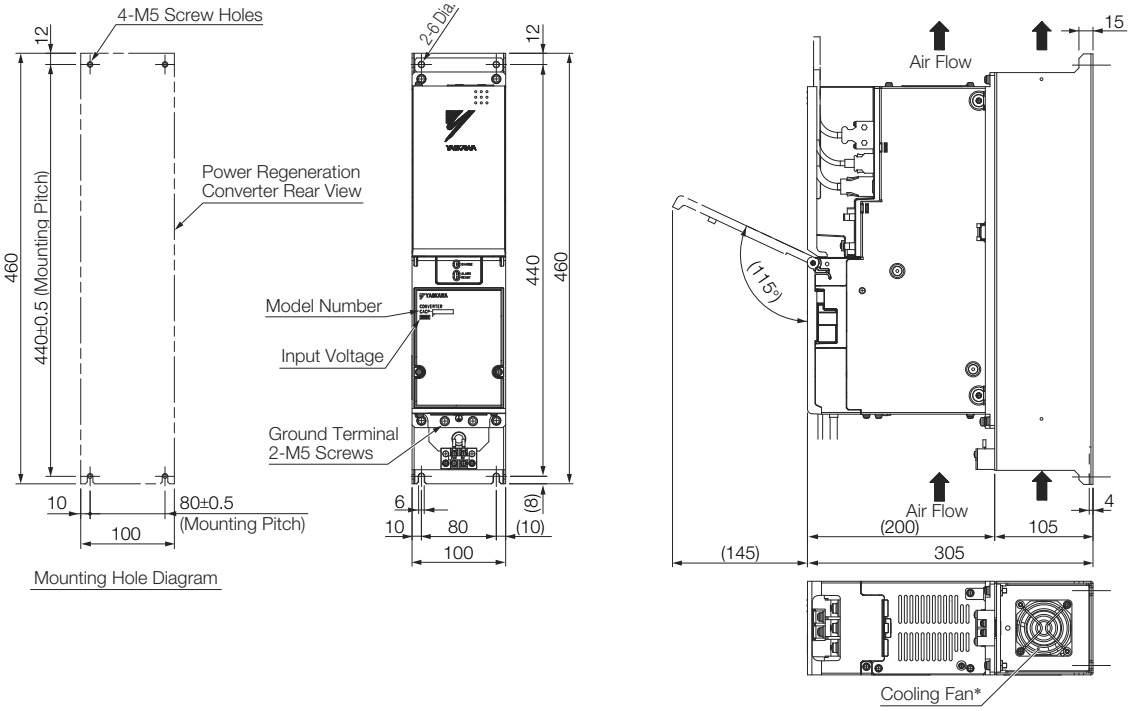


Unit: mm
Approx. Mass: 20.0 kg

* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.
Note: Available only for three-phase 200 VAC models.

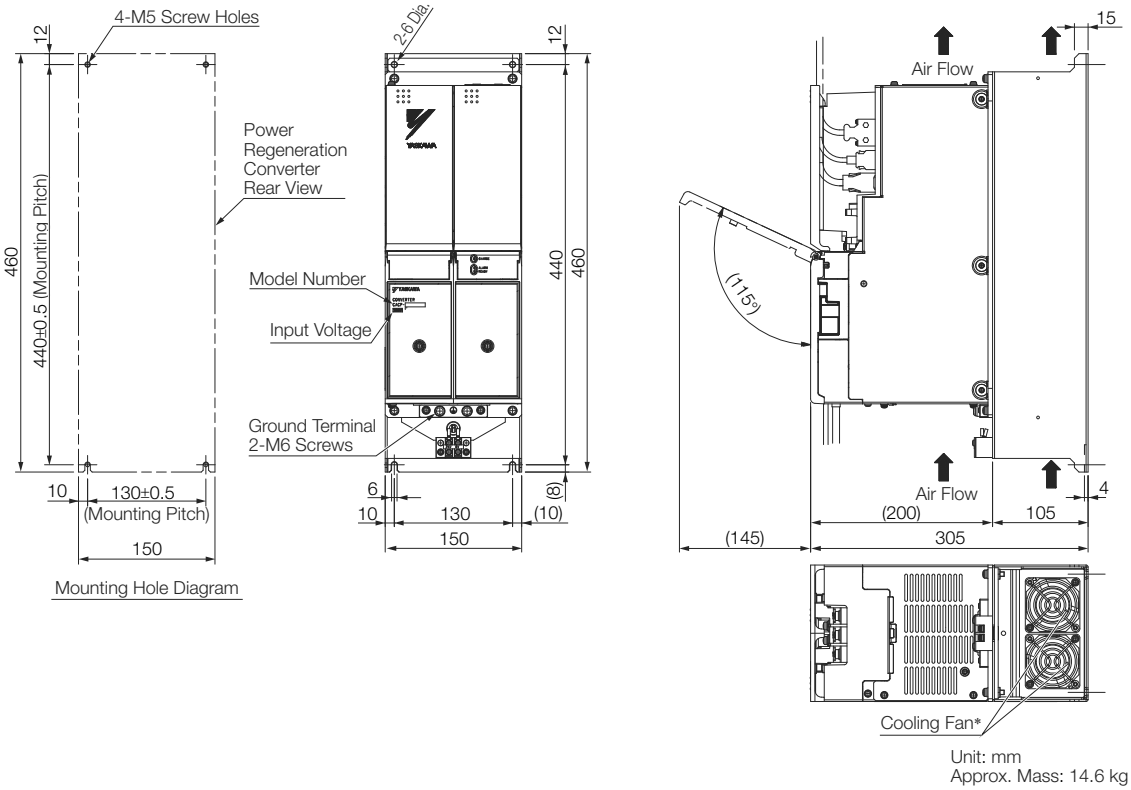
Base-mounted Type

◆ Model: CACP-JU15A3BB, -JU19A3BB, -JU22A3BB



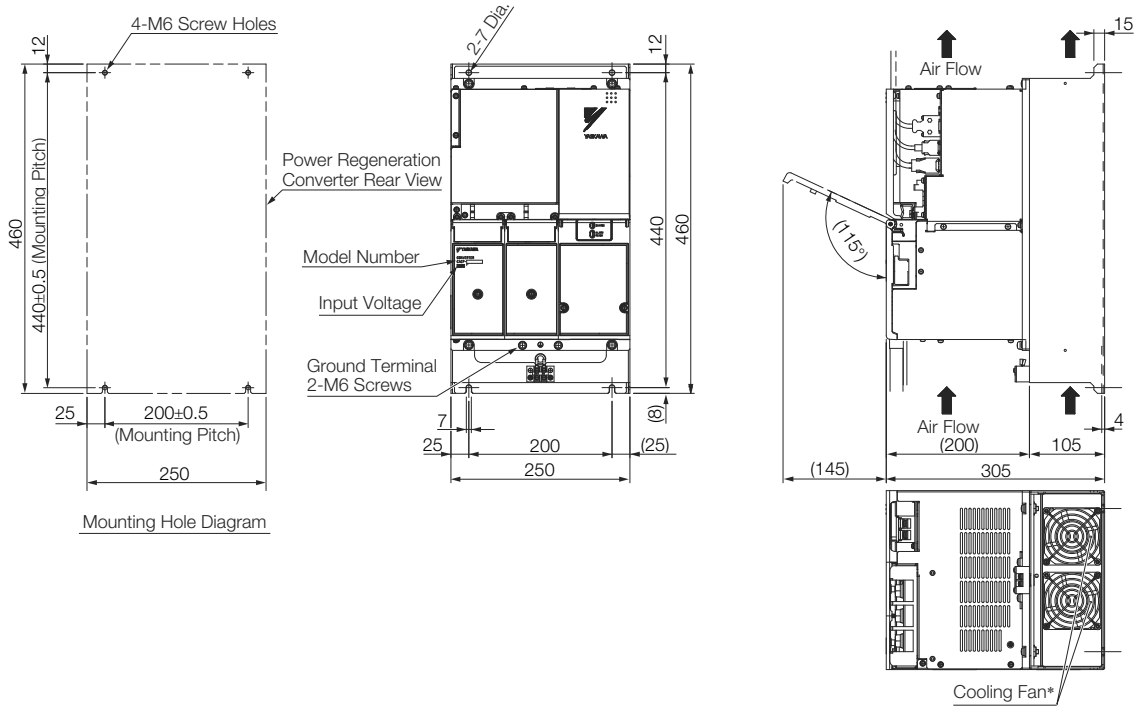
* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.
Note: Available only for three-phase 200 VAC models.

◆ Model: CACP-JU30A3BB



* 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-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.

MEMO

Basic Specifications

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
		Input Signals	Number of Channels	14 for each axis (isolated)
		Output Signals	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.

Continued from previous page.

Item				Specifications
Basic Specifications (cont'd)	HWBB Signal	External Input Power	Input Power Voltage	24 VDC ±5%
			Current Required per Channel	4 mA
		Input Signals	Number of Channels	2 for each axis (isolated)
		Output Signal	Number of Channels	1 for each axis (isolated)
			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		Allowable Input Voltage	±12 V
			Input Impedance	60 kΩ
			Internal Power Supply	+15 VDC ±5%
	12-bit Digital Reference Input		Input Power Voltage	24 VDC ±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
Functions	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			• Standard: Orientation control with a motor encoder • Orientation control with an external encoder: Orientation with an external encoder • Orientation control with a magnetic sensor: 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.

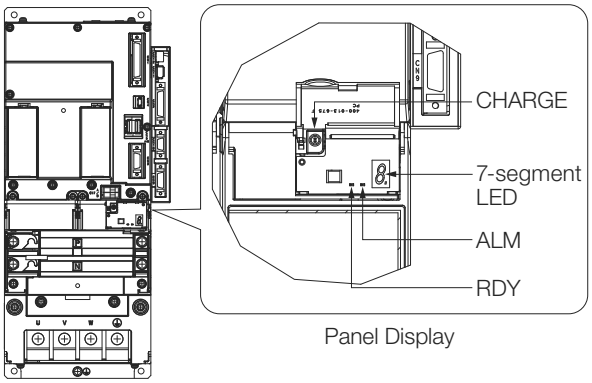
*2. Not available for serial encoder.

*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.

Panel Display

The SERVOPACK status 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.
RDY	Green	Lit when CPU of SERVOPACK works normally. Blink when the digital operator is connected. Not lit when CPU of SERVOPACK not working.
ALM	Red	Lit when alarm occurs. Not lit when no alarm occurs.
7-segment LED	Red	Shows the status of the SERVOPACK such as alarms.



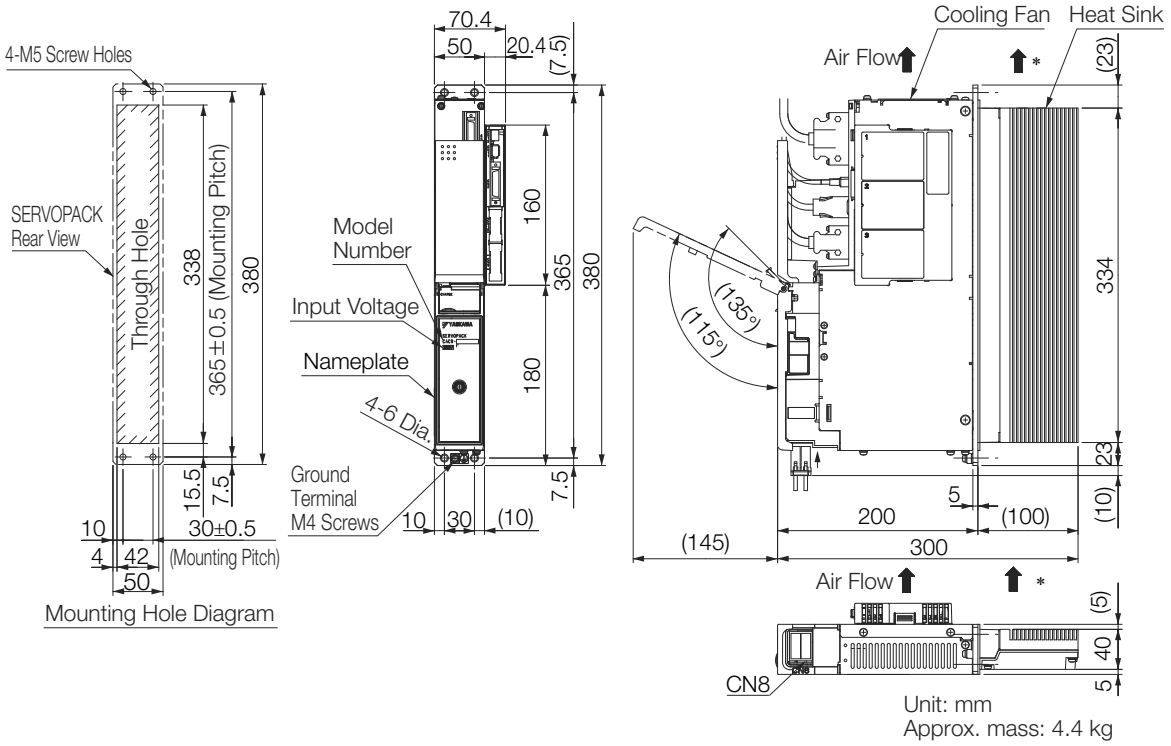
Panel Display

SERVOPACK

External Dimensions

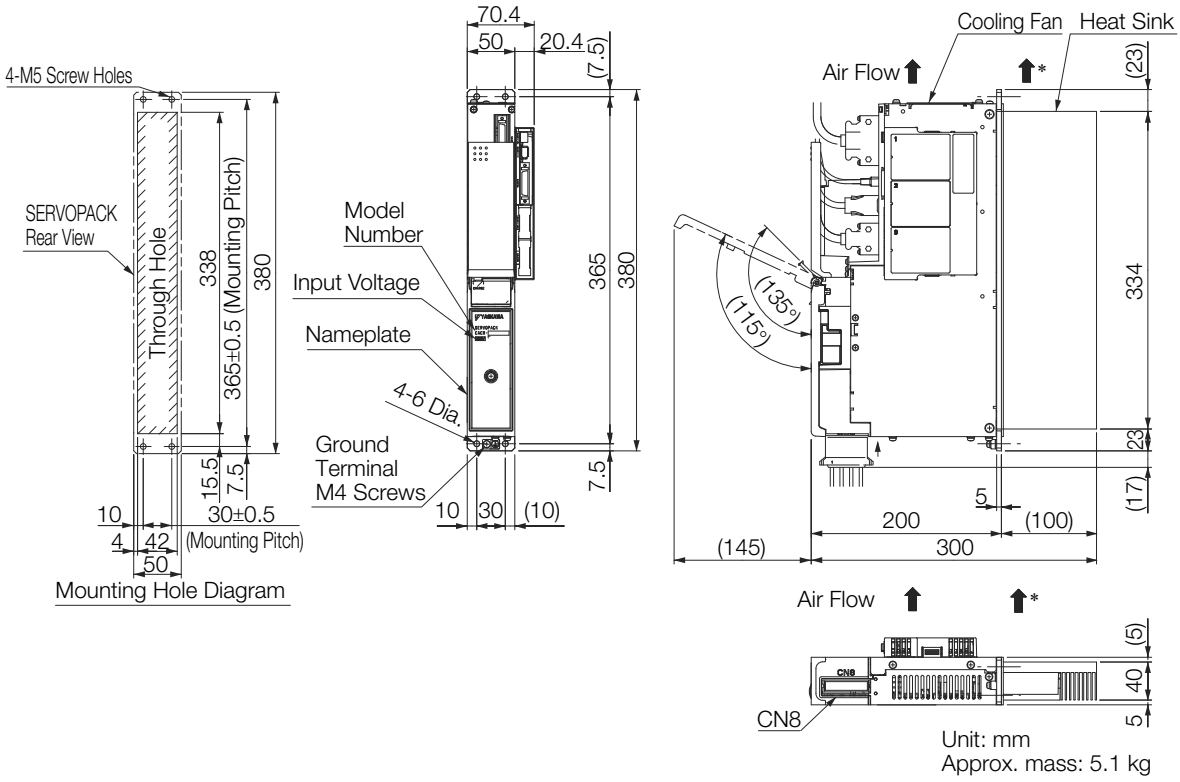
Duct-ventilated Type

◆ Model: CACR-JU028AEA, -JU014DEA



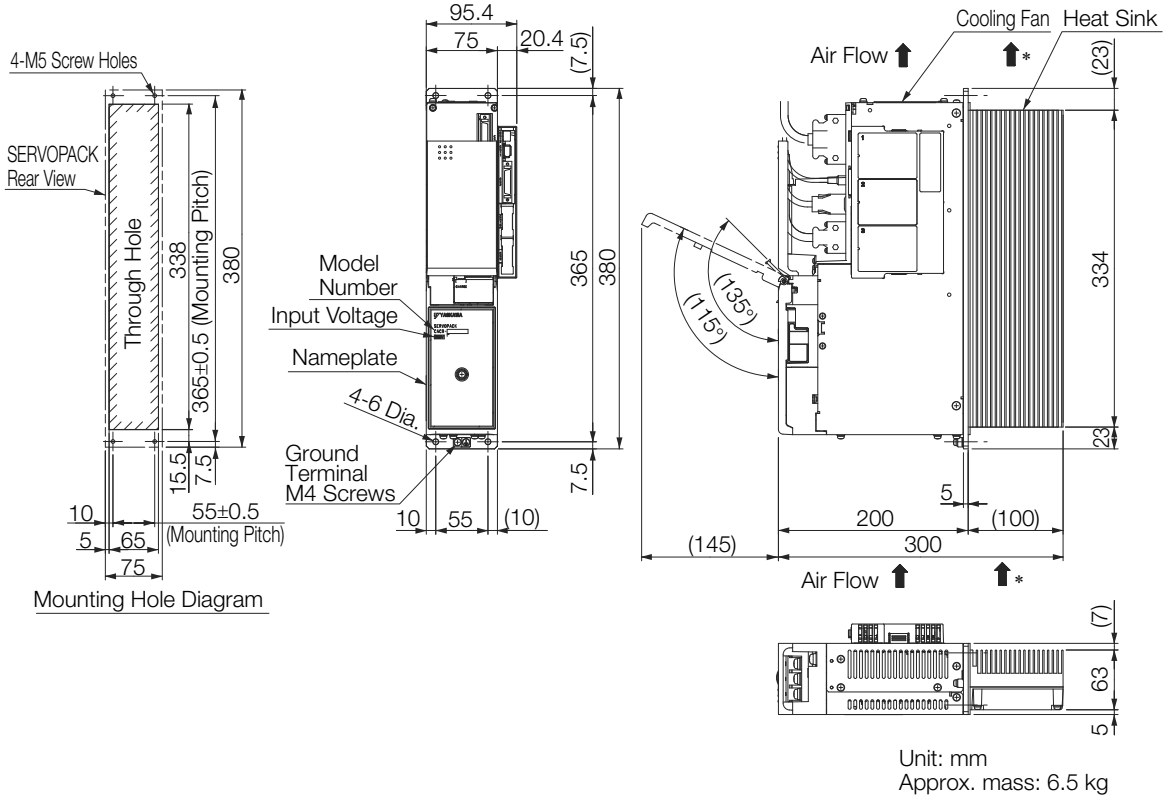
* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

◆ Model: CACR-JU036AEA, -JU018DEA



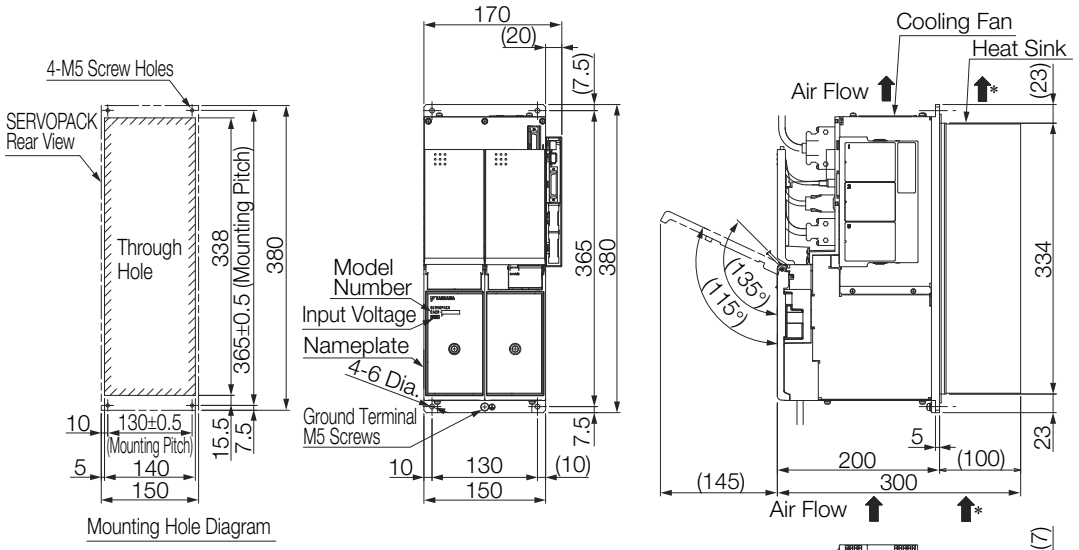
* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

◆ Model: CACR-JU065AEA, -JU033DEA



* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

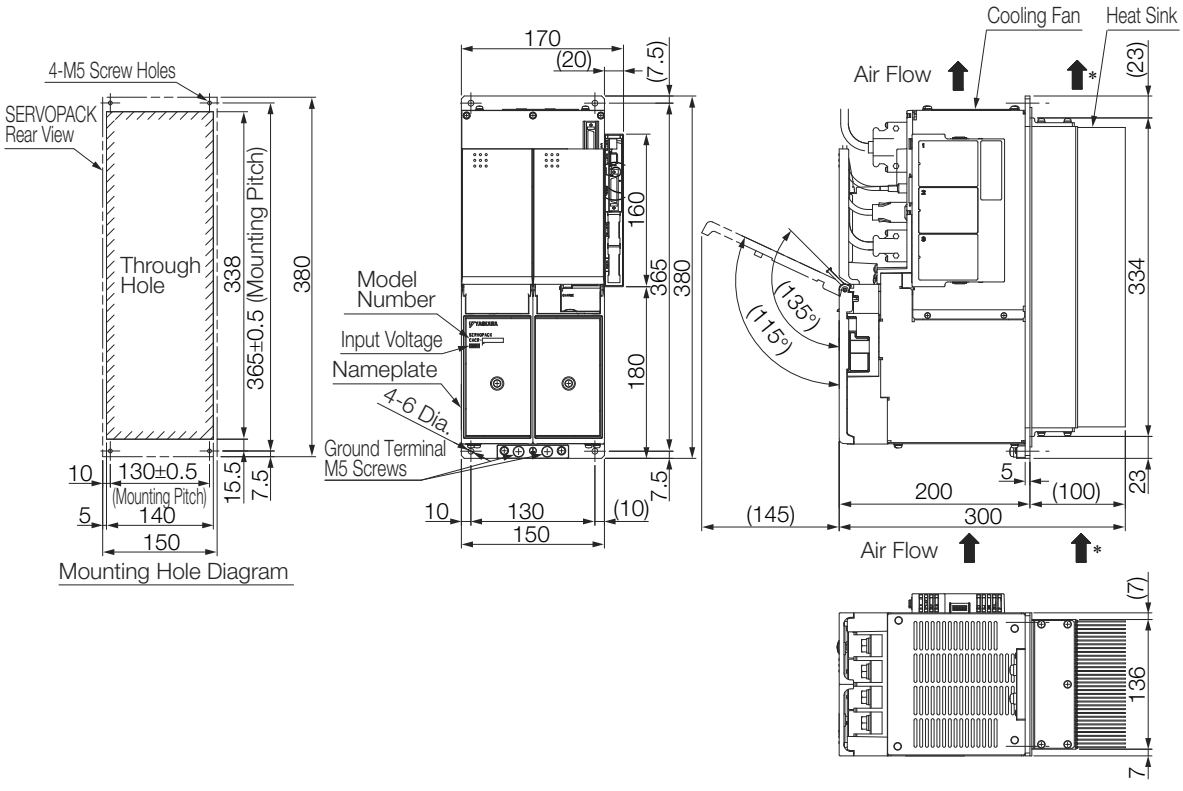
◆ Model: CACR-JU084AEA, -JU102AEA, -JU042DEA, -JU051DEA



Unit: mm
Approx. mass: 11.9 kg

* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

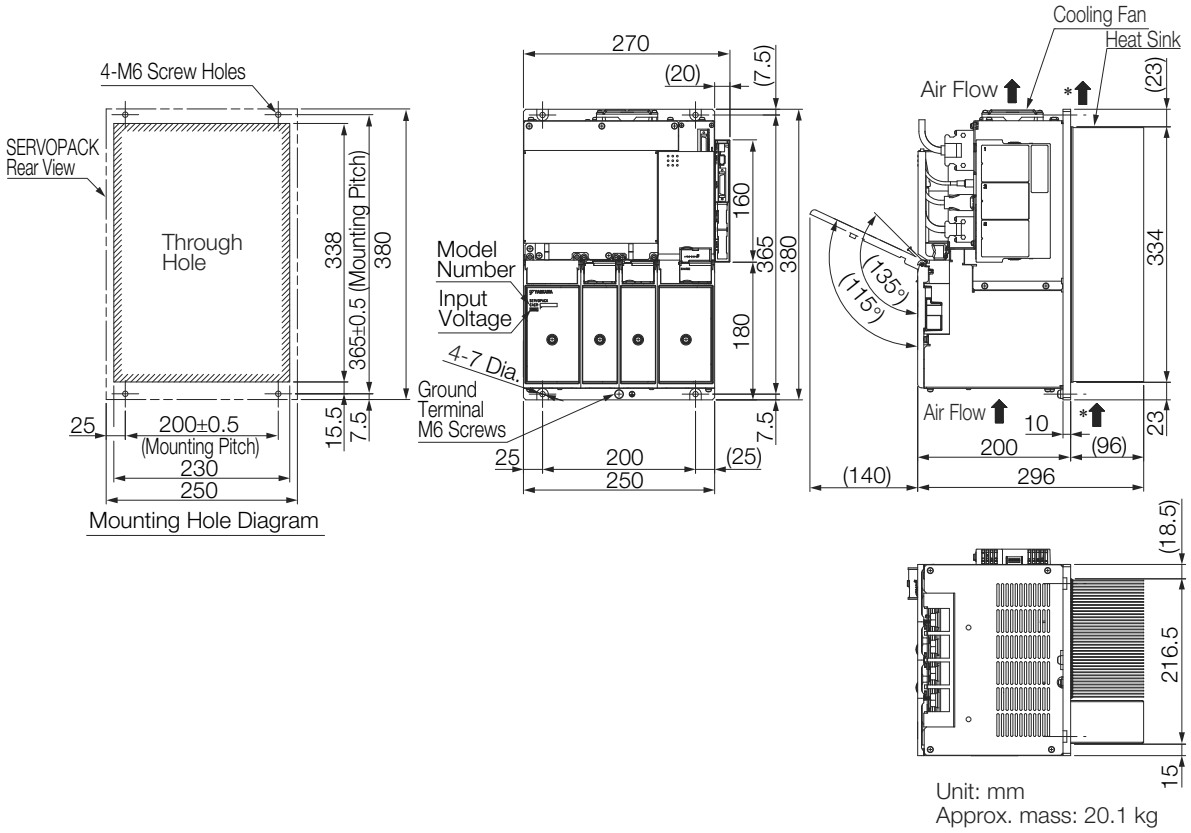
◆ Model: CACR-JU125AEA



Unit: mm
Approx. mass: 12.1 kg

* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

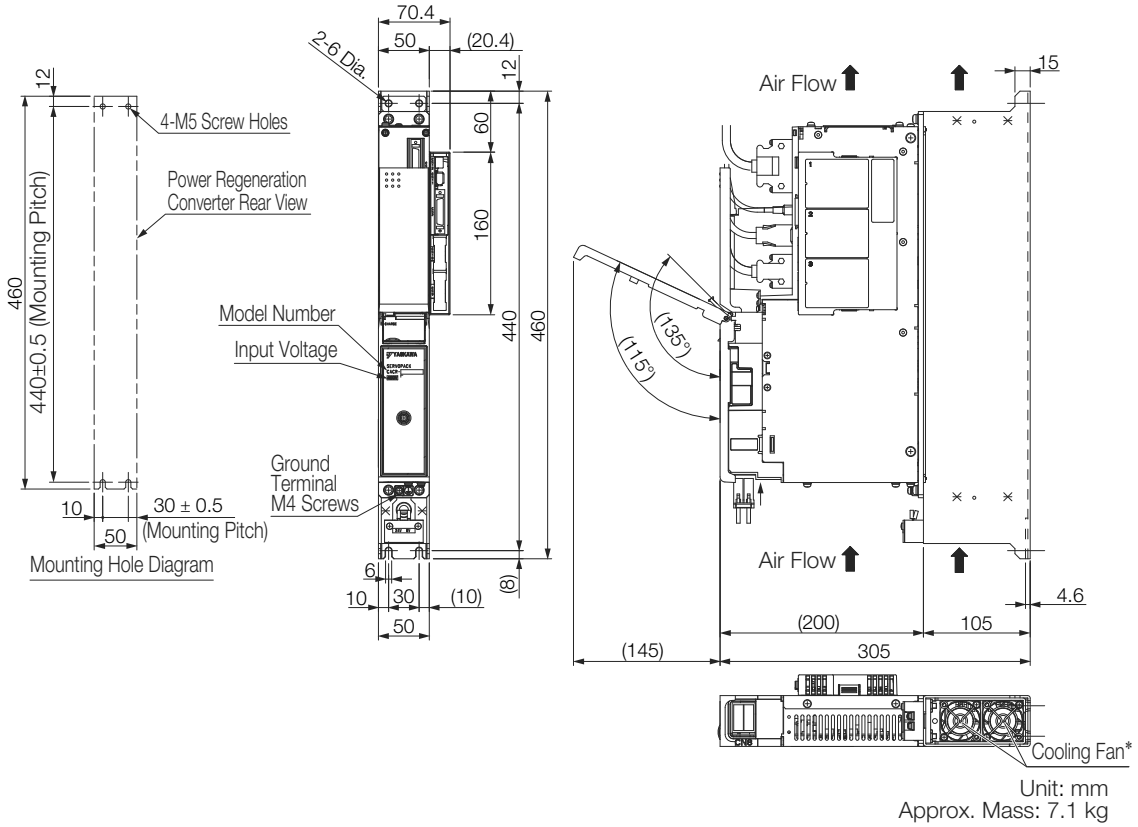
◆ Model: CACR-JU196AEA



* The cooling air speed of heat sink must be at least 2.5 m/s at the point closest to the heat sink.

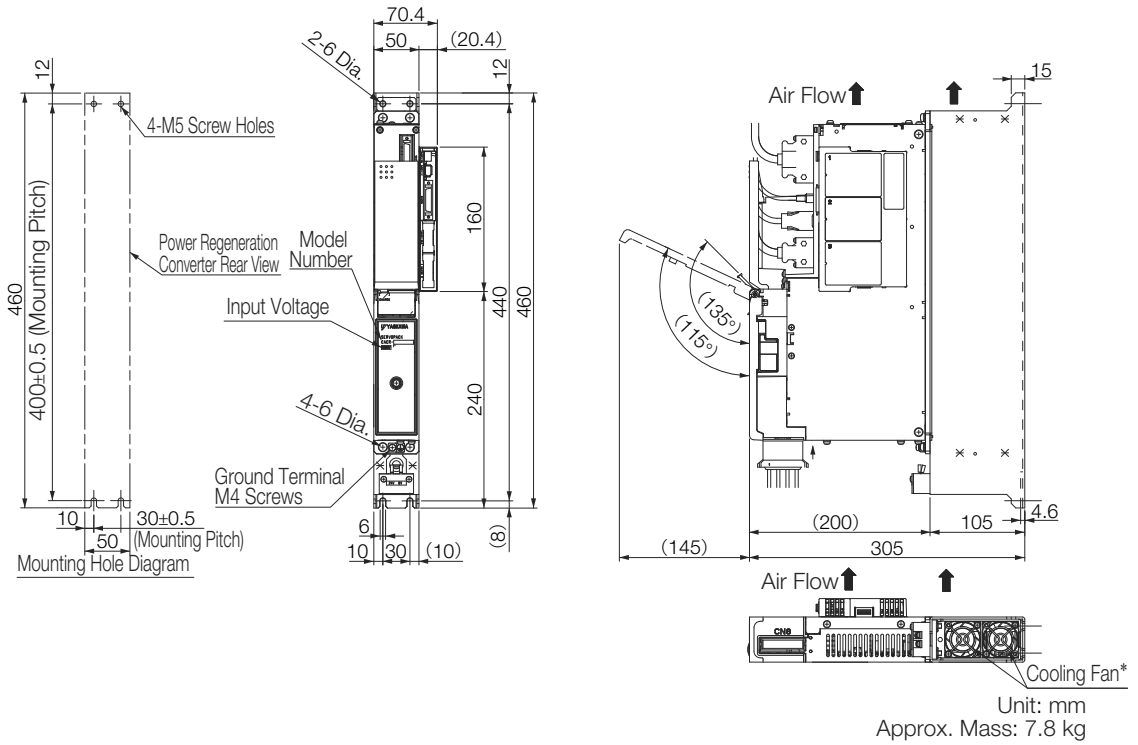
Base-mounted Type

◆ Model: CACR-JU028AEAB



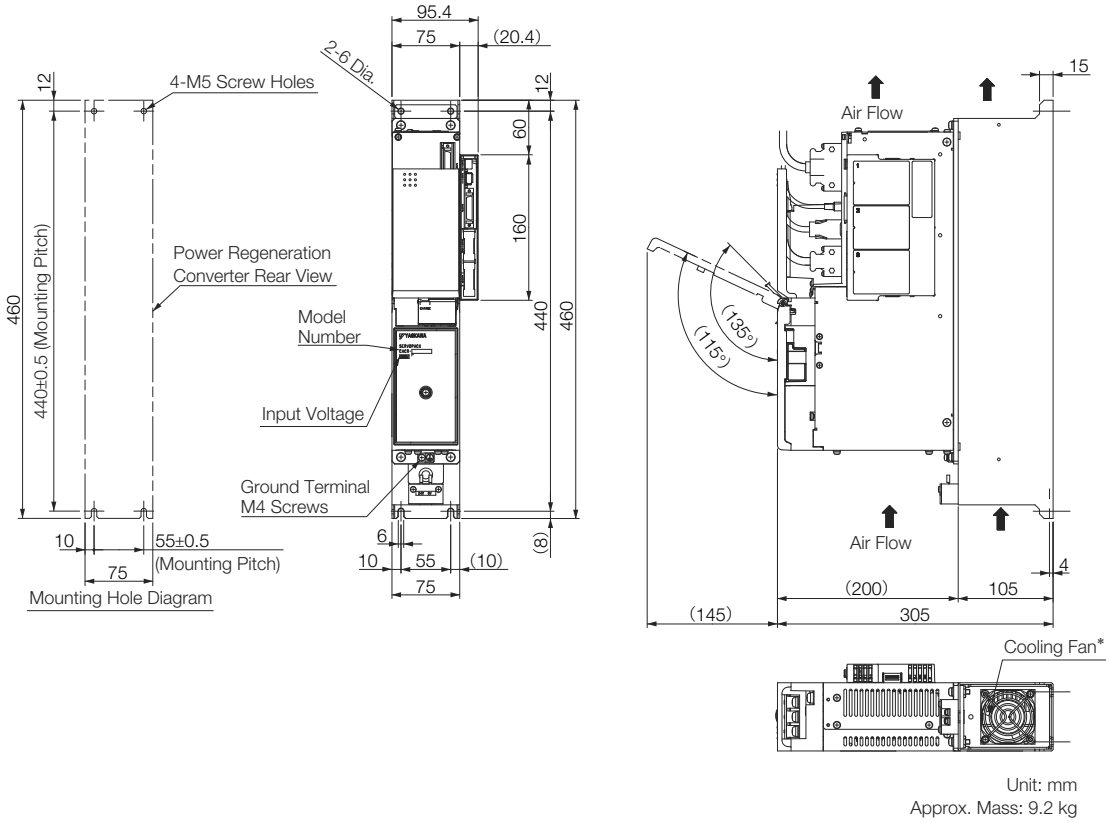
* The power supply for a cooling fan (24 VDC) is not provided by Yaskawa.

◆ Model: CACR-JU036AEAB



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

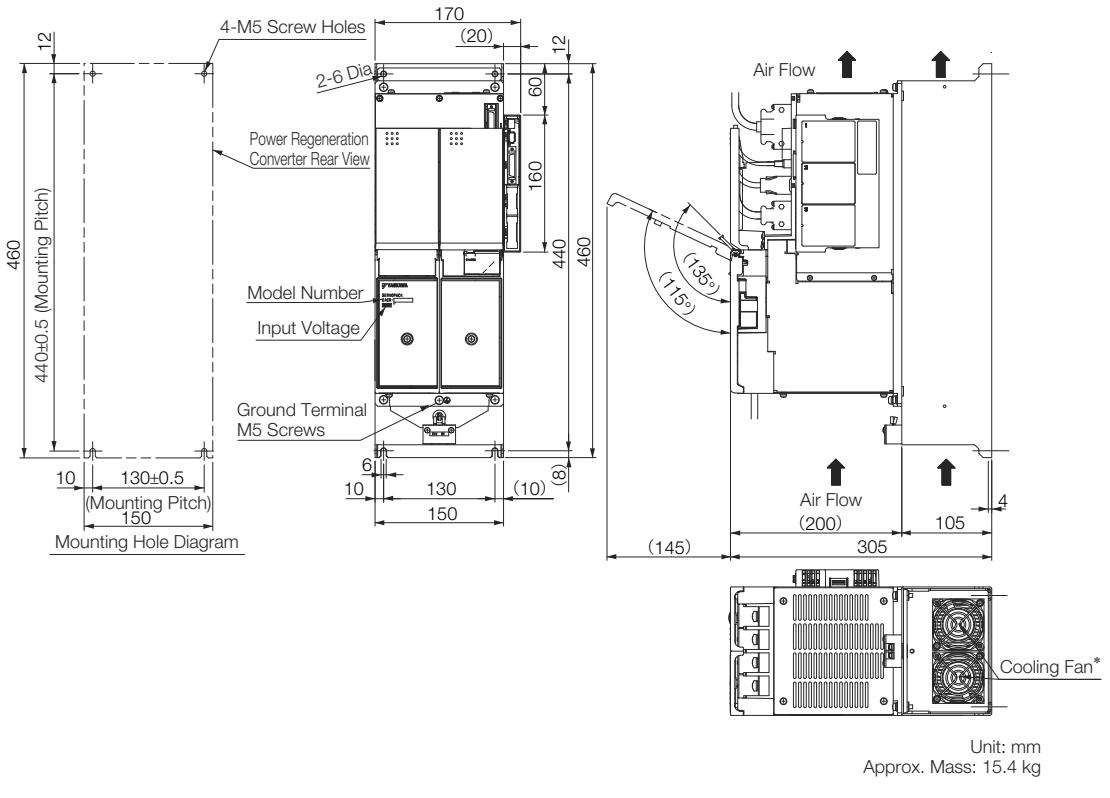
◆ Model: CACR-JU065AEAB



Unit: mm
Approx. Mass: 9.2 kg

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

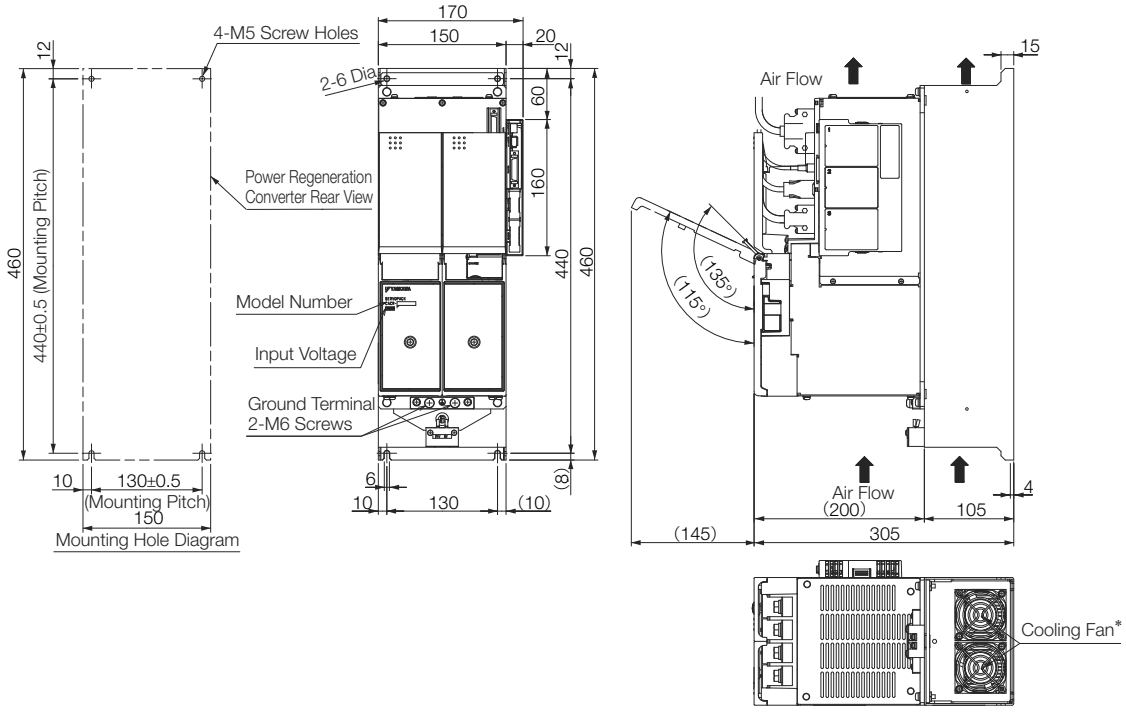
◆ Model: CACR-JU084AEAB, -JU102AEAB



Unit: mm
Approx. Mass: 15.4 kg

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

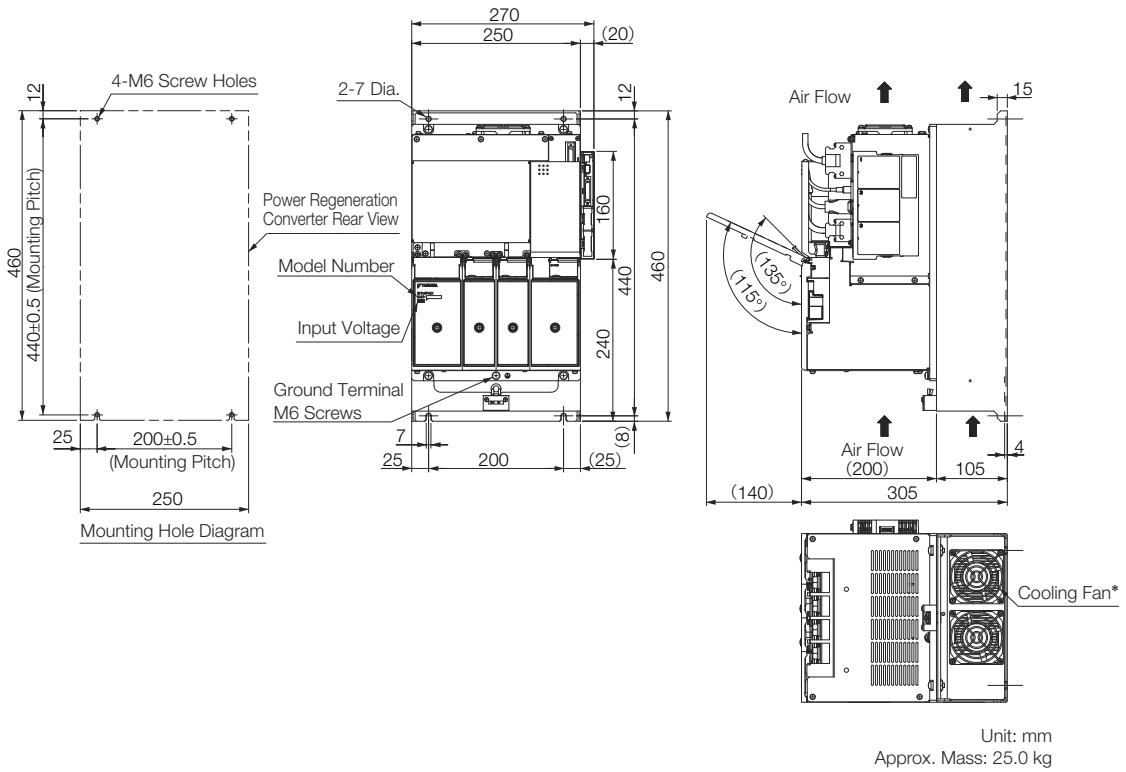
◆ Model: CACR-JU125AEAB



Unit: mm
Approx. Mass: 15.6 kg

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

◆ Model: CACR-JU196AEAB



Unit: mm
Approx. Mass: 25.0 kg

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

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	• 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)

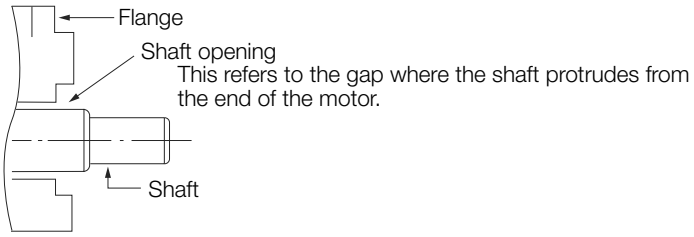
⚠ CAUTION

- **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.

◆ Foot-mounted type

Mount the legs on the floor. If the legs are installed upward, excessive force will be imposed on the legs.
As a result, the service life of the spindle motor will be adversely affected.

Coupling Motor and Machinery

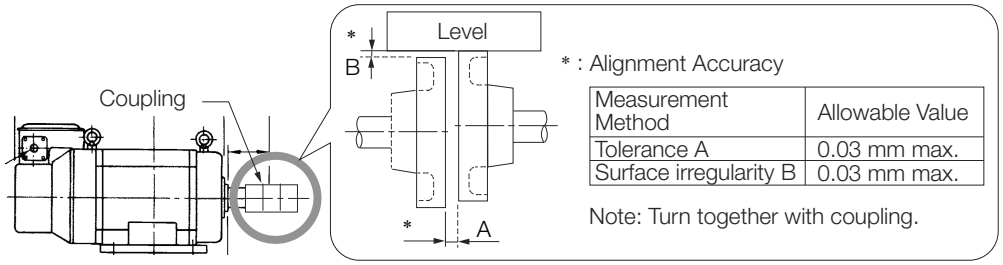
Consider the following conditions when coupling the spindle motor with the machinery.

◆ 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.

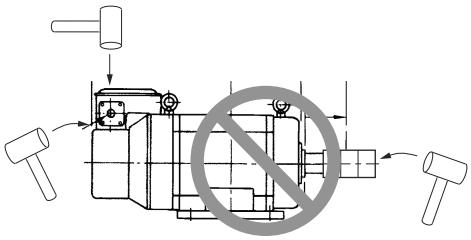


* : Alignment Accuracy

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

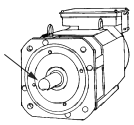
Note: Turn together with coupling.

- 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.



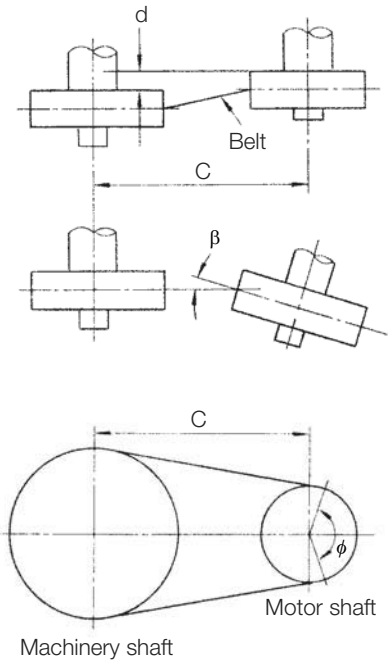
- Before installation, thoroughly remove the anticorrosive paint from the flange surface and the end of the motor shaft. Only after removing the paint can motors be installed on the machines.

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.



- If C is 1,000 mm or less, d < 1 mm.
- If C is more than 1,000 mm, d/C < 1/1000.
- β < 1/3°
- Contact angle ϕ > 140°

Belt Installation

◆ 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-V-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-V-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-JU028AEA	154.1	19.0	135.1	27.0	108.1
CACR-JU036AEA	181.0	19.0	162.0	32.4	129.6
CACR-JU065AEA	324.2	18.9	305.3	30.5	274.8
CACR-JU084AEA	424.6	21.6	403.0	40.3	362.7
CACR-JU102AEA	478.8	21.6	457.2	45.7	411.5
CACR-JU125AEA	614.5	28.6	585.9	58.6	527.3
CACR-JU196AEA	1322.4	29.8	1292.6	129.3	1163.3
CACR-JU014DEA	142.1	19.6	122.5	24.5	98.0
CACR-JU018DEA	168.6	19.6	149.0	29.8	119.2
CACR-JU033DEA	308.4	19.0	289.4	28.9	260.5
CACR-JU042DEA	368.5	21.6	346.9	34.7	312.2
CACR-JU051DEA	424.9	21.6	403.3	40.3	363.0

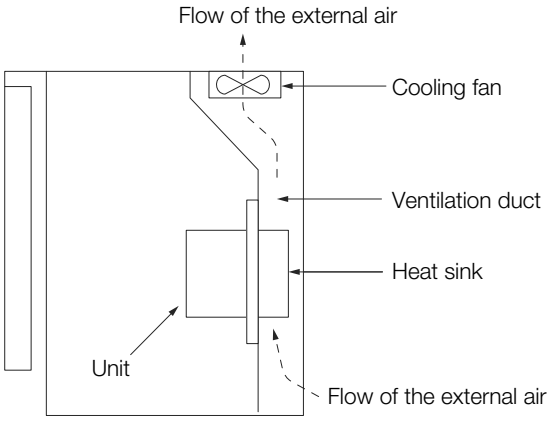
Installation Precautions

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 42).

◆ Duct-ventilated type

- Place the heat sink of the Σ-V-SD driver outside of the ventilation ducts to allow external air flow through the heat sink. The loss from the control panel will be reduced, and the majority of the loss from the unit will be cooled directly by the external air.
- Cooling the heat sink requires an air flow of 2.5 m/s in the ventilation duct.
- Make sure that cooling air flows through the heat sink for each Σ-V-SD driver.
- We recommend a metal cooling fan. Plastic fans will deteriorate when exposed to cutting oil, which may cause Σ-V-SD driver failure or other problems.



Σ-V-SD Driver Installation

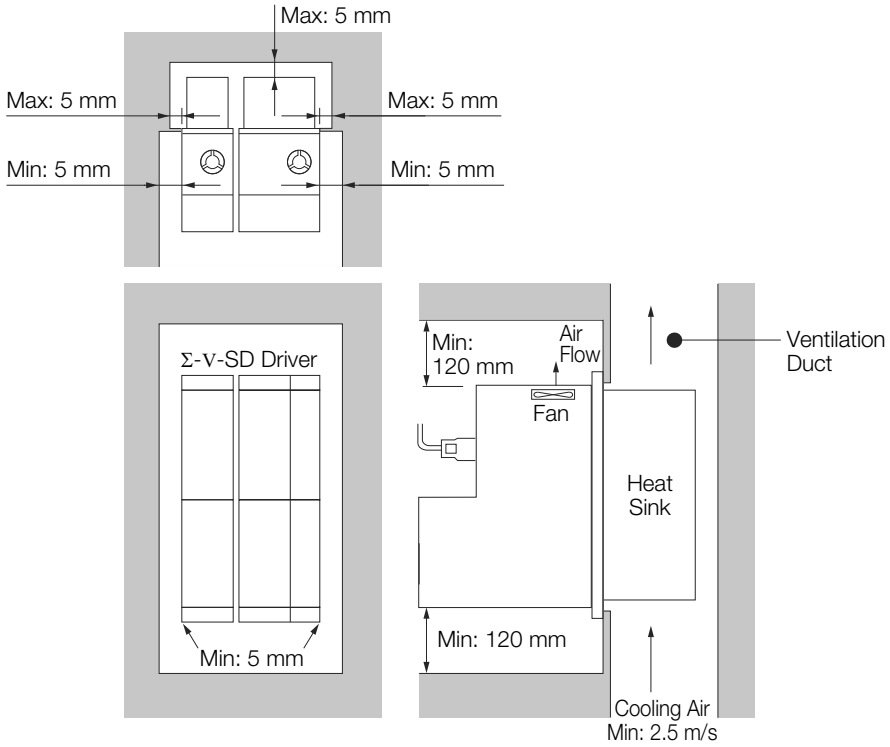
◆ Base-mounted Type

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 40-41.

Installation Orientation and Space

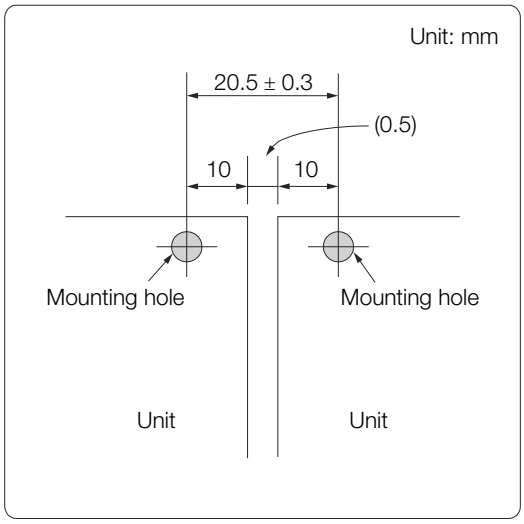
Precautions for the mounting the Σ-V-SD driver, including the mounting orientation and mounting space, are given below.

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).

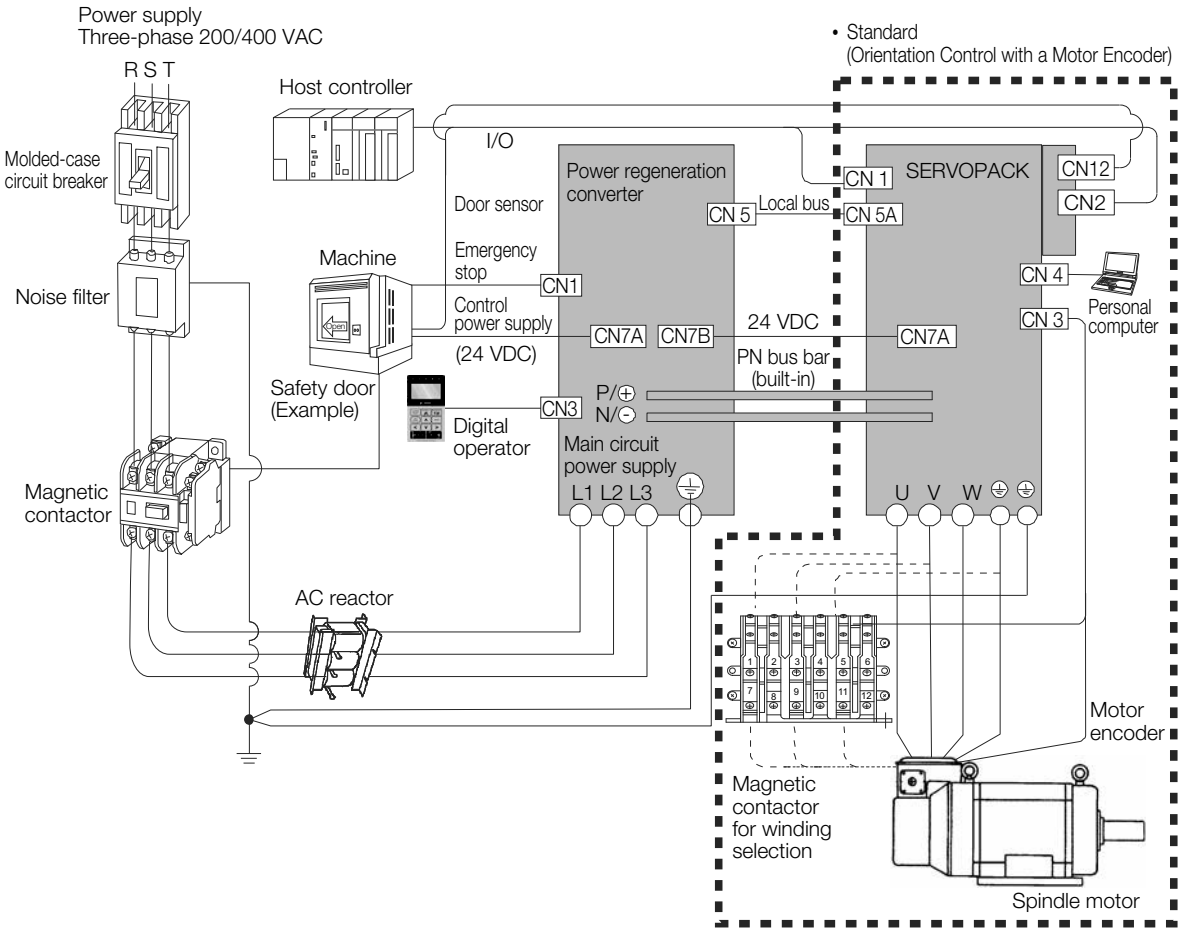


Installation Orientation and Space for Σ-V-SD Driver

- 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.

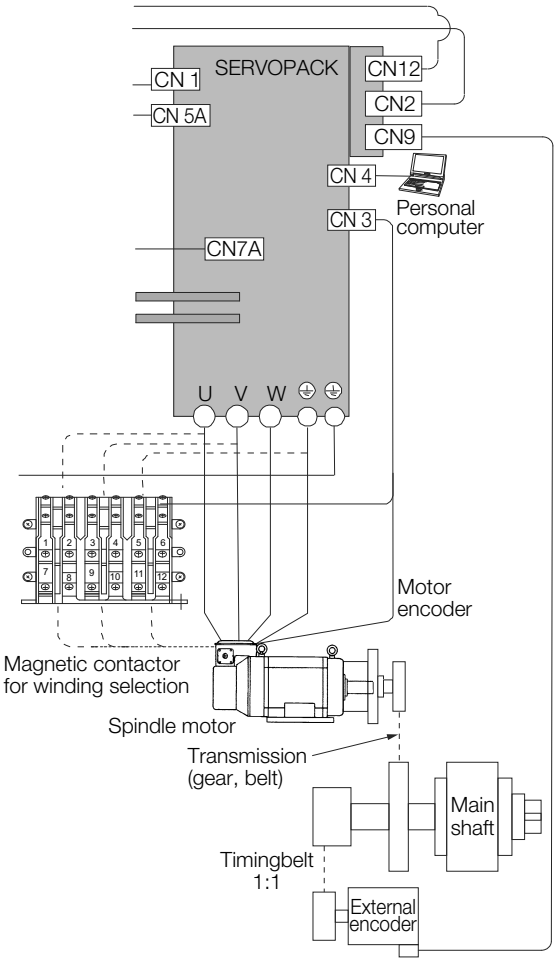

Unit: mm
20.5 ± 0.3
(0.5)
10
10
Mounting hole
Mounting hole
Unit
Unit

System Configurations

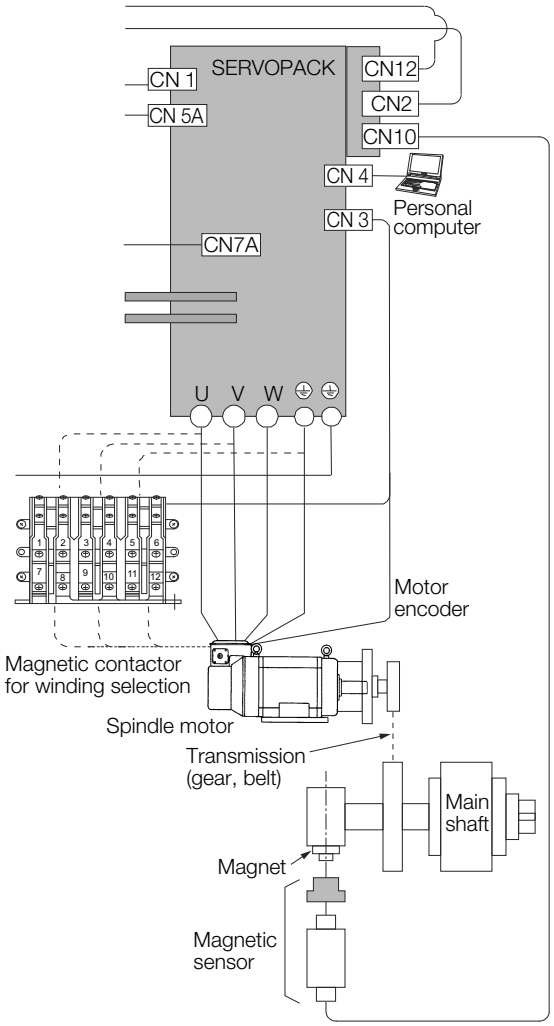


☞ For the other orientation control, see the connection examples on the next page.

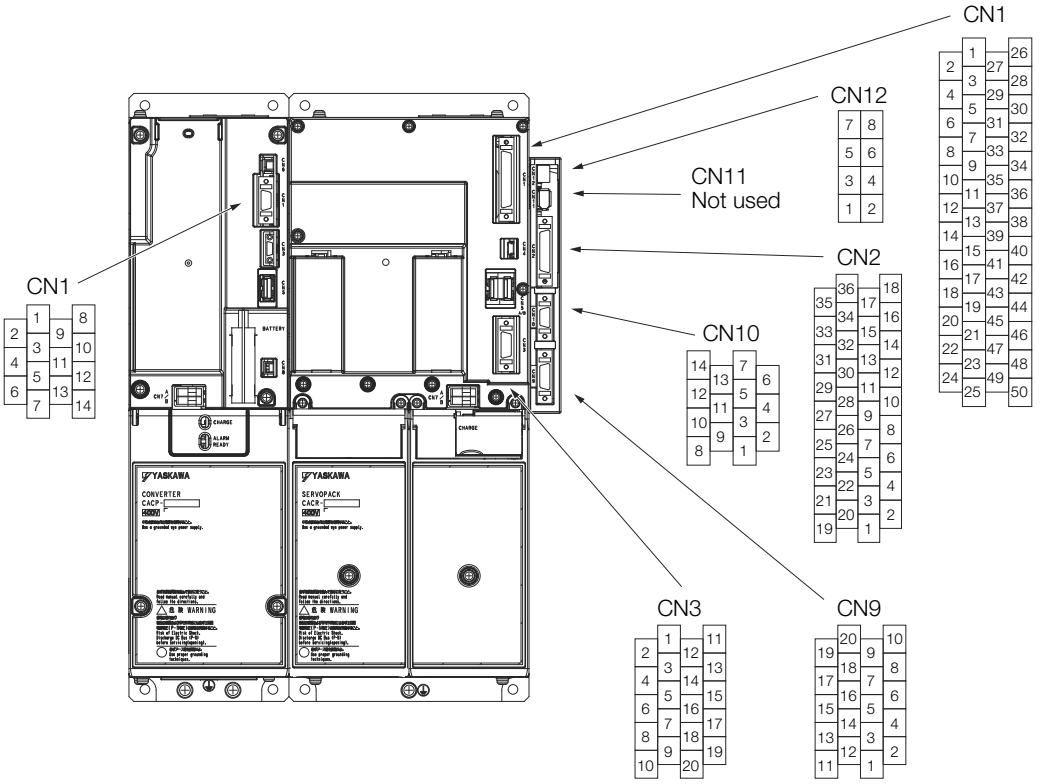
• Orientation Control with an External Encoder



• Orientation Control with a Magnetic Sensor



I/O Signal



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
4	0V	–	Analog speed reference 0 V	29	FC3	O	Error code signal 3

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Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
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
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	EXTCOM 2	–	Latch input common	19	D1	I	12-bit digital reference 1
2	/EXT1	I	Latch input 1	20	D2	I	12-bit digital reference 2
3	/EXT2	I	Latch input 2	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 I/O Signals of 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	

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Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
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.

Orientation Control with an External Encoder

The following connectors have been added for orientation control with an external encoder.

◆ Connector Pin Arrangement (CN9) for I/O Signals of 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	(NC)	–	–
2	PG0V	–	Power supply for encoder 0 V	12	(NC)	–	–
3	PG0V	–	Power supply for encoder 0 V	13	(NC)	–	–
4	PG5V	O	Power supply for encoder +5 V	14	SPC	I	External encoder phase C input
5	PG5V	O	Power supply for encoder +5 V	15	/SPC	I	
6	PG5V	O	Power supply for encoder +5 V	16	SPA	I	External encoder phase A input
7	(NC)	–	–	17	/SPA	I	
8	(NC)	–	–	18	SPB	I	External encoder phase B input
9	(NC)	–	–	19	/SPB	I	
10	(NC)	–	–	20	(NC)	–	–

◆ Connector Pin Arrangement (CN10) for I/O Signals of the SERVOPACK

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	(NC)	–	–	8	(NC)	–	–
2	SPCO	O	External encoder phase C signal output	9	(NC)	–	–
3	/SPCO	O	External encoder phase C signal output	10	(NC)	–	–
4	SPAO	O	External encoder phase A signal output	11	(NC)	–	–
5	/SPAO	O	External encoder phase A signal output	12	(NC)	–	–
6	SPBO	O	External encoder phase B signal output	13	(NC)	–	–
7	/SPBO	O	External encoder phase B signal output	14	(NC)	–	–

Orientation Control with a Magnetic Sensor

The following connectors have been added for orientation control with a magnetic sensor.

◆ Connector Pin Arrangement (CN10) for I/O Signals of the SERVOPACK

Pin No.	Signal Name	I/O	Function	Pin No.	Signal Name	I/O	Function
1	(NC)	–	–	8	(NC)	–	–
2	(NC)	–	–	9	(NC)	–	–
3	0V	–	Power supply for magnetic sensor 0 V	10	+12V	–	Power supply for magnetic sensor +12 V
4	(NC)	–	–	11	(NC)	–	–
5	0V	–	Power supply for magnetic sensor 0 V	12	+15V	–	Power supply for magnetic sensor +15 V
6	(NC)	–	–	13	SIG+	I	Magnetic sensor signal +
7	(NC)	–	–	14	SIG-	I	Magnetic sensor signal -

Spindle Motor

Main Circuit Cable

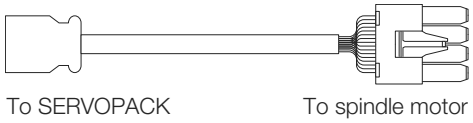
The main circuit cable for the spindle motor must be assembled by the customer. The following SERVOPACKs are connected to spindle motors with cable-end connectors. Other SERVOPACKs use screw terminals.

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.

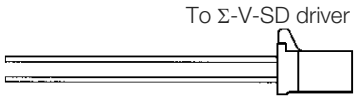
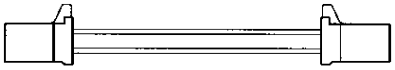
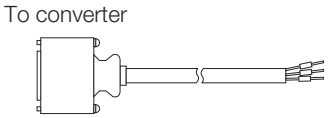
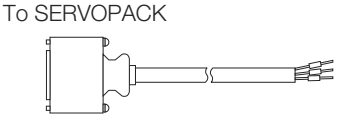
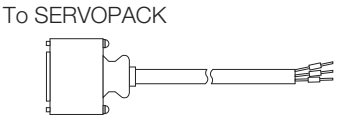
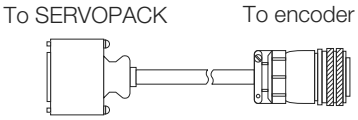
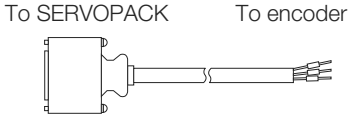
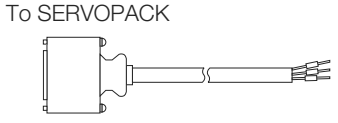
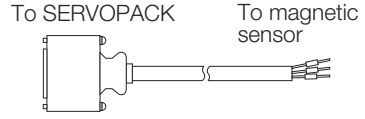
Pulse Encoder Cable

Name	Length	Order No.	External Appearance
Pulse Encoder Cable for Spindle Motor	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.

Σ-V-SD Driver

Cables for Σ-V-SD Drivers

Name	Length	Order No.	External Appearance	Page
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		53
	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		54
	0.3 m	JZSP-CNG01-A3-E		
Cables for local bus communications	0.5 m	JUPIT-W6004-A5		54
Cable for converter I/O	1 m	JZSP-CJI01-1-E		54
	2 m	JZSP-CJI01-2-E		
	3 m	JZSP-CJI01-3-E		
Cable for SERVOPACK CN1 I/O	1 m	JZSP-CJI103-1-E		54
	2 m	JZSP-CJI103-2-E		
	3 m	JZSP-CJI103-3-E		
Cable for SERVOPACK CN2 I/O	1 m	JZSP-CJI203-1-E		55
	2 m	JZSP-CJI203-2-E		
	3 m	JZSP-CJI203-3-E		
Cable for external encoder (with connectors on both ends)*1	3 m	JZSP-CJPS00-03-E		55
	5 m	JZSP-CJPS00-05-E		
	10 m	JZSP-CJPS00-10-E		
	15 m	JZSP-CJPS00-15-E		
	20 m	JZSP-CJPS00-20-E		
Cable for external encoder (with loose leads on encoder end)*1	3 m	JZSP-CJPS03-03-E		55
	5 m	JZSP-CJPS03-05-E		
	10 m	JZSP-CJPS03-10-E		
	15 m	JZSP-CJPS03-15-E		
	20 m	JZSP-CJPS03-20-E		
Cable for external encoder pulse output*1, *2	1 m	JZSP-CJPE03-1-E		56
	2 m	JZSP-CJPE03-2-E		
	3 m	JZSP-CJPE03-3-E		
Cable for magnetic sensor*3, *4	3 m	JZSP-CJMS03-03-E		56
	5 m	JZSP-CJMS03-05-E		
	10 m	JZSP-CJMS03-10-E		
	15 m	JZSP-CJMS03-15-E		
	20 m	JZSP-CJMS03-20-E		

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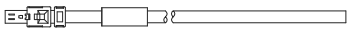
Continued from previous page.

Name		Length	Order No.	External Appearance	Page
Cable for analog monitor*5		1 m	JZSP-CA01-E	To SERVOPACK To measuring device 	56
Cable for personal computer connection		2.5 m	JZSP-CVS06-02-E	To computer To SERVOPACK 	56
HWBB cable	Cable with connector*6	1 m	JZSP-CVH03-01-E	To SERVOPACK 	57
		3 m	JZSP-CVH03-03-E		
	Connector kit*7		Contact Tyco Electronics Japan G.K. Product name: INDUSTRIAL MINI I/O D-SHAPW TYPE1 PLUG CONNECTOR KIT Model: 2013595-1		–
Digital operator			JUSP-OP05A-1-E	With connector cable (1 m) 	57

*1. Required for Orientation control with an external encoder.

*2. Required for system in which the signals of an external encoder are connected to an external device via a SERVOPACK.

*3. The cable connector for the FS-1378C magnetic sensor end of the cable is provided with the FS-1378C magnetic sensor.

*4. A cable is not required when using a FS-200A magnetic sensor because the cable is already included as part of the sensor. However, a CN10 connector kit (JZSP-CHI9-1) is required.

*5. Required for maintenance work.

*6. Used for HWBB. If you do not use the HWBB function, attach the enclosed safety jumper connection to Cn12.

*7. Use this connector kit when you assemble an HWBB cable.

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 Shell: 10350-52A0-008	Sumitomo 3M Ltd.	JZSP-CSI9-1-E
CN2	I/O	10236-52A2PL	Plug: 10136-3000PE Shell: 10336-52A0-008	Sumitomo 3M Ltd.	JZSP-VAI09-E
CN9	External encoder input signal	10220-52A2PL	Plug: 10120-3000PE Shell: 10320-52A0-008	Sumitomo 3M Ltd.	JZSP-VEP02-E
CN10	Magnetic sensor signal output and external encoder pulse output	10214-52A2PL	Plug: 10114-3000PE Shell: 10314-52A0-008	Sumitomo 3M Ltd.	JZSP-CHI9-1

* 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-CNG00-01-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	HRZFVV-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

* 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

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

◆ Cable Specifications for External Encoder Input Signal (SERVOPACK CN9)

Items	Specifications
Order No. *	JZSP-CJPS00-□□-E
Cable Length	3 m, 5 m, 10 m, 15 m, 20 m
Cable and connector	Cable : AWG24 to AWG30 × 10P (shielded) Shell : 10320-52A0-008 Plug : 10120-3000PE (soldered type)
Remarks	With connectors on both ends

* Specify the cable length in □□ of the order number.
Example: JZSP-CJPS00-03-E (3 m)

◆ Cable Specifications for External Encoder Input Signal (SERVOPACK CN9)

Items	Specifications
Order No. *	JZSP-CJPS03-□□-E
Cable Length	3 m, 5 m, 10 m, 15 m, 20 m
Cable and connector	Cable : AWG24 to AWG30 × 10P (shielded) Shell : 10320-52A0-008 Plug : 10120-3000PE (soldered type)
Remarks	With loose leads on encoder end

* Specify the cable length in □□ of the order number.
Example: JZSP-CJPS03-03-E (3 m)

◆ Cable Specifications for External Encoder Pulse Output (SERVOPACK CN10)

Items	Specifications
Order No. *	JZSP-CJPE03-□-E
Cable Length	1 m, 2 m, 3 m
Cable and connector	Cable : AWG24 to AWG30 × 7P (shielded) Shell : 10314-52A0-008 Plug : 10114-3000PE (soldered type)
Remarks	With loose leads on external encoder end

* Specify the cable length in □ of the order number.
Example: JZSP-CJPE03-1-E (1 m)

◆ Cable Specifications for Magnetic Sensor (SERVOPACK CN10)

Items	Specifications
Order No. *	JZSP-CJMS03-□□-E
Cable Length	3 m, 5 m, 10 m, 15 m, 20 m
Cable and connector	Cable : AWG24 to AWG30 × 7P (shielded) Shell : 10314-52A0-008 Plug : 10114-3000PE (soldered type)
Remarks	With loose leads on magnetic sensor end

* Specify the cable length in □□ of the order number.
Example: JZSP-CJMS03-03-E (3 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

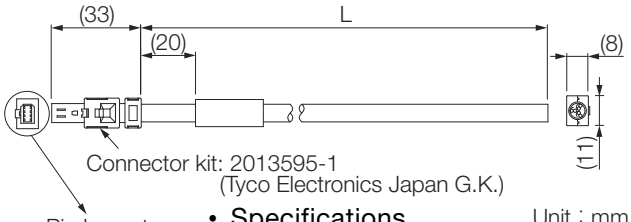
Items	Specifications
Order No.	JZSP-CVS06-02-E
Cable length	2.5 m
Connectors	Cable-end connector to SERVOPACK : USB Type miniB Cable-end connector to computer : USB Type A
Remarks	Used to connect a SERVOPACK with a personal computer in which SigmaWin+ is installed.

◆ HWBB Cable (Model JZSP-CVH03-□□-E)

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

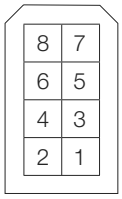
Even when not using the HWBB function, use SERVOPACKs with the Safe Jumper Connector.

• External Dimensions



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

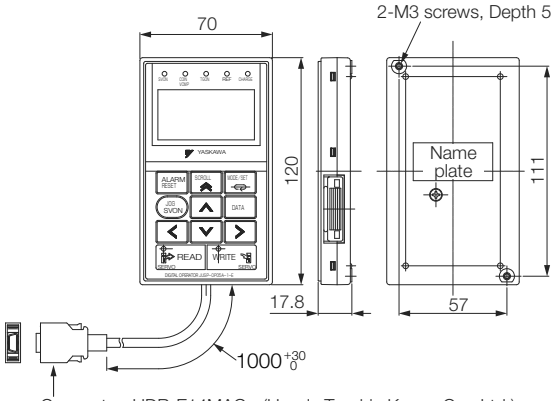
Pin Layout



• Specifications Unit : mm

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

◆ Digital Operator (Model: JUSP-OP05A-1-E)



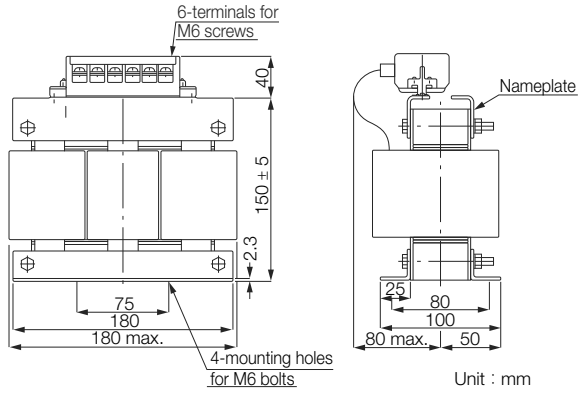
AC Reactor

Specifications

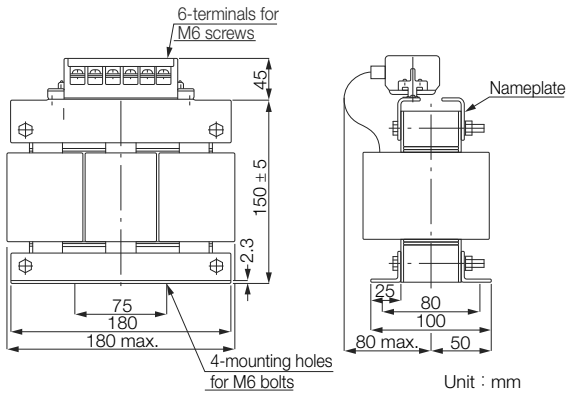
Power Regeneration Converter Model	AC Reactor Model	Rated Voltage (V)	Frequency (Hz)	Rated Current (A)	Inductance (mH)	Insulation Class (class)	Watt Data Loss (W)	Surrounding Air Temperature, Storage Temperature	Approx. Mass (kg)
CACP-JU15A3□	X008017	230	50/60	56	0.21	H	55	-10°C to 55°C, -20°C to 85°C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

External Dimensions

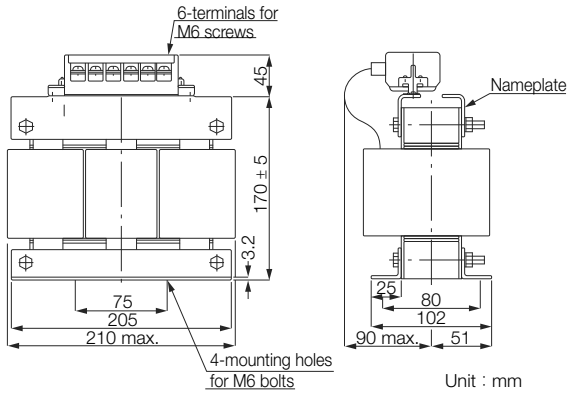
◆ Model: X008017



◆ Model: X008018

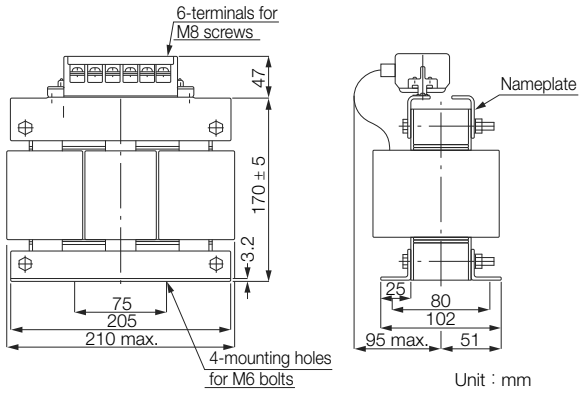


◆ Model: X008019



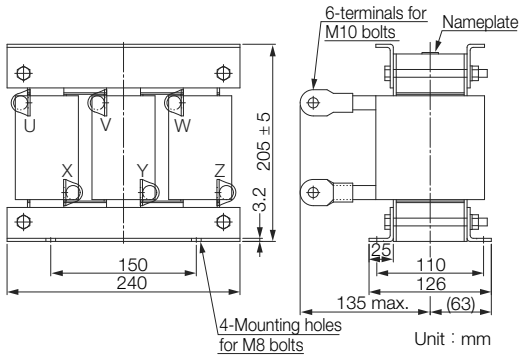
Unit : mm

◆ Model: X008020



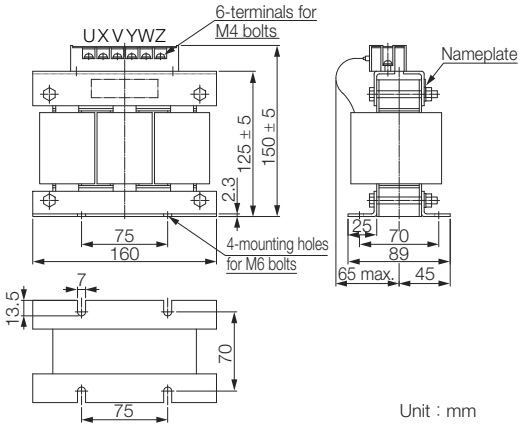
Unit : mm

◆ Model: X008022



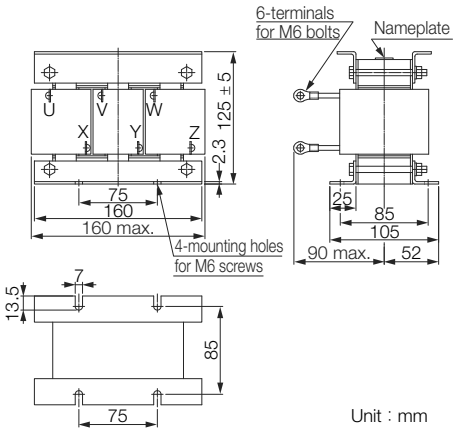
Unit : mm

◆ Model: X008010



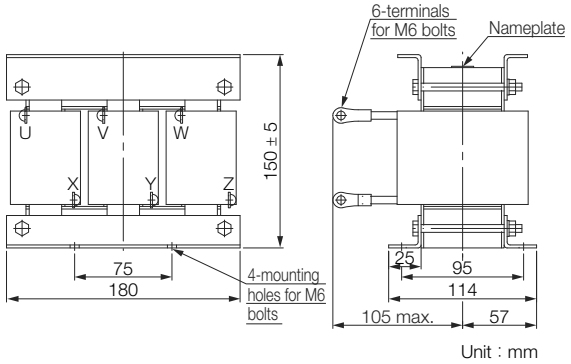
Unit : mm

◆ Model: X008011



Unit : mm

◆ Model: X008012



Unit : mm

Magnetic Contactor for Winding Selection

Specifications

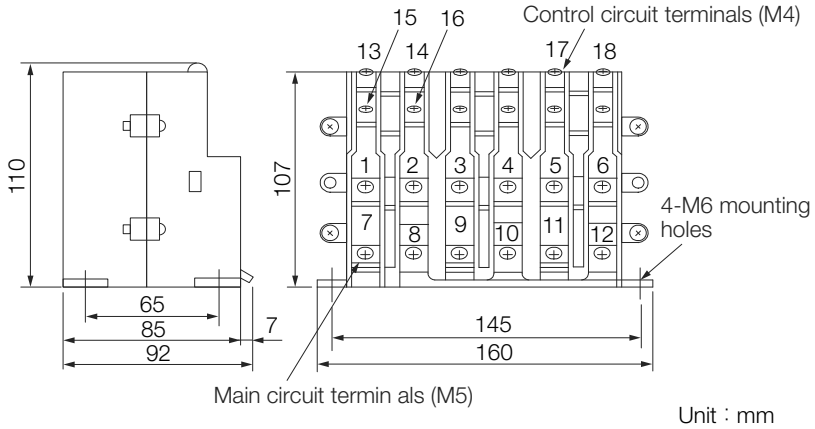
Model[*1]	Standard	HV-75AP4	HV-150AP4
	For UL Compliance	HV-75AP4/UL	HV-150AP4/UL
Contact		Main contact: 3NO, 3NC, auxiliary contact: 1NC	
Rated Insulation Voltage		600 V	
Rated Applying Current	Continuous	75 A	150 A
	30 minutes[*2]	87 A	175 A
Breaking Current Capacity	220 V	200 A	400 A
	440 V	150 A	300 A
Open/Close Frequency		600 times/hour	
Mechanical Duration of Life		5 million times	
Control Magnetic Coil Rating		200 V 50/60 Hz, 220 V 50/60 Hz, 230 V 60 Hz	
Mass		2.5 kg	5.0 kg
Surrounding Air Temperature		–10°C to 55°C	
Storage Temperature		–20°C to 85°C	
Humidity		10% to 95%RH (non-condensing)	
Spindle Motor Capacity (50%ED)		5.5 kW to 15 kW	18.5 kW to 30 kW

*1. Model numbers for contactors with safety covers are HV-□AP4S and HV-□AP4S/UL.

*2. A dwell time of 1 hour or more is required after applying power supply for 30 minutes.

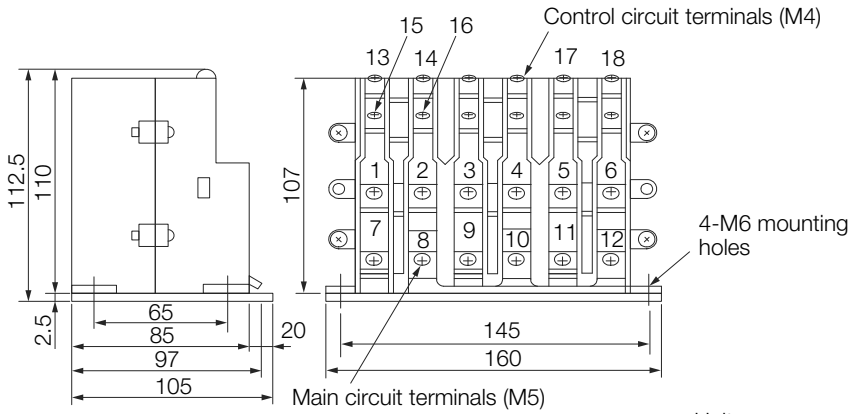
External Dimensions

◆ Model: HV-75AP4



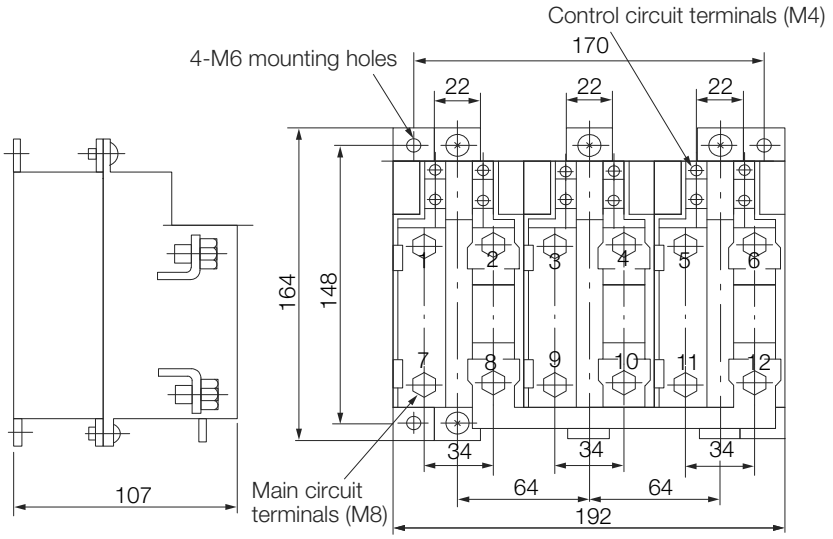
Unit : mm

◆ Model: HV-75AP4/UL



Unit: mm

◆ Model: HV-150AP4, HV-150AP4/UL



Unit: mm

Molded-case Circuit Breaker, Ground Fault Detector, and Magnetic Contactor

Always install a circuit breaker to protect the main circuits. The type of circuit breaker that is required depends on what you need to detect.
Detecting only overcurrent: Use a molded-case circuit breaker.

Detecting overcurrent and leakage current:

Use a ground fault detector that detects overloads and leakage current. Or, use a molded-case circuit breaker together with a ground fault detector that detects only leakage current.

⚠ DANGER

- **Always install a molded-case circuit breaker or ground fault detector in the main circuit.**
  Failure to observe this warning may result in electric shock, equipment damage, or fire.

Molded-case Circuit Breaker

A molded-case circuit breaker shuts OFF the power supply when it detects an overcurrent. Install a molded-case circuit breaker between the power supply and the main circuit power supply input terminals (R/L1, S/L2, and T/L3).

Select the molded-case circuit breaker 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 63).

Ground Fault Detector

A ground fault detector detects leakage current. Some models will also detect overcurrent in addition to leakage current. Use the type that is suitable for your application. Install a ground fault detector between the power supply and the main circuit power supply input terminals (R/L1, S/L2, and T/L3).

Recommended ground fault detector:

A ground fault detector with harmonic countermeasures and a rated sensed current of 30 mA or higher for each power regeneration converter. A ground fault detector with harmonic countermeasures removes leakage current for harmonics and detects only leakage current in the frequency range that presents a hazard to humans. If you use a ground fault breaker that does not have harmonic countermeasures, the leakage current from the harmonics will increase the chance of malfunctions.

Select the ground fault detector 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 63).

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 63).

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

Noise Filter

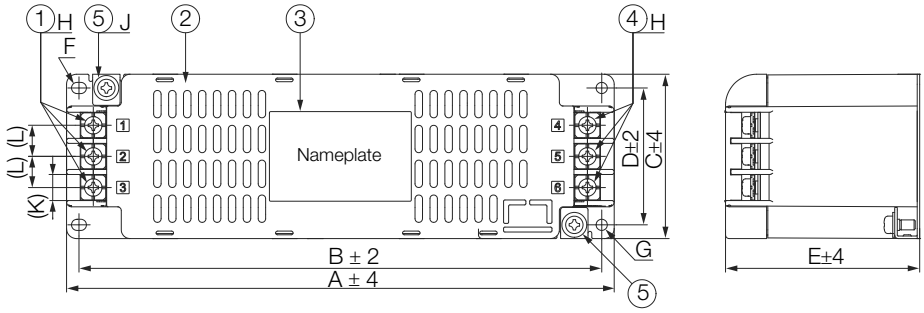
Specifications

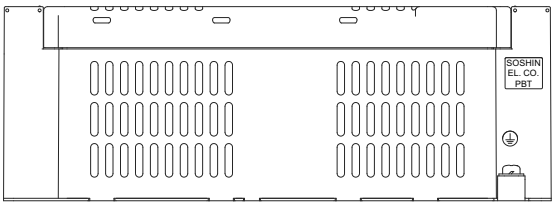
Power Regeneration Converter		Noise Filter					
Input Voltage	Model	Model	Rated Current (A)	Classification	Rated Voltage	Leakage Current (mA)	Manufacturer
Three-phase 200 VAC	CACP-JU15A3□	HF3060C-SZC-47EDD	60	Three-phase three-wire	480 VAC	7 (for 200 VAC, 60 Hz)	SOSHIN ELECTRIC CO., LTD
	CACP-JU19A3□	HF3080C-SZC-47EDD	80				
	CACP-JU22A3□	HF3100C-SZC-47EDD	100				
	CACP-JU30A3□	HF3150C-SZC-47EDD	150				
	CACP-JU45A3B	HF3200C-SZC-49EDE*	200			25 (for 200 VAC, 60 Hz)	
Three-phase 400 VAC	CACP-JU15D3□	HF3030C-SZC-47DDD	30	Three-phase three-wire	480 VAC	12 (for 400 VAC, 50 Hz)	SOSHIN ELECTRIC CO., LTD
	CACP-JU19D3□	HF3040C-SZC-47EDD	40				
	CACP-JU22D3□	HF3050C-SZC-47EDD	50				

* Also use the following compact AC power supply block-type capacitor (X capacitor).
Compact AC power supply block-type capacitor (X capacitor) model: LDA106M-AA (Soshin Electric Co., Ltd.)
Connect the X capacitor near the noise filter input terminal.

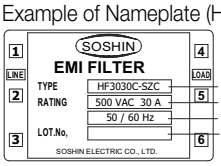
External Dimensions

◆ Model: HF3030C-SZC-47DDD, HF3040C-SZC-47EDD,
HF3050C-SZC-47EDD, HF3060C-SZC-47EDD





Example of Nameplate (HF3030C-SZC)



Model name
Rated voltage and current
Rated frequency
Lot No.

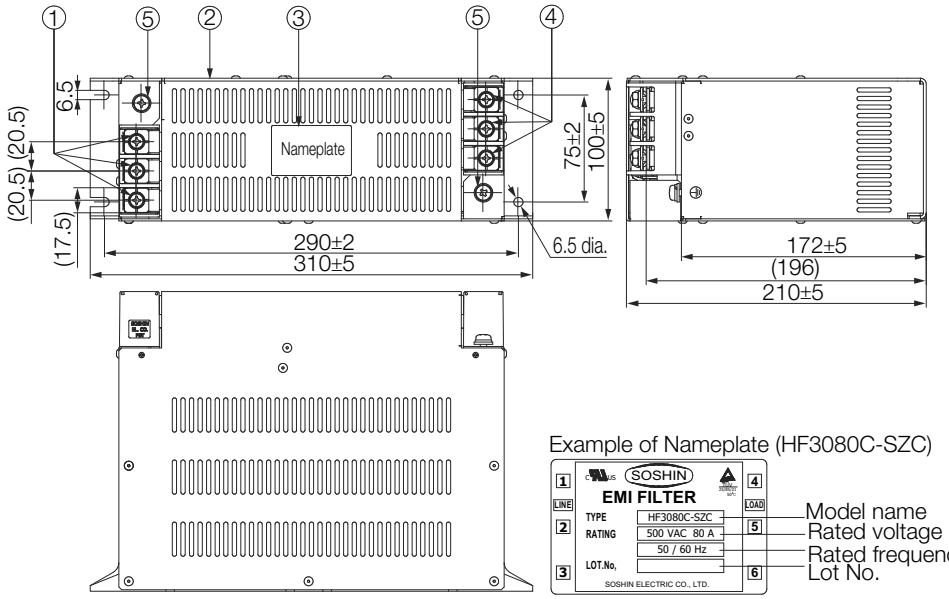
① Input terminal ② Case ③ Nameplate
④ Output terminal ⑤ Earth terminal

Unit: mm

Unit: mm

Noise Filter Model	A	B	C	D	E	F	G	H	J	K	L
HF3030C-SZC-47DDD	220	210	66	55	78	R2.25 × 6	4.5 dia.	M4	M4	10.5	12.5
HF3040C-SZC-47EDD	270	260	80	70	84	R2.75 × 7	5.5 dia.	M5	M4	13	16
HF3050C-SZC-47EDD											
HF3060C-SZC-47EDD											

◆ Model: HF3080C-SZC-47EDD, HF3100C-SZC-47EDD



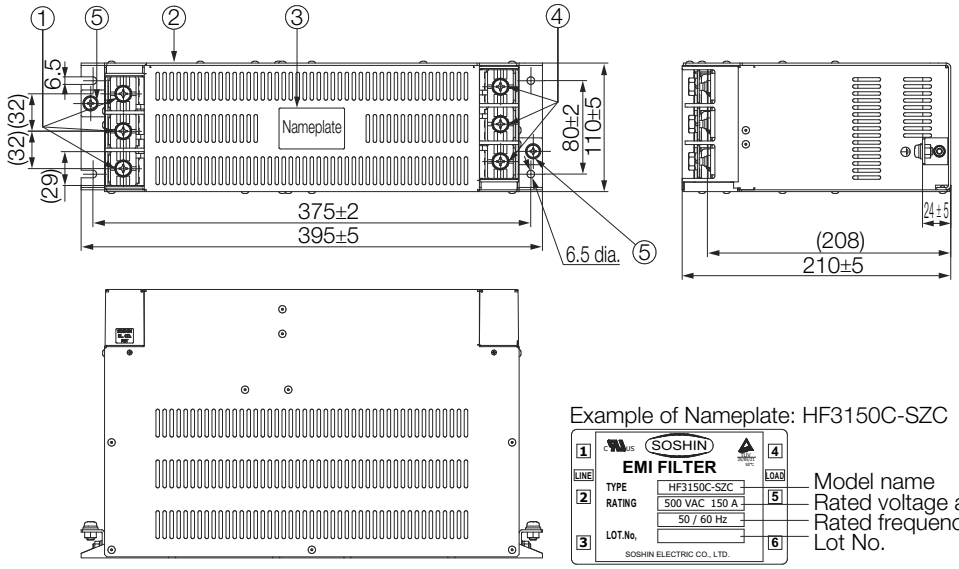
Example of Nameplate (HF3080C-SZC)

Model name
Rated voltage and current
Rated frequency
Lot No.

① Input terminal: M6 ② Case ③ Nameplate
④ Output terminal: M6 ⑤ Earth terminal: M6

Unit: mm

◆ Model: HF3150C-SZC-47EDD



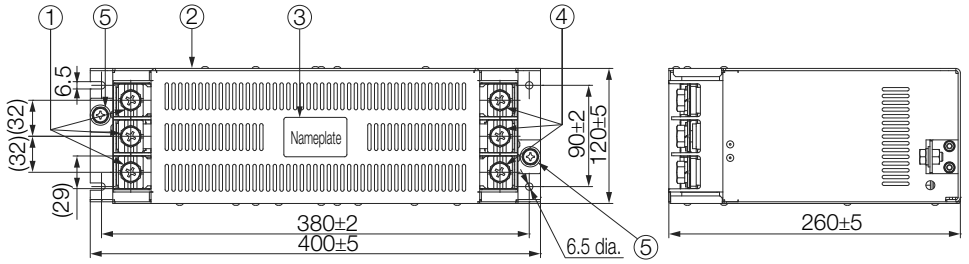
Example of Nameplate: HF3150C-SZC

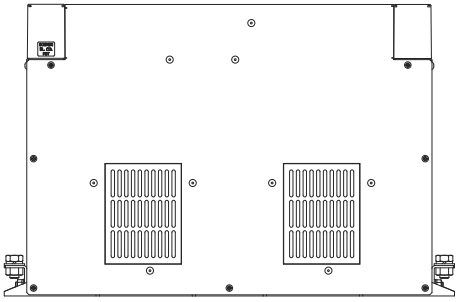
Model name
Rated voltage and current
Rated frequency
Lot No.

① Input terminal: M8 ② Case ③ Nameplate
④ Output terminal: M8 ⑤ Earth terminal: M6

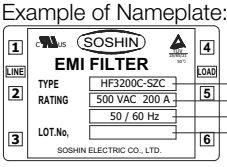
Unit: mm

◆ Model: HF3200C-SZC-49EDE





Example of Nameplate: HF3200C-SZC

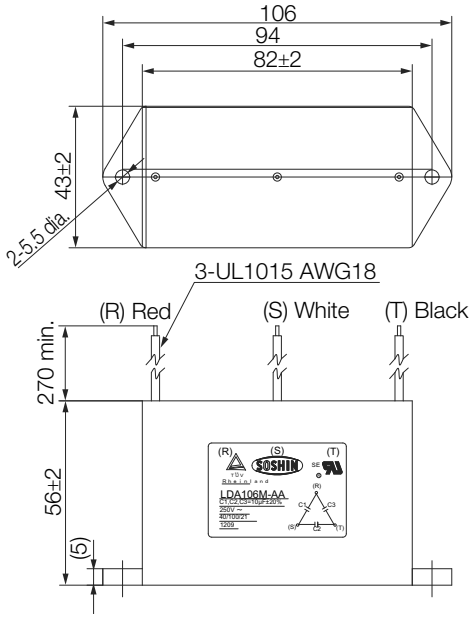


Model name
Rated voltage and current
Rated frequency
Lot No.

① Input terminal: M10 ② Case ③ Nameplate
④ Output terminal: M10 ⑤ Earth terminal: M8

Unit: mm

Compact AC power supply block-type capacitor (X capacitor)
Model: LDA106M-AA



Unit：mm

Base Mounting Unit

Specifications

Model	Unit Width (mm)	Cooling Fan		Terminal Block		
		Input Voltage (VDC)	Input Current (A)	Terminal Screw	Wire Sizes (AWG)	Tightening Torque (N·m)
JUSP-JUBM050AA	50	24	0.42	M3.5	24 to 12	0.8 to 1.2
JUSP-JUBM075AA	75		0.94			
JUSP-JUBM100AA	100		0.94			
JUSP-JUBM150AA	150		1.88			
JUSP-JUBM250AA	250		1.24			

Note: The input current that is given above is the current for one base mounting unit.

Combination Lists

When mounting Servo Drives to bases, mount them together with the following Base Mounting Units.

◆ Power Regeneration Converters

Power Regeneration Converter		Base Mounting Unit
Input Voltage	Model	Model
Three-phase 200 VAC	CACP-JU15A3☐	JUSP-JUBM100AA
	CACP-JU19A3☐	
	CACP-JU22A3☐	
	CACP-JU30A3☐	JUSP-JUBM150AA
	CACP-JU45A3B	JUSP-JUBM250AA
Three-phase 400 VAC	CACP-JU15D3☐	JUSP-JUBM100AA
	CACP-JU19D3☐	
	CACP-JU22D3☐	

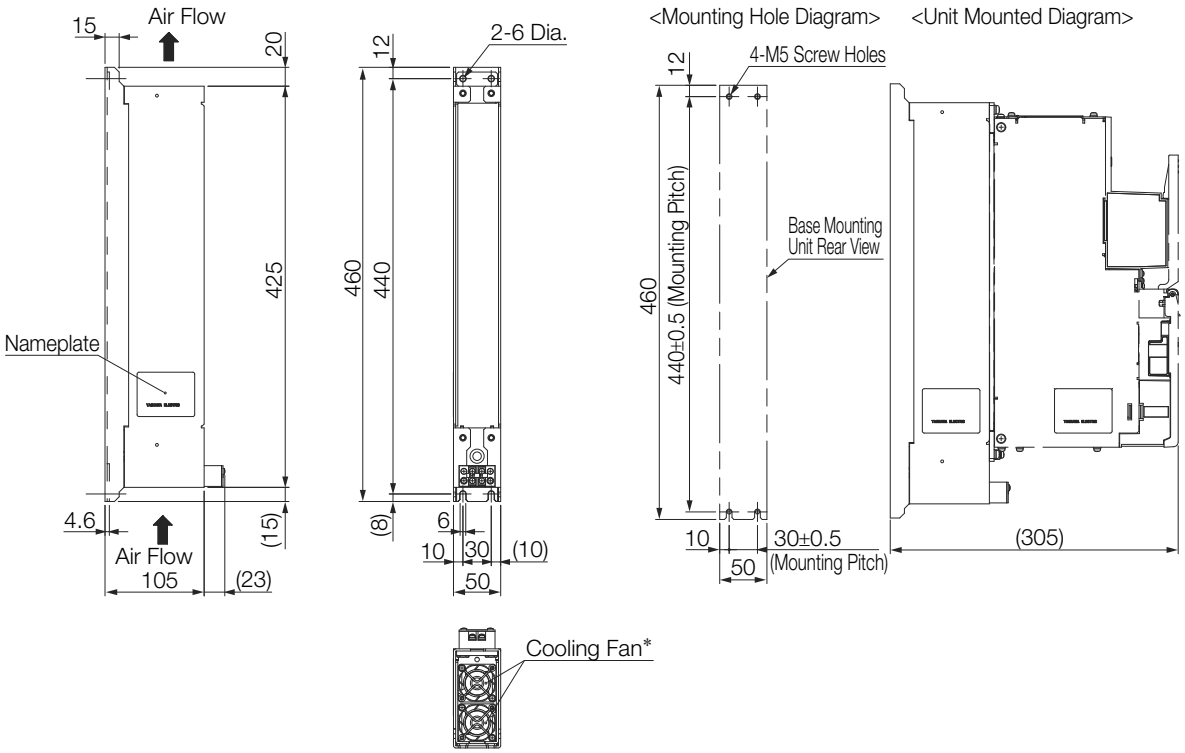
◆ SERVOPACK

SERVOPACK		Base Mounting Unit
Input Voltage	Model	Model
270 VDC	CACR-JU028AEA	JUSP-JUBM050AA
	CACR-JU036AEA	
	CACR-JU065AEA	JUSP-JUBM075AA
	CACR-JU084AEA	JUSP-JUBM150AA
	CACR-JU102AEA	
	CACR-JU125AEA	
	CACR-JU196AEA	JUSP-JUBM250AA
540 VDC	CACR-JU014DEA	JUSP-JUBM050AA
	CACR-JU018DEA	
	CACR-JU033DEA	JUSP-JUBM075AA
	CACR-JU042DEA	JUSP-JUBM150AA
	CACR-JU051DEA	

External Dimensions

◆ JUSP-JUBM050AA

Unit: mm

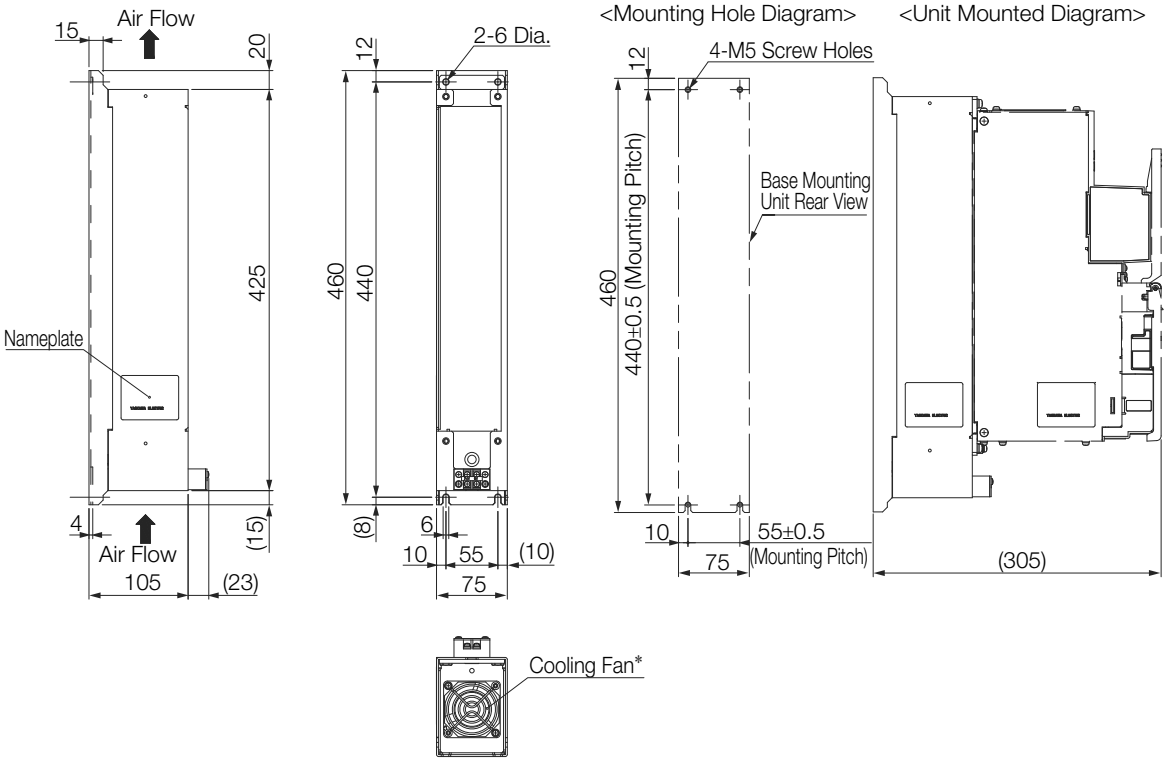


Approx.Mass: 2.7 kg

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

◆ JUSP-JUBM075AA

Unit: mm

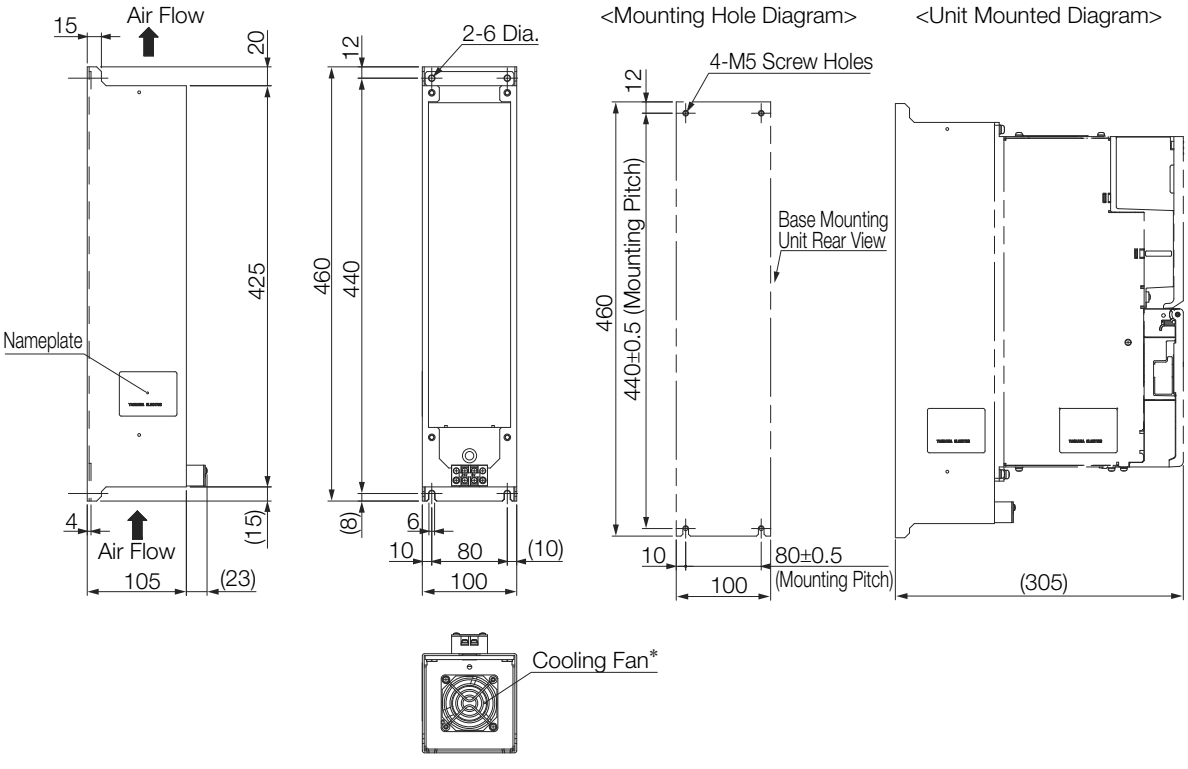


Approx.Mass: 2.7 kg

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

◆ JUSP-JUBM100AA

Unit: mm

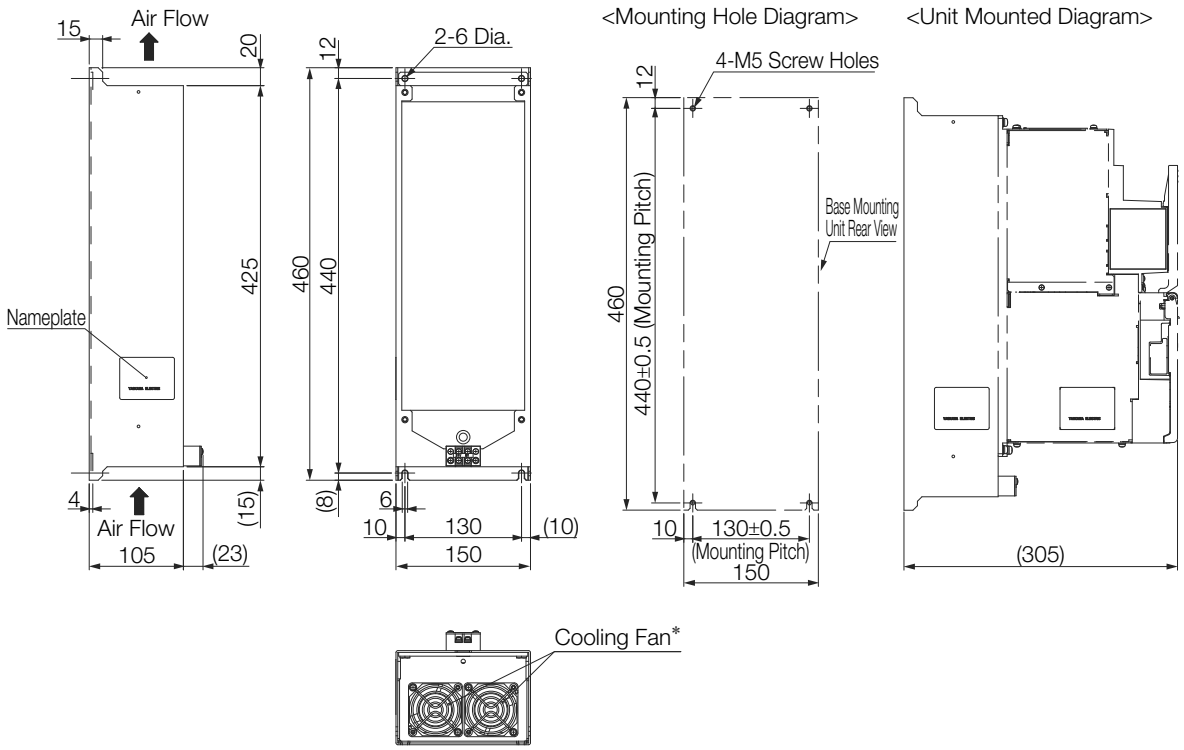


Approx.Mass: 2.8 kg

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

◆ JUSP-JUBM150AA

Unit: mm

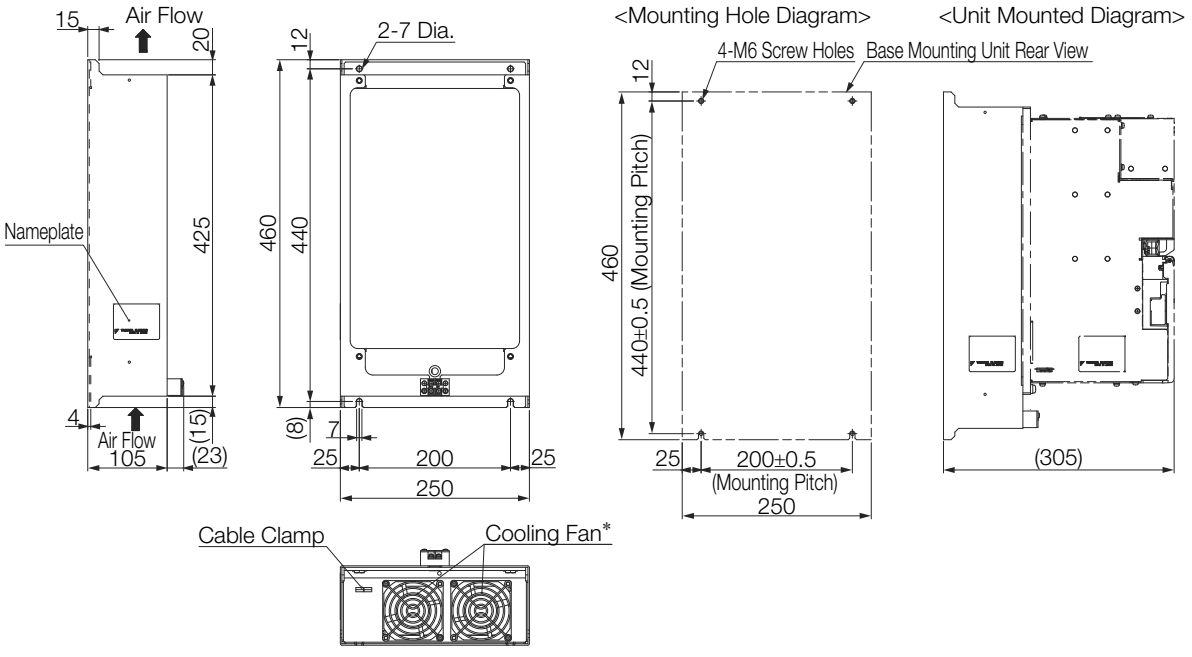


Approx.Mass: 3.5 kg

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

◆ JUSP-JUBM250AA

Unit: mm



Approx.Mass: 4.9 kg

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

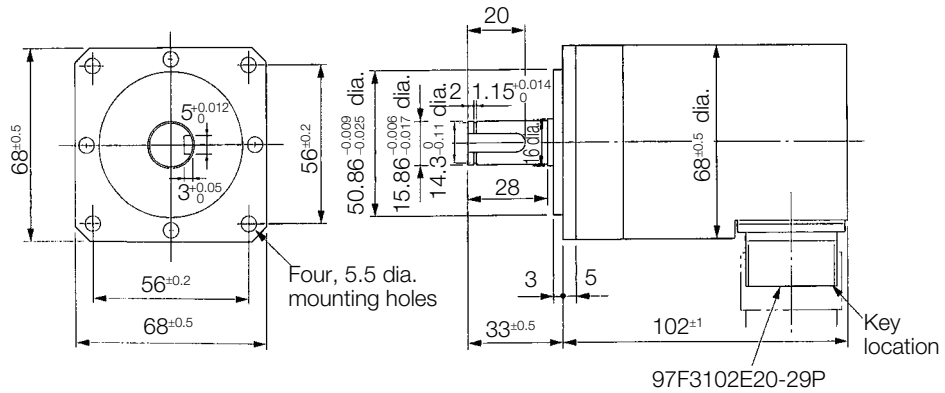
External Encoder

Specifications

Item	Specifications	
Model	NE-1024-2MDF-068-11	NE-1024-2MDF-068-12
Maximum Speed* (min^{-1})	6000	8000
Power Supply	5 VDC ±5%, 350 mA	
Number of Pulses	Phases A and B: 1,024 pulses/rotation	
	Phase C: 1 pulse/rotation	
Outputs	Balanced output via line driver for each phase	
	AM26LS31 or equivalent	
Maximum Response Frequency	200 kHz	
Accumulated Pitch Error	Within 20% of phase A and B signal cycle	
Pitch Error	Within 10% of phase A and B signal cycle	
Input Shaft Moment of Inertia	170×10^{-3} kgf × cm × s^2 max.	
Input Shaft Torque	1 kgf·cm max.	
Allowable Input Shaft Load	Thrust: 5 kg max. static, 10 kg max. dynamic Radial: 10 kg max. static, 20 kg max. dynamic	
Structure	IP54 (with connector facing down)	
Output Connector	Encoder side: 97F3102E20-29P Cable side: MS3106A20-29S DDK Ltd.	
Mass	1 kg	
Surrounding Air Temperature Range	0°C to 60°C	
Humidity	85% RH max. (with no condensation)	

* The maximum speed is the maximum speed limit in actual operation.

External Dimensions Unit: mm



Note: 1. Backlash may cause offset in positions. Attach the encoder to eliminate backlash as much as possible.
2. There are also external encoders without flanges.

Magnet and Magnetic Sensor

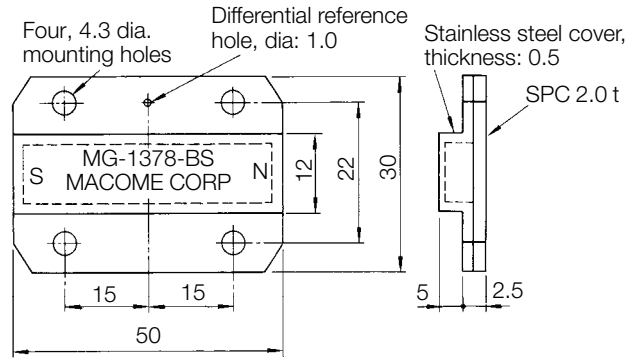
Specifications

Magnet Model	Specifications	
	MG-1378BS	MG-1444S
Detection Range (mm)	±15	±7
Allowable Speed (min^{-1}) (when magnet is mounted to circumference of 200-mm diameter)	6,700	10,000
Mass (g)	33	15
Magnetic Sensor Model	FS-1378C	FS-200A
Power Supply Voltage	15 VDC ±5%	12 VDC ±10%
Current Consumption	100 mA max.	50 mA max.
Manufacturer	Macome Corporation	

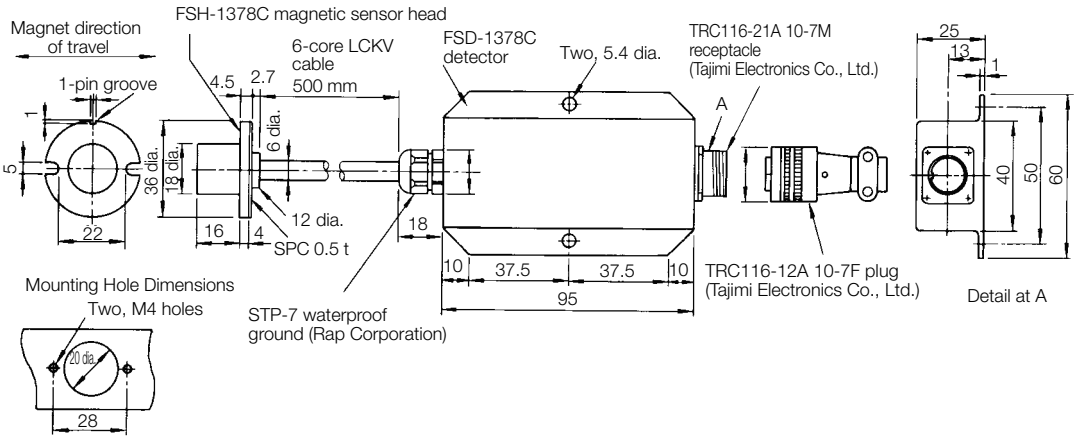
External Dimensions Unit : mm

Use magnets and magnetic sensors in the following combinations.

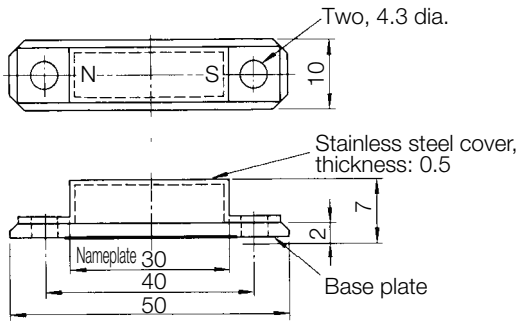
■Magnet: MG-1378BS



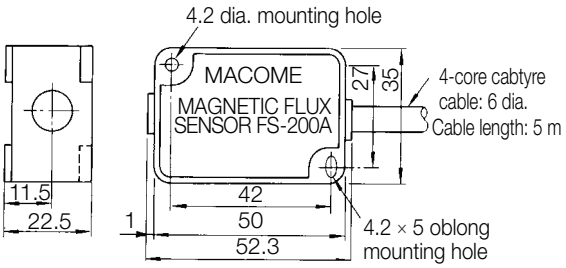
■Magnetic sensor: FS-1378C



■Magnet: MG-1444S



■Magnet Sensor: FS-200A



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 warranty period above. 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
- Abuse 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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YASKAWA ELECTRIC CORPORATION

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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