

2.3.2 αi SV series

Specifications (common)

Item	Specifications
Main circuit control method	Sine-wave PWM control with transistor (IGBT) bridge
Applicable CNC	16i-B, 18i-B, 21i-B, 0i-B/C/D, and 30i/31i/32i



CAUTION

HRV4 cannot be applied to A06B-6114-Hxxx and -6124-Hxxx.

200-V input series - 1-axis amplifier

Name	Axis	Rated output current [Arms]	Nominal current limit [Apeak]
αi SV 4	-	1.5	4
αi SV 20	-	6.5	20
αi SV 20L	-	6.5	20
αi SV 40	-	13	40
αi SV 40L	-	13	40
αi SV 80	-	19	80
αi SV 80L	-	19	80
αi SV 160	-	45	160
αi SV 160L	-	45	160
αi SV 360	-	115	360

200-V input series - 2-axis amplifier

Name	Axis	Rated output current [Arms]	Nominal current limit [Apeak]
αi SV 4/4	L	1.5	4
	M	1.5	4
αi SV 4/20	L	1.5	4
	M	6.5	20
αi SV 20/20	L	6.5	20
	M	6.5	20
αi SV 20/40	L	6.5	20
	M	13	40
αi SV 40/40	L	13	40
	M	13	40
αi SV 40/80	L	13	40
	M	19	80
αi SV 80/80	L	19	80
	M	19	80
αi SV 80/160	L	19	80
	M	39	160
αi SV 160/160	L	39	160
	M	39	160
αi SV 20/20L	L	6.5	20
	M	6.5	20

Name	Axis	Rated output current [Arms]	Nominal current limit [Apeak]
αi SV 20/40L	L	6.5	20
	M	13	40
αi SV 40/40L	L	13	40
	M	13	40
αi SV 40/80L	L	13	40
	M	19	80
αi SV 80/80L	L	19	80
	M	19	80
αi SV 80/160L	L	19	80
	M	39	160

NOTE

The current limit (peak value) is a standard value. It varies by about $\pm 10\%$, depending on the circuit constants.

200-V input series - 3-axis amplifier

Name	Axis	Rated output current [Arms]	Nominal current limit [Apeak]
αi SV 4/4/4	L	1.5	4
	M	1.5	4
	N	1.5	4
αi SV 20/20/20	L	6.5	20
	M	6.5	20
	N	6.5	20
αi SV 20/20/40	L	6.5	20
	M	6.5	20
	N	13	40

400-V input series - 1-axis amplifier

Name	Axis	Rated output current [Arms]	Nominal current limit [Apeak]
αi SV 10HV	-	3.1	10
αi SV 20HV	-	5.6	20
αi SV 40HV	-	9.1	40
αi SV 80HV	-	18.2	80
αi SV 180HV	-	58	180
αi SV 360HV	-	115	360
αi SV 10HVL	-	3.1	10
αi SV 20HVL	-	5.6	20
αi SV 40HVL	-	9.1	40
αi SV 80HVL	-	18.2	80

400-V input series - 2-axis amplifier

Name	Axis	Rated output current [Arms]	Nominal current limit [Apeak]
αi SV 10/10HV	L	3.1	10
	M	3.1	10
αi SV 20/20HV	L	5.6	20
	M	5.6	20
αi SV 20/40HV	L	5.6	20
	M	9.1	40
αi SV 40/40HV	L	9.1	40
	M	9.1	40
αi SV 40/80HV	L	9.1	40
	M	18.2	80
αi SV 80/80HV	L	18.2	80
	M	18.2	80
αi SV 10/10HVL	L	3.1	10
	M	3.1	10
αi SV 20/20HVL	L	5.6	20
	M	5.6	20
αi SV 20/40HVL	L	5.6	20
	M	9.1	40
αi SV 40/40HVL	L	9.1	40
	M	9.1	40

NOTE

The current limit (peak value) is a standard value. It varies by about $\pm 10\%$, depending on the circuit constants.

2.3.3 αi SP series

200-V input series

Model Item	<i>αi</i> SP 2.2	<i>αi</i> SP 5.5	<i>αi</i> SP 11	<i>αi</i> SP 15	<i>αi</i> SP 22	<i>αi</i> SP 26	<i>αi</i> SP 30	<i>αi</i> SP 37	<i>αi</i> SP 45	<i>αi</i> SP 55
Rated output (HRV type)	13A	27A	48A	63A	95A	111A	133A	165A	198A	250A
	Spindle HRV2					Spindle HRV1 (Note 3)				
Main circuit control method	Sine-wave PWM control with transistor (IGBT) bridge									
Speed control range	Speed ratio 1:100									
Speed variation rate	0.1% or less of maximum speed (load variation: 10% to 100%)									
Applicable CNC	16i-B, 18i-B, 21i-B, 0i-B/C/D, and 30i/31i/32i									
Applicable motors (Note 1) (typical examples)	<i>αi</i> I 0.5 <i>αi</i> I 1	<i>αi</i> I 1.5 <i>αi</i> I 2 <i>αi</i> I 3	<i>αi</i> I 6 <i>αi</i> I 8 <i>αi</i> I _P 12	<i>αi</i> I 12 <i>αi</i> I _P 15 <i>αi</i> I _P 18	<i>αi</i> I 15 <i>αi</i> I 18 <i>αi</i> I _P 22 <i>αi</i> I _P 30	<i>αi</i> I 22 <i>αi</i> I _P 40 <i>αi</i> I _P 50	<i>αi</i> I _P 60	(Note 2)	<i>αi</i> I 30 <i>αi</i> I 40	<i>αi</i> I 50

400-V input series

Model Item	<i>αi</i> SP 5.5HV	<i>αi</i> SP 11HV	<i>αi</i> SP 15HV	<i>αi</i> SP 30HV	<i>αi</i> SP 45HV	<i>αi</i> SP 75HV	<i>αi</i> SP 100HV
Rated output (HRV type)	14A	23A	32A	70A	107A	170A	200A
	HRV2		HRV1 注 3				
Main circuit control method	Sine-wave PWM control with transistor (IGBT) bridge						
Speed control range	Speed ratio 1:100						
Speed variation rate	0.1% or less of maximum speed (load variation: 10% to 100%)						
Applicable CNC	16i-B, 18i-B, 21i-B, 0i-B/C/D, and 30i/31i/32i						
Applicable motors ^(Note 1) (typical examples)	<i>αi</i> I 0.5HV <i>αi</i> I 1HV <i>αi</i> I 2HV <i>αi</i> I 3HV	<i>αi</i> I 6HV <i>αi</i> I 8HV	<i>αi</i> I _P 15HV	<i>αi</i> I 15HV <i>αi</i> I 22HV <i>αi</i> I _P 40HV <i>αi</i> I _P 50HV	<i>αi</i> I 30HV <i>αi</i> I 40HV <i>αi</i> I _P 60HV	<i>αi</i> I 60HV	<i>αi</i> I 100HV

NOTE

- For combinations of motor models and amplifier models, refer to "Applicable spindle amplifier" in the specification list in the descriptions manual of the spindle motor.
- Built-in spindle motors are applied.
- For spindle HRV2, the rated current is derated as follows:
 αi SP37 85%, αi SP45 79%, αi SP55 80%
 αi SP15HV 94%, αi SP30HV 83%, αi SP45HV 72%
 αi SP75HV 83%, αi SP100HV 91%

Types (A and B) of αi SP models and sensors applicable to each type

Either of two αi SP models, types A and B, is available for each detector on the spindle to be used. The following lists combinations of an αi SP type, applicable sensors, and functions.

		Configuration	Configuration number									Remarks
			1	2	3	4	5	6	7	8	9	
Spindle system configuration	αi SP	TYPE A	O	O	O	O	O	O		O		
		TYPE B	O	O	O	O	O	O	O	O	O	
	Sensor on the motor	αi M	O				O	O	O	O	O	
		αi MZ sensor		O								
		αi BZ sensor (*8) (when a built-in motor is used)			O							
		αi CZ I sensor (when a built-in motor is used)				O						See next page.
	Sensor on the spindle	αi position coder					O					*3
		External 1-rotation						O				*3
		αi BZ sensor							O			*3
		αi CZ IS sensor								O		See next page.
		α position coder S									O	*3
Function	Rigid tapping		O*1	O*2	O	O	O	O*2	O	O	O	
	Orientation by a position coder			O*6	O	O	O		O	O	O	
	Orientation by the external one-rotation signal							O*2				*5
	Spindle synchronization	Velocity synchronization	O*2	O*6	O	O	O	O*2	O	O	O	*4
		Phase synchronization		O*6	O	O	O	O*7	O	O	O	*4
	Threading			O*6	O	O	O		O	O	O	
	Cs-axis contour control			O*6	O				O	O	O	

- *1 The spindle and motor must be interconnected directly or with a timing belt or gear. No orientation is available to adjust the tapping start position.
- *2 The spindle and motor must be interconnected with a timing belt or gear.
- *3 The spindle and detector must be interconnected in one-to-one connection mode.
- *4 Two motor amplifiers are required.
- *5 Note that the stop position moves by a backlash between the spindle and motor because of the theory of operation.
- *6 The spindle and motor must be interconnected directly or with a timing belt or gear in one-to-one connection mode.
- *7 Before specifying spindle synchronization, perform orientation to detect the one-rotation signal (PC1DT=1).
- *8 The αi CZ analog output type is also applicable.

Other functions

	TYPE A	TYPE B	Remarks
Analog output of load meter and speedometer	O	O	Connector JY1
Analog override input	O	O	Connector JY1
Excitation off monitor signal output	O	O	Connector JX4
Position coder signal output		O *1	Connector JX4
Spindle EGB function (Inter-SP communication function)		O *1	Connector JX4

*1 The α iCZ I sensor and α iCZ IS sensor are excluded.



CAUTION

The excitation off state signal output is not supported by A06B-6111, -6112, -6121, and -6122.

Submodule SW

By using α i SP TYPE A or α i SP TYPE B with a Submodule SW, the spindle switch function for switching between two motors (main and sub) with one spindle amplifier can be used. (*2)
For details of the sub module SW, see Chapter 10.

*2 The α iCZ I sensor and α iCZ IS sensor are excluded.

Submodule SM

By using α i SP TYPE B with the Submodule SM, the synchronous built-in spindle motor Bi S series can be used.



CAUTION

For the latest α iSP series, use Submodule SM unit version B or later.

α iCZ sensors (I, IS)

- Applicable spindle amplifiers
Unit version B or later
200-V system: A06B-6141-H002, -H006, -H011, -H015, -H030, -H037, -H055#H580
400-V system: A06B-6151-H006, -H011, -H015, -H045, -H075, -H100#H580
Unit version C or later
200-V system: A06B-6141-H022, -H026, -H045#H580
400-V system: A06B-6151-H030#H580
- The following functions cannot be used:
Spindle switch control, differential spindle speed control, and position coder signal output
- The following functions are not supported at present:
Synchronous spindle motor, spindle EGB, simple spindle EGB, torque tandem control, dual check safety (motor sensor side), disconnection detection disable signal

2.4 WEIGHT

αi PS

Model	Weight
αi PS _R 3	2.6kg
αi PS _R 5.5	4.3kg
αi PS 5.5	4.9kg
αi PS 11, 15, 11HV, 18HV	6.3kg
αi PS 26, 30, 37, 30HV, 45HV	10.7kg
αi PS 55, 75HV, 100HV	22.0kg

αi SV

Model	Weight
αi SV 4, 20, 10HV	2.2Kg
αi SV 40, 80, 160, 20L, 40L, 80L	3.9Kg
αi SV 20HV, 40HV, 80HV, 10HVL, 20HVL, 40HVL	
αi SV 4/4, 4/20, 20/20, 10/10HV	2.4Kg
αi SV 20/40, 40/40, 40/80, 80/80, 20/40L, 40/40L	4.6Kg
αi SV 20/20HV	
αi SV 160L, 80HVL	5.5Kg
αi SV 80/160, 160/160, 40/80L, 80/80L	
αi SV 20/40HV, 40/40HV, 40/80HV,	
αi SV 80/80HV, 20/40HVL, 40/40HVL	
αi SV 4/4/4, αi SV 20/20/20	
αi SV 20/20/40	3.8Kg
αi SV 360, 180HV	10.7Kg
αi SV 360HV	22.0Kg
DBM(A06B-6079-H401)	5.4Kg
DBM(A06B-6069-H300)	10.0Kg

αi SP

Model	Weight
αi SP 2.2	4.9Kg
αi SP 5.5, 5.5HV	6.1Kg
αi SP 11, 15, 11HV, 15HV	6.3Kg
αi SP 22, 26, 30, 37, 30HV, 45HV	10.7Kg
αi SP 45, 55, 75HV, 100HV	22.0Kg

AC reactor

Model	Weight
A81L-0001-0083#3C	1.1kg
A81L-0001-0171	1.1kg
A81L-0001-0101#C	3.0kg
A81L-0001-0155	4.5kg
A81L-0001-0156	6.5kg
A81L-0001-0157	9.5kg
A81L-0001-0158	9.2kg
A81L-0001-0159	16.5kg

Model	Weight
A81L-0001-0160	20.0kg
A81L-0001-0163	8.0kg
A81L-0001-0164	14.0kg
A81L-0001-0165	26.0kg
A81L-0001-0167	8.2kg
A81L-0001-0170	4.2kg

Regenerative discharge unit

Model	Weight
A06B-6089-H510	0.8kg
A06B-6089-H500	2kg
A06B-6089-H711	5kg
A06B-6089-H712	6kg
A06B-6089-H713	5kg

Transformer

Model	Weight
A80L-0024-0006	27kg
A80L-0024-0003	36kg
A06B-6052-J001	61kg
A06B-6044-J006	115kg
A06B-6044-J007	165kg
A06B-6044-J010	260kg
A06B-6044-J015	375kg

Noise filter

Model		Weight
A06B-6077-K155	3SUP-HL30-ER-6 : *1	5.2kg
A06B-6077-K156	3SUP-HL75-ER-6 : *1	12.0kg
A06B-6077-K157	3SUP-HL150-ER-6: *1	23.5kg
A06B-6077-K158	3SUP-HL200-ER-6: *1	24.5kg
A06B-6110-K160	NF3050C-VQ : *2	2.9kg
A06B-6110-K161	NF3080C-VQ : *2	3.6kg
A06B-6110-K162	NF3150C-VQ : *2	9.0kg
A06B-6110-K163	NF3200C-VQ : *2	16kg
A06B-6110-K164	NF3250C-VQ : *2	16kg

*1 manufacturer Okaya electric Inc.

*2 manufacturer Sosin electric Inc.

3

ORDERING INFORMATION

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3.1 SERVO AMPLIFIER

3.1.1 200-V Input Series

3.1.1.1 αi PS series

Category	Ordering number	Name	Remarks
Standard	A06B-6140-H006	αi PS 5.5	
	A06B-6140-H011	αi PS 11	
	A06B-6140-H015	αi PS 15	
	A06B-6140-H026	αi PS 26	
	A06B-6140-H030	αi PS 30	
	A06B-6140-H037	αi PS 37	
	A06B-6140-H055	αi PS 55	

NOTE

See Section 4.3, "HOW TO SELECT THE αi PS series (POWER SUPPLY)" for details of how to select the αi PS.

3.1.1.2 αi PS_R series

Category	Ordering number	Name	Remarks
Standard	A06B-6115-H003	αi PS _R 3	
	A06B-6115-H006	αi PS _R 5.5	

Category	Ordering number	Name	Remarks
Standard	A06B-6115-H003	PSMR-3 <i>i</i>	
	A06B-6115-H006	PSMR-5.5 <i>i</i>	

NOTE

See Section 4.4, "HOW TO SELECT THE αi PS_R series (POWER SUPPLY RESISTOR DISCHARGE TYPE)" for details of how to select the αi PS_R.

3.1.1.3 αi SV series

1-axis amplifier

Category	Ordering number	Name	Remarks
Standard	A06B-6117-H101	αi SV 4	HRV2 and HRV3 supported
	A06B-6117-H103	αi SV 20	HRV2 and HRV3 supported
	A06B-6117-H104	αi SV 40	HRV2 and HRV3 supported
	A06B-6117-H105	αi SV 80	HRV2 and HRV3 supported
	A06B-6117-H106	αi SV 160	HRV2 and HRV3 supported
	A06B-6117-H109	αi SV 360	DBM required HRV2, HRV3, and HRV4 supported
	A06B-6117-H153	αi SV 20L	HRV4 supported
	A06B-6117-H154	αi SV 40L	HRV4 supported
	A06B-6117-H155	αi SV 80L	HRV4 supported
	A06B-6117-H156	αi SV 160L	HRV4 supported

2-axis amplifier

Category	Ordering number	Name	Remarks
Standard	A06B-6117-H201	αi SV 4/4	HRV2 and HRV3 supported
	A06B-6117-H203	αi SV 4/20	HRV2 and HRV3 supported
	A06B-6117-H205	αi SV 20/20	HRV2 and HRV3 supported
	A06B-6117-H206	αi SV 20/40	HRV2 and HRV3 supported
	A06B-6117-H207	αi SV 40/40	HRV2 and HRV3 supported
	A06B-6117-H208	αi SV 40/80	HRV2 and HRV3 supported
	A06B-6117-H209	αi SV 80/80	HRV2 and HRV3 supported
	A06B-6117-H210	αi SV 80/160	HRV2 and HRV3 supported
	A06B-6117-H211	αi SV 160/160	HRV2 and HRV3 supported
	A06B-6117-H255	αi SV 20/20L	HRV4 supported
	A06B-6117-H256	αi SV 20/40L	HRV4 supported
	A06B-6117-H257	αi SV 40/40L	HRV4 supported
	A06B-6117-H258	αi SV 40/80L	HRV4 supported
	A06B-6117-H259	αi SV 80/80L	HRV4 supported

3-axis amplifier

Category	Ordering number	Name	Remarks
Standard	A06B-6117-H301	αi SV 4/4/4	HRV2 and HRV3 supported
	A06B-6117-H303	αi SV 20/20/20	HRV2 and HRV3 supported
	A06B-6117-H304	αi SV 20/20/40	HRV2 and HRV3 supported

Dynamic brake module

Category	Ordering number	Name	Remarks
Standard	A06B-6079-H401	DBM	αi SV 360

NOTE

- 1 See Section 4.1, "HOW TO SELECT THE αi SV SERIES (SERVOAMPLIFIER)" for details of how to select the αi SV.
- 2 For the αi SV 360, a dynamic brake module (DBM) is required.
The dynamic brake module is used to immediately stop the motor at emergency stop. Other αi SV models contain a similar function.

3.1.1.4 αi SP series

Ordering numbers depend on the detectors being used (function).

(1) TYPE A (1 spindle sensor input)

Category	Ordering number	Name	Remarks
Standard	A06B-6141-H002#H580	αi SP 2.2	
	A06B-6141-H006#H580	αi SP 5.5	
	A06B-6141-H011#H580	αi SP 11	
	A06B-6141-H015#H580	αi SP 15	
	A06B-6141-H022#H580	αi SP 22	
	A06B-6141-H026#H580	αi SP 26	
	A06B-6141-H030#H580	αi SP 30	
	A06B-6141-H037#H580	αi SP 37	
	A06B-6141-H045#H580	αi SP 45	
	A06B-6141-H055#H580	αi SP 55	

(2) TYPE B (2 spindle sensor inputs)

Category	Ordering number	Name	Remarks
Standard	A06B-6142-H002#H580	αi SP 2.2	
	A06B-6142-H006#H580	αi SP 5.5	
	A06B-6142-H011#H580	αi SP 11	
	A06B-6142-H015#H580	αi SP 15	
	A06B-6142-H022#H580	αi SP 22	
	A06B-6142-H026#H580	αi SP 26	
	A06B-6142-H030#H580	αi SP 30	
	A06B-6142-H037#H550	αi SP 37	
	A06B-6142-H045#H580	αi SP 45	
	A06B-6142-H055#H580	αi SP 55	

NOTE

See Section 4.2, "HOW TO SELECT THE αi SP SERIES (SPINDLE AMPLIFIER)" for details of how to select the αi SP.

3.1.2 400-V Input Series

3.1.2.1 αi PS series

Category	Ordering number	Name	Remarks
Standard	A06B-6150-H011	αi PS 11HV	
	A06B-6150-H018	αi PS 18HV	
	A06B-6150-H030	αi PS 30HV	
	A06B-6150-H045	αi PS 45HV	
	A06B-6150-H075	αi PS 75HV	
	A06B-6150-H100	αi PS 100HV	

NOTE

See Section 4.3, "HOW TO SELECT THE αi PS series (POWER SUPPLY)" for details of how to select the αi PS.

3.1.2.2 αi SV series

1-axis amplifier

Category	Ordering number	Name	Remarks
Standard	A06B-6127-H102	αi SV 10HV	HRV2 and HRV3 supported
	A06B-6127-H103	αi SV 20HV	HRV2 and HRV3 supported
	A06B-6127-H104	αi SV 40HV	HRV2 and HRV3 supported
	A06B-6127-H105	αi SV 80HV	HRV2 and HRV3 supported
	A06B-6127-H106	αi SV 180HV	DBM required HRV2, HRV3, and HRV4 supported
	A06B-6127-H109	αi SV 360HV	DBM required HRV2, HRV3, and HRV4 supported
	A06B-6127-H152	αi SV 10HVL	HRV4 supported
	A06B-6127-H153	αi SV 20HVL	HRV4 supported
	A06B-6127-H154	αi SV 40HVL	HRV4 supported
	A06B-6127-H155	αi SV 80HVL	HRV4 supported

2-axis amplifier

Category	Ordering number	Name	Remarks
Standard	A06B-6127-H202	αi SV 10/10HV	HRV2 and HRV3 supported
	A06B-6127-H205	αi SV 20/20HV	HRV2 and HRV3 supported
	A06B-6127-H206	αi SV 20/40HV	HRV2 and HRV3 supported
	A06B-6127-H207	αi SV 40/40HV	HRV2 and HRV3 supported
	A06B-6127-H208	αi SV 40/80HV	HRV2 and HRV3 supported
	A06B-6127-H209	αi SV 80/80HV	HRV2 and HRV3 supported
	A06B-6127-H252	αi SV 10/10HVL	HRV4 supported
	A06B-6127-H255	αi SV 20/20HVL	HRV4 supported
	A06B-6127-H256	αi SV 20/40HVL	HRV4 supported
	A06B-6127-H257	αi SV 40/40HVL	HRV4 supported

Dynamic brake module

Category	Ordering number	Name	Remarks
Standard	A06B-6079-H401	DBM	αi SV 180HV, αi SV 360HV
	A06B-6069-H300	DBM	αi SV 360HV (Note 3)

NOTE

- 1 See Section 4.1, "HOW TO SELECT THE α iSV SERIES (SERVOAMPLIFIER)" for details of how to select the α iSV.
- 2 For the α i SV 180HV and α i SV 360HV, a dynamic brake module (DBM) is required.
The dynamic brake module is used to immediately stop the motor at emergency stop. Other α i SV models contain a similar function.
- 3 A06B-6069-H300 is used when the servo motor is the α i S1000HV, 2000HV, or 3000HV.

3.1.2.3 αi SP series

Ordering numbers depend on the detectors being used (function).

(1) TYPE A (1 spindle sensor input)

Category	Ordering number	Name	Remarks
Standard	A06B-6151-H006#H580	αi SP 5.5HV	
	A06B-6151-H011#H580	αi SP 11HV	
	A06B-6151-H015#H580	αi SP 15HV	
	A06B-6151-H030#H580	αi SP 30HV	
	A06B-6151-H045#H580	αi SP 45HV	
	A06B-6151-H075#H580	αi SP 75HV	
	A06B-6151-H100#H580	αi SP 100HV	

(2) TYPE B (2 spindle sensor inputs)

Category	Ordering number	Name	Remarks
Standard	A06B-6152-H006#H580	αi SP 5.5HV	
	A06B-6152-H011#H580	αi SP 11HV	
	A06B-6152-H015#H580	αi SP 15HV	
	A06B-6152-H030#H580	αi SP 30HV	
	A06B-6152-H045#H580	αi SP 45HV	
	A06B-6152-H075#H580	αi SP 75HV	
	A06B-6152-H100#H580	αi SP 100HV	

NOTE

See Section 4.2, "HOW TO SELECT THE αi SP SERIES (SPINDLE AMPLIFIER)" for details of how to select the αi SP.

3.1.3 Others

3.1.3.1 AC reactor

Category	Ordering number	Applicable models	Remarks
Standard	A81L-0001-0155	αi PS 5.5, 11	(Note)
	A81L-0001-0156	αi PS 15	
	A81L-0001-0157	αi PS 26	
	A81L-0001-0158	αi PS 30	
	A81L-0001-0159	αi PS 37	
	A81L-0001-0160	αi PS 55	
	A81L-0001-0163	αi PS 11HV, 18HV	(Note)
	A81L-0001-0164	αi PS 30HV, 45HV	
	A81L-0001-0165	αi PS 75HV, 100HV	
	A81L-0001-0167	αi PS 11HV	(Note)
	A81L-0001-0170	αi PS 5.5	(Note)

For the outside dimensions, see Subsection 8.1.2, "AC Reactor Unit".
For the tightening torque, see Subsection 9.3.1.1, "Details of cable K1 (Common power supply line)".

NOTE

When an αi SV or αi SP unit with a small capacity is connected to the αi PS, the AC reactor unit A81L-0001-0170 (200-V input) or A81L-0001-0167 (400-V input) must be used. For details, see the next page.

AC reactor used when an αi SV or αi SP with a small capacity is connected to the αi PS

200-V input series

When only as many αi SV or αi SP units as indicated in the tables below are connected to a power regeneration type αi PS unit, AC reactor unit A81L-0001-0170 must be used.

CAUTION

- 1 When using the normal AC reactor, depending on the power state (when the power impedance is low or the voltage is out of balance), power regeneration is maintained and input current becomes too large, possibly damaging the amplifier.
- 2 This problem does not occur in the resistance regeneration type αi PS_R.

αi SV

Name	Number of connected units	Ordering number (*1)
αi SV 4	1	A06B-6117-H101
αi SV 4	2	A06B-6117-H101
αi SV 20	1	A06B-6117-H103
αi SV 20	2	A06B-6117-H103
αi SV 20L	1	A06B-6117-H153
αi SV 20L	2	A06B-6117-H153
αi SV 4/4	1	A06B-6117-H201
αi SV 4/20	1	A06B-6117-H203
αi SV 20/20	1	A06B-6117-H205
αi SV 20/20L	1	A06B-6117-H255

αi SP

Name	Number of connected units	Ordering number (*2)
αi SP 2.2	1	A06B-6141-H002#H580 A06B-6142-H002#H580

*1 The same restriction applies to the old specification A06B-6114-Hxxx.

*2 The same restriction applies to the old specifications A06B-6111-Hxxx and A06B-6112-Hxxx.

400-V input series

When only as many αi SV or αi SP units as indicated in the tables below are connected to a power regeneration type αi PS unit, AC reactor unit A81L-0001-0167 must be used.



CAUTION

When using the normal AC reactor, depending on the power state (when the power impedance is low or the voltage is out of balance), power regeneration is maintained and input current becomes too large, possibly damaging the amplifier.

αi SV

Name	Number of connected units	Ordering number (*1)
αi SV 10HV	1	A06B-6127-H102
αi SV 20HV	1	A06B-6127-H103
αi SV 10HVL	1	A06B-6127-H152
αi SV 20HVL	1	A06B-6127-H153
αi SV 10/10HV	1	A06B-6127-H202
αi SV 20/20HV	1	A06B-6127-H205
αi SV 10/10HVL	1	A06B-6127-H252
αi SV 20/20HVL	1	A06B-6127-H255

*1 The same restriction applies to the old specification A06B-6124-Hxxx.

3.1.3.2 AC line filter

Category	Ordering number	Applicable models	Remarks
Standard	A81L-0001-0083#3C	αi PS _R 3	
	A81L-0001-0101#C	αi PS _R 5.5	

For the dimensions of the AC line filters, see Section 8.1.3, "AC Line Filter".

As a compatible product of the A81L-0001-0083#3C, the A81L-0001-0171 can be used.

3.1.3.3 Sub module SW

Category	Ordering number	Applicable models	Remarks
Optional	A06B-6111-H401	αi SP TYPE A, TYPE B	Main unit 60-mm width
	A06B-6111-K808	αi SP 90mm,150mm TYPE A	Connection cable One cable needs to be prepared for each sub module SW.
	A06B-6111-K809	αi SP 90mm,150mm TYPE B	
	A06B-6111-K810	αi SP 60mm, TYPE A	
	A06B-6111-K811	αi SP 60mm, TYPE B	

A sub module SW can be used with the αi SP to support the spindle switch function.

- (a) A cable for connecting the sub module SW and the αi SP needs to be prepared.
- (b) See Section 10.3, and prepare a metal fitting for mounting the sub module SW.

3.1.3.4 Sub module SM

Category	Ordering number	Applicable models	Remarks
Optional	A06B-6111-H403	αi SP 5.5HV~45HV TYPE B	
	A06B-6111-H404	αi SP 75HV~100HV TYPE B	

A sub module SM is used with the αi SP TYPE B to drive a synchronous spindle motor.

3.1.3.5 Connectors

The ordering drawing number of the connectors required for connection of input/output signals of each amplifier, and the configuration of each connector, are shown below.

The "Use" column of the table indicates connection symbol K*, which is described in Section 9.3, "CABLE CONNECTION DETAILS."

For the connector dimensions, see Appendix C.

(1) Usable with each amplifier:

Connectors for the α i PS interface (between CXA2A and CXA2B)

Category	Ordering number	Quantity	Use	Connection tool
Standard	A06B-6110-K210	Housing: 1 pcs. Contact: 8 pcs.	K69 (Note 1)	Contact crimping tool A06B-6110-K220#D2M
	A06B-6110-K211	Housing: 1 pcs. Contact: 2 pcs.	(Note 2)	Contact crimping tool A06B-6110-K220#D2M

NOTE

- 1 See Subsection 9.3.1.4 as for the detailed connection of K69.
- 2 See Subsection 9.3.2.10 as for the connection of battery.

(2) Usable with each amplifier:

Power line connectors for motors and power supplies

Category	Ordering number	Quantity	Use	Connection tool
Standard	A06B-6110-K200 #XXSS	Housing: 1 pcs. (XX key) Contact: 4 pcs. (SS size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5SS
	A06B-6110-K200 #XXS	Housing: 1 pcs. (XX key) Contact: 4 pcs. (S size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5S
	A06B-6110-K200 #XXM	Housing: 1 pcs. (XX key) Contact: 4 pcs. (M size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5M
	A06B-6110-K200 #XXL	Housing: 1 pcs. (XX key) Contact: 4 pcs. (L size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5L
	A06B-6110-K201 #XYSS	Housing: 1 pcs. (XY key) Contact: 4 pcs. (SS size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5SS
	A06B-6110-K201 #XYS	Housing: 1 pcs. (XY key) Contact: 4 pcs. (S size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5S
	A06B-6110-K201 #XYM	Housing: 1 pcs. (XY key) Contact: 4 pcs. (M size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5M
	A06B-6110-K201 #XYL	Housing: 1 pcs. (XY key) Contact: 4 pcs. (L size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5L
	A06B-6110-K202 #YYSS	Housing: 1 pcs. (YY key) Contact: 4 pcs. (SS size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5SS
	A06B-6110-K202 #YYS	Housing: 1 pcs. (YY key) Contact: 4 pcs. (S size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5S
	A06B-6110-K202 #YYM	Housing: 1 pcs. (YY key) Contact: 4 pcs. (M size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5M
	A06B-6110-K202 #YYL	Housing: 1 pcs. (YY key) Contact: 4 pcs. (L size)	K1, K10, K21	Contact crimping tool A06B-6110-K220#D5L

(3) For αi PS

Category	Ordering number	Quantity	Use	Connection tool
Standard	A06B-6071-K203	Housing: 1 pcs./module Contact: 7 pcs.	K3, K6, K7	Contact crimping tool A06B-6110-K220#D3L
Standard	A06B-6130-K201	Housing: 1 pcs. Contact: 6 pcs.	K100	Contact crimping tool A06B-6110-K220#D2M

(4) For αi SV

Category	Ordering number	Quantity	Use	Connection tool
Standard	A06B-6078-K225	Case: 1 pcs. Connector: 1 pcs. Solder type	K22	
	A06B-6073-K216	Case: 2 pcs. Connector: 4 pcs.	K24,K25	Contact crimping tool A06B-6110-K220#D3L

(5) For αi SP

Category	Ordering number	Quantity	Use	Use
Standard	A06B-6078-K222	Case: 1 pcs. Connector: 1 pcs. Solder type	K14, K17, K71	
	A06B-6078-K223	Case: 1 pcs. Connector: 1 pcs. Crimp type	K12	Purchase a connector for F130-20S from Hirose Electric.
	A06B-6078-K224	Case: 1 pcs. Connector: 1 pcs. Solder type	K33	
	A06B-6078-K225	Case: 1 pcs. Connector: 1 pcs. Crimp type	K16	

NOTE

- 1 Some connectors are attached to a cable by crimping or soldering. Be careful when placing an order.
- 2 When attaching a connector of crimp type, use a dedicated tool prepared by each manufacturer. For the specifications of the tools, see the description of "Connection tools" below.

Connection tools

Connector connection tools are indicated below with their ordering numbers for purchase from FANUC. The connection tools can also be directly purchased from each manufacturer.

- (a) Connectors manufactured by Tyco Electronics AMP
D-2100 series (for αi PS interface)

Category	Ordering number	Manufacturer part number	Use
Optional	A06B-6110-K220#D2M	91595-1	M size Contact crimping tool
Optional	A06B-6110-K220#D2R	1276716-1	Contact extractor

- D-3000 series (for αi PS)

Category	Ordering number	Manufacturer part number	Use
Optional	A06B-6110-K220#D3L	91558-1	L size Contact crimping tool
Optional	A06B-6110-K220#D3R	234168-1	Contact extractor

- D-5000 series (for power line)

Category	Ordering number	Manufacturer part number	Use
Optional	A06B-6110-K220#D5SS	91596-1	SS size Contact crimping tool
Optional	A06B-6110-K220#D5S	234170-1	S size Contact crimping tool
Optional	A06B-6110-K220#D5M	234171-1	M size Contact crimping tool
Optional	A06B-6110-K220#D5L	1366044-1	L size Contact crimping tool
Optional	A06B-6110-K220#D5R	409158-1	Contact extractor

- (b) Half-pitch 20-pin press-mount connector of Hirose Electric (FI30-20S)

Name	Manufacturer part number
Jig for neat cabling	FI30-20CAT1
Jig for press-mounting	HHP-502, FI30-20GP

- (c) Half-pitch 20-pin press-mount connector of Honda Tsushin Kogyo (PCR-E20FA)

Name	Manufacturer part number
Jig for neat cabling	JGPS-015-1/1-20, JGPS-014
Jig for press-mounting	MFC-K1, PCS-K1

Connector configuration**- Configuration of A06B-6110-K210**

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CXA2A	AMP Japan, Ltd.	1-1318119-4 (housing)	1	For αi PS	C(d)
CXA2B		131807-1 (contact)	8		-

- Configuration of A06B-6110-K211

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CXA2A	AMP Japan, Ltd.	1-1318119-4 (housing)	1	For connection to separate battery	C(d)
CXA2B		131807-1 (contact)	2		-

- Configuration of A06B-6093-K303 (Connector with lock mechanism)

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CX5X	Japan Aviation Electronics Industry, Ltd.	IL-L2S—S3L-B (N)	1	For connection to separate battery	C(d)
		IL-C2-1-00001	2		-

- Configuration of A06B-6110-K200#XXSS

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2	AMP Japan, Ltd.	1-917807-2 (housing)	1	For L-axis motor power	-
CZ2L		1318986-6 (contact)	4	Wire diameter: 0.75 mm ² max.	-

- Configuration of A06B-6110-K200#XXS

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2	AMP Japan, Ltd.	1-917807-2 (housing)	1	For L-axis motor power	-
CZ2L		316040-6 (contact)	4	Wire diameter: 2.0mm ² max	-

- Configuration of A06B-6110-K200#XXM

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ1, CZ2	AMP Japan, Ltd.	1-917807-2 (housing)	1	For input power supply and L-axis motor power	-
CZ2L		316041-6 (contact)	4		Wire diameter: 5.5mm ² max

- Configuration of A06B-6110-K200#XXL

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2	AMP Japan, Ltd.	1-917807-2 (housing)	1	For L-axis motor power	-
CZ2L		1318697-6 (contact)	4	Wire diameter: 8.0mm ² max	-

- Configuration of A06B-6110-K201#XYSS

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2M	AMP Japan, Ltd.	3-917807-2 (housing)	1	For M-axis motor power Wire diameter: 0.75 mm ² max	-
		1318986-6 (contact)	4		-

- Configuration of A06B-6110-K201#XYS

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2M	AMP Japan, Ltd.	3-917807-2 (housing)	1	For M-axis motor power	-
		316040-6 (contact)	4	Wire diameter: 2.0mm ² max	-

- Configuration of A06B-6110-K201#XYM

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2M	AMP Japan, Ltd.	3-917807-2 (housing)	1	For M-axis motor power	-
		316041-6 (contact)	4	Wire diameter: 5.5mm ² max	-

- Configuration of A06B-6110-K201#XYL

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2M	AMP Japan, Ltd.	3-917807-2 (housing)	1	For M-axis motor power	-
		1318697-6 (contact)	4	Wire diameter: 8.0mm ² max	-

- Configuration of A06B-6110-K202#YYSS

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2N	AMP Japan, Ltd.	2-917807-2 (housing)	1	For N-axis motor power	-
		1318986-6 (contact)	4	Wire diameter: 0.75 mm ² max	-

- Configuration of A06B-6110-K202#YYSS

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2N CZ3	AMP Japan, Ltd.	2-917807-2 (housing)	1	For N-axis motor power	-
		316040-6 (contact)	4	PSR regenerative resistor Wire diameter: 2.0mm ² max	-

- Configuration of A06B-6110-K202#YYM

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2N	AMP Japan, Ltd.	2-917807-2 (housing)	1	For N-axis motor power	-
		316041-6 (contact)	4	Wire diameter: 5.5mm ² max	-

- Configuration of A06B-6110-K202#YYL

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CZ2N	AMP Japan, Ltd.	2-917807-2 (housing)	1	For N-axis motor power	-
		1318697-6 (contact)	4	Wire diameter: 8.0mm ² max	-

- Configuration of A06B-6071-K203

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CX1A	AMP Japan, Ltd.	1-178128-3 (housing)	1	For control, single-phase 200VAC input	C(a)
		1-175218-2 (contact)	3		C(c)
CX4	AMP Japan, Ltd.	1-178128-3 (housing)	1	For emergency stop signal	C(a)
		1-175218-2 (contact)	2		C(c)
CX3	AMP Japan, Ltd.	2-178128-3 (housing)	1	For ON/OFF control for external MCC	C(b)
		1-175218-2 (contact)	2		C(c)

- Configuration of A06B-6130-K201

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CX37	AMP Japan, Ltd.	1-1318119-3 (housing)	1	For power failure detection output	-
		1318107-1 (contact)	6		-

- Configuration of A06B-6078-K225 (solder type, side cable type)

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
JFx	Hirose Electric Co., Ltd.	FI40B-2015S (connector)	1	For pulse coder	C(g)
		FI-20-CVS2 (case)	1		C(h)

- Configuration of A06B-6073-K216

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
CX8	AMP Japan, Ltd.	2-178128-3 (housing)	1	For DB interlock signals	C(b)
		1-175218-2 (contact)	2		C(c)
CX9	AMP Japan, Ltd.	1-178128-3 (housing)	1	For DB driving coil	C(a)
		1-175218-2 (contact)	2		C(c)

- Configuration of A06B-6078-K222 (solder type, side cable type)

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
JY1 JYA2 JYA3 JYA4	Hirose Electric Co., Ltd.	FI40B-20S (connector)	1	See below.	C(f)
		FI-20-CVS5 (case)	1		C(i)

Use αi M sensor, αi MZ sensor, αi BZ sensor, external one-rotation signal, speedometer, or analog override

- Configuration of A06B-6078-K223 (crimp type, side cable type)

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
JA7A JA7B	Hirose Electric Co., Ltd.	FI30-20S (connector)	1	See below.	C(e)
		FI-20-CVS2 (case)	1		C(h)

Use JA7A and JA7B : For communication between CNC and SP or SPC

- Configuration of A06B-6078-K224 (solder type, side cable type)

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
JA7A JA7B	Hirose Electric Co., Ltd.	FI40B-20S (connector)	1	See below.	C(f)
		FI-20-CVS2 (case)	1		C(h)

Use JY7B and JY7B : For communication between CNC and SP or SPC

- Configuration of A06B-6078-K225 (solder type, side cable type)

Connector name	Manufacturer	Part number	Quantity	Use	Dimensions
JYA3 JYA4	Hirose Electric Co., Ltd.	FI40B-2015S (connector)	1	See below.	C(g)
		FI-2015-CVS (case)	1		C(i)

Use JYA3: For αi position coder
JYA4: For αi position coder S

3.1.3.6 Fuses

The ordering numbers of fuses used with each amplifier (αi PS, αi SV, αi SP) are indicated below.

(1) For control power supply for αi PS

Category	Ordering number	Remarks
Optional	A06B-6077-K250	Manufacturer: DAITO TSUSHIN KOGYO Ltd. Manufacturer part number : DM20, DM50 Specification : 2A/250V, 5A/250V Use : For short-circuit protection of 200VAC

(2) For control power supply for αi PS_R

Category	Ordering number	Remarks
Optional	A06B-6081-K250	Manufacturer: DAITO TSUSHIN KOGYO Ltd. Manufacturer part number : DM50 Specification : 5A/250V Use : For short-circuit protection of 200VAC

(3) For control power supply for αi SV and αi SP

Category	Ordering number	Remarks
Optional	A06B-6073-K250	Manufacturer: DAITO TSUSHIN KOGYO Ltd. Manufacturer part number : LM32C Specification : 3.2A/48V Use : For short-circuit protection of 24-VDC control power supply

NOTE

- 1 When a fuse blows, the control circuit may often be faulty. In such a case, replacing the fuse does not correct the trouble. Replace the amplifier.
- 2 A fuse is installed on the control board of an amplifier, but is not directly accessible for replacement from the outside. When replacing a fuse, extract the control board.

3.1.3.7 Power transformer

When an αi PS series of the 200V input series is used in an area where the input voltage is not within the range of 200 to 240VAC, a power transformer is required. The ordering drawing numbers and specifications of power transformers manufactured by FANUC are listed below. When other than a FANUC power transformers is to be prepared by the user, it must satisfy the transformer specifications indicated Section 2.1.

Ordering drawing numbers of power transformers manufactured by FANUC

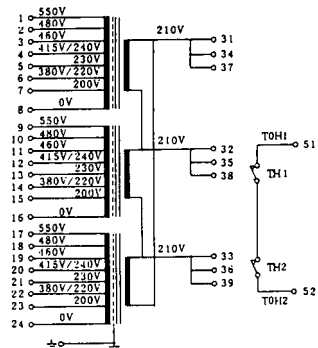
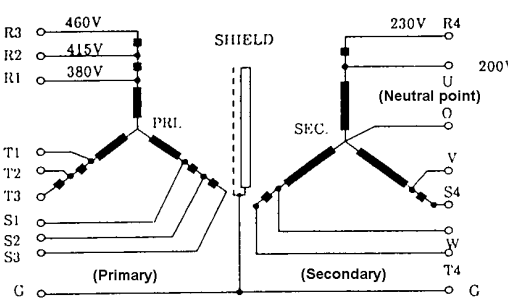
Category	Ordering number	Name	Remarks
Optional	A80L-0024-0006	αi PS _R 3 (at 2kw output)	
	A80L-0024-0003	αi PS _R 3 (at 3kw output)	
	A06B-6052-J001	αi PS _R 5.5 (at 5.5kw output) αi PS 5.5	Primary 380/415/460VAC Secondary 200VAC
	A06B-6044-J006	αi PS _R 5.5 (at 7.5kw output) αi PS 11i	
	A06B-6044-J007	αi PS 15	
	A06B-6044-J010	αi PS 26, 30	
	A06B-6044-J015	αi PS 37 αi PS 55 (at 45kw output)	

Specifications of power transformers manufactured by FANUC

Power transformer for αi PS

Model	αi PS 5.5	αi PS 11	αi PS 15	αi PS 26, 30	αi PS 37 αi PS 55 (at 45kw output)
Ordering drawing number	A06B-6052-J001	A06B-6044-J006	A06B-6044-J007	A06B-6044-J010	A06B-6044-J015
FANUC drawing number	A80L-0001-0496	A80L-0001-0313	A80L-0001-0314	A80L-0001-0352	A80L-0001-0452
Rated capacity	10kVA	20kVA	30kVA	45kVA	64kVA
Rated primary voltage	380/415/460VAC 230VAC (The secondary is used as an autotransformer.) +10% -15%, 50/60 $\pm$ 1Hz, 3 ϕ				
Rated primary current	15A (at 380V)	30A (at 380V)	46A (at 380V)	68A (at 380V)	97A (at 380V)
	14A (at 415V)	28A (at 415V)	42A (at 415V)	63A (at 415V)	89A (at 415V)
	13A (at 460V)	25A (at 460V)	38A (at 460V)	56A (at 460V)	80A (at 460V)
Rated secondary voltage	200/220/230VAC				
Rated primary current	29A	58A	87A	130A	185A
Voltage regulation at the secondary	5%				
Voltage deviation at the secondary	$\pm 3\%$				
Connection	Y-Y connection				
Insulation	Class H (maximum allowable temperature : 180°C)				
Ambient temperature	0 to 45°C				
Allowable temperature rise	135deg				
Relative humidity	Max. 95%RH				
Type	Dry type, natural air cooling type				
Dielectric withstand voltage	2000VAC, for 1 minute				
Weight	Max. 61kg	Max. 115kg	Max. 165kg	Max. 260kg	Max. 375kg
Outline drawing	Fig.8.1.4(a)	Fig.8.1.4(b)	Fig.8.1.4(c)	Fig.8.1.4(d)	Fig.8.1.4(e)
Connection diagram	The connection diagram illustrates the internal wiring of the transformer. On the left, the primary winding (PRL) is connected to terminals R3 (460V), R2 (415V), and R1 (380V). The secondary winding (SEC.) is connected to terminals R4 (230V), U (200V), and V (Neutral point). The diagram also shows a shield (SHIELD) and a ground connection (G). The primary winding is connected to terminals T1, T2, and T3, and the secondary winding is connected to terminals S1, S2, and S3. The secondary winding is also connected to terminals S4, W, and T4. The primary winding is connected to terminals G and C.				

Power transformer for αi PS_R

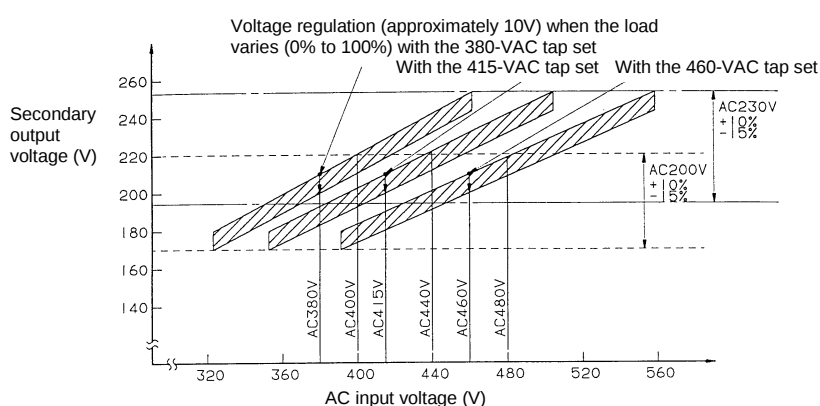
Model Item	αi PS _R 3 (at 2kw output)	αi PS _R 3 (at 3kw output)	αi PS _R 5.5 (at 5.5kw output)	αi PS _R 5.5 (at 7.5kw output)
Ordering drawing number	A80L-0024-0006	A80L-0026-0003	A06B-6052-J001	A06B-6044-J006
FANUC drawing number	A80L-0024-0006	A80L-0026-0003	A80L-0001-0496	A80L-0001-0313
Rated capacity	3.5kVA	5kVA	10kVA	20kVA
Rated primary voltage	200/220/230/240VAC , Δ connection 380/415/460/480/550VAC , Y connection $\pm$ 15%, 50/60Hz $\pm$ 2Hz, 3 ϕ		380/415/460VAC 230VAC(The secondary is used as an autotransformer.) $+10\%$ -15%, 50/60 $\pm$ 1Hz, 3 ϕ	
Rated primary current			15A (at 380V)	30A (at 380V)
	5.3A (at 380V)	7.6A (at 380V)	14A (at 415V)	28A (at 415V)
			13A (at 460V)	25A (at 460V)
Rated secondary voltage	210VAC		200VAC	
Rated primary current	9.6A	13.7A	29A	58A
Voltage regulation at the secondary	2%		5%	
Voltage deviation at the secondary	$\pm$ 3%			
Connection	Δ - Δ connection or Y- Δ connection		Y-Y connection	
Insulation	Class B (maximum allowable temperature: 130°C)		Class H (maximum allowable temperature: 180°C)	
Ambient temperature	-20 to 55°C		0 to 45°C	
Allowable temperature rise	135deg			
Thermostat	B contact (operating temperature: 135°C)		None	
Relative humidity	Max. 95%RH			
Type	Dry type, natural air cooling type			
Dielectric withstand voltage	2300VAC, for 1 minute		2000VAC, for 1 minute	
Weight	Max. 27kg	Max. 36kg	Max. 61kg	Max. 115kg
Outline drawing	Fig.8.1.5(e)	Fig.8.1.5(e)	Fig.8.1.5(a)	Fig.8.1.5(b)
Connection diagram				

Connecting a power transformer

Power transformers must be set according to the supply voltage used.

- (a) Connection points of power transformers for αi PS 5.5, αi PS 11, αi PS 15, αi PS 26, αi PS 30, and αi PS 37

Supply voltage	Connection points at the primary	Remarks
380 VAC	R - R1, S - S1, T - T1 (380-V tap)	
400 VAC	R - R1, S - S1, T - T1 (380-V tap)	
415 VAC	R - R2, S - S2, T - T2 (415-V tap)	
440 VAC	R - R2, S - S2, T - T2 (415-V tap)	
460 VAC	R - R3, S - S3, T - T3 (460-V tap)	
480 VAC	R - R3, S - S3, T - T3 (460-V tap)	



⚠ CAUTION

- 1 When installing a transformer in a cabinet, be careful to ensure that the transformer does not thermally affect other equipment. For example, separate the transformer from the other equipment.
- 2 When installing a transformer outside the cabinet, make sure that the transformer is not directly exposed to cutting chips or coolant.
- 3 If there is a possibility of the transformer falling, secure the transformer with bolts or similar.

3.1.3.8 Regenerative discharge unit

Whenever a αi PS_R (resistance regeneration type Common Power Supply) is used, a regenerative discharge unit must be specified. For how to select the regenerative discharge unit, see Subsection 4.4.4.

Category	Name	Ordering number	Remarks
Standard	αi PS _R 3	A06B-6089-H510	16 Ω /100W (at natural cooling)
	αi PS _R 3, 5.5	A06B-6089-H500	16 Ω /200W (at natural cooling)
		A06B-6089-H713	16 Ω /800W (forced cooling fan motor is included)
	αi PS _R 5.5	A06B-6089-H711	8 Ω /800W (forced cooling fan motor is included)
		A06B-6089-H712	8 Ω /1200W (forced cooling fan motor is included)

See Subsection 8.1.5, "Selecting a Regenerative Discharge Unit" for details of selection.

3.1.3.9 Cables

DC link short bar

Category	Ordering number	Applicable terminal-to-terminal distance
Optional	A06B-6078-K801	90mm (86mm - 94mm)
	A06B-6078-K803	64mm (60mm - 68mm)
	A06B-6078-K840	154mm (150mm - 158mm)
	A06B-6078-K841	300mm (298mm - 302mm)
	A06B-6078-K842	150mm (146mm - 154mm)

See 9.3.1.2 for details.

A06B-6078-K842 is used to connect between a 150-mm wide amplifier (left) and a 300-mm wide amplifier (right).

Cables for connection of amplifiers

Category	Ordering number	Cable length	Applicable amplifier width
Optional	A06B-6110-K801	200mm	150mm width amplifier
	A06B-6110-K802	150mm	90mm width amplifier
	A06B-6110-K803	100mm	60mm width amplifier
	A06B-6110-K804	400mm	300mm width amplifier

NOTE

- 1 The above table lists the cable for each interface between amplifiers.
For connection of CXA2A and CXA2B
- 2 The connection cable for the battery of the absolute pulse coder is not included in the cables shown above. For details, see Subsection 9.3.1.10.

Cables for connection of detectors

Category	Ordering number	Use	Remarks
Optional	A06B-6078-K811	For αi M sensor, αi MZ sensor	Cable length : 7m
	A06B-6078-K814	For αi Positioncoder	Cable length : 7m Connector figure : Straight
	A06B-6078-K815		Cable length : 7m Connector figure : Elbow

Cables for FSSB interface

Category	Ordering number	Cable length	Applicable amplifier width
Optional	A66L-6001-0023#L150R0	15cm	For between αi SV and αi SV
	A66L-6001-0023#L300R0	30cm	

3.1.3.10 Circuit breaker and magnetic contactor

The circuit breaker and magnetic contactor capacities are determined by the Common Power Supply specifications. The ordering drawing numbers and specifications of the circuit breakers and magnetic contactors are shown below.

When this equipment is to be prepared by the user, it must satisfy the circuit breaker and magnetic contactor specifications indicated below.

Circuit breaker and magnetic contactor specifications

For αi PS and αi PS_R

PS name	Circuit breaker 1	Circuit breaker 2	Magnetic contactor	Remarks
αi PS _R 3	20A	5A	20A	
αi PS _R 5.5	30A		30A	Note 4)
	50A		50A	Note 5)
αi PS 5.5	30A to 50A		30A	
αi PS 11	55A to 75A		55A	
αi PS 15	70A to 100A		70A	
αi PS 26	120A to 150A		120A	
αi PS 30	140A to 200A		140A	
αi PS 37	175A to 225A		175A	
αi PS 55	250A		250A	

NOTE

- 1 For the installation positions of the circuit breakers and magnetic contactor, see Section 1.2.
- 2 Set the rated voltage of circuit breakers 1 and 2 according to the power supply voltage.
- 3 The current and voltage of the operation coil of the magnetic contactor must be within the rating of the internal contact [CX3 (MCC)] of the αi PS.
For details, see Subsection 9.3.1.5.
- 4 When the αi PS_R 5.5 is used at a rated output capacity of 5.5 kW
- 5 When the αi PS_R 5.5 is used at a rated output capacity of 7.5 kW
- 6 When the circuit breaker trips, the contact of the magnetic contactor may be melted. Therefore, before turning on the circuit breaker again, check to make sure that the contact of the magnetic contactor is not melted.

For 400-V input series of αi PS

PS name	Circuit breaker 1	Circuit breaker 2	Circuit breaker 3	Magnetic contactor	Remarks
αi PS 11HV	30A	3A	3A	30A	
αi PS 18HV	45A			45A	
αi PS 30HV	75A			75A	
αi PS 45HV	125A			125A	
αi PS 75HV	200A			200A	
αi PS 100HV	250A			250A	

NOTE

- 1 For the installation positions of the circuit breakers and magnetic contactor, see Section 1.2.
- 2 Set the rated voltage of circuit breakers 1 and 2 according to the power supply voltage.
- 3 The current and voltage of the operation coil of the magnetic contactor must be within the rating of the internal contact [CX3 (MCC)] of the αi PS.
For details, see Subsection 9.3.1.5.
- 4 When the circuit breaker trips, the contact of the magnetic contactor may be melted. Therefore, before turning on the circuit breaker again, check to make sure that the contact of the magnetic contactor is not melted.

Ordering drawing numbers of circuit breakers

Category	Model	Ordering number	Outline drawing	Circuit breaker specification	Circuit breaker cover specification
Optional	αi PS _R 3 αi PS 11HV	A06B-6077-K101	8.1.7(a)	Fuji Electric EA53C/30	Fuji Electric BZ6TBH10C3
	αi PS _R 5.5 αi PS 5.5 αi PS 18HV	A06B-6077-K102	8.1.7(b)	Fuji Electric EA103C/50	Fuji Electric BZ6TBH10C3
	αi PS 11	A06B-6077-K103	8.1.7(c)	Fuji Electric EA103C/60	Fuji Electric BZ6TBH10C3
	αi PS 15, 30HV	A06B-6077-K104	8.1.7(d)	Fuji Electric EA103C/75	Fuji Electric BZ6TBH10C3
	αi PS 45HV	A06B-6077-K108	8.1.7(e)	Fuji Electric EA203B/125	Fuji Electric BZ-TB40B
	αi PS 26, 30	A06B-6077-K105	8.1.7(f)	Fuji Electric EA203B/150	Fuji Electric BZ-TB40B
	αi PS 37	A06B-6077-K110	8.1.7(g)	Fuji Electric EA203B/175	Fuji Electric BZ-TB40B
	αi PS 75HV	A06B-6077-K109	8.1.7(h)	Fuji Electric EA203B/200	Fuji Electric BZ-TB40B
	αi PS 55, 100HV	A06B-6077-K111	8.1.7(i)	Fuji Electric EA403B/250	Fuji Electric BZ-TB60B
	For control power	A06B-6077-K106	8.1.7(j)	Fuji Electric EA33AC/5	Fuji Electric BZ6TBH10C3

Ordering drawing numbers of magnetic contactors

Category	Model	Ordering number	Outline drawing	Magnetic contactor specification	Magnetic contactor cover specification
Optional	αi PS _R 3 , αi PS 11HV	A06B-6077-K121	8.1.7(a)	Fuji Electric SC-5-1	Fuji Electric SZ-JC4
	αi PS _R 5.5, αi PS 5.5 αi PS 18HV	A06B-6077-K122	8.1.7(b)	Fuji Electric SC-N1	Fuji Electric SZ-N1J
	αi PS 11	A06B-6077-K123	8.1.7(b)	Fuji Electric SC-N2	Fuji Electric SZ-N1J
	αi PS 15, 30HV	A06B-6077-K124	8.1.7(c)	Fuji Electric SC-N2S	Fuji Electric SZ-N2SJ
	αi PS 26, 45HV	A06B-6077-K125	8.1.7(d)	Fuji Electric SC-N4	Fuji Electric SZ-N4J
	αi PS 30	A06B-6077-K126	8.1.7(e)	Fuji Electric SC-N5	Fuji Electric SZ-N4J
	αi PS 37, 75HV	A06B-6077-K128	8.1.7(f)	Fuji Electric SC-N7	Fuji Electric SZ-N7J
	αi PS 55, 100HV	A06B-6077-K127	8.1.7(g)	Fuji Electric SC-N8	Fuji Electric SZ-N8J

NOTE

The coil voltage specification of the magnetic contactor is 200VAC.

3.1.3.11 Lightning surge protector

To protect equipment from surge voltages caused by lightning, install a lightning surge protector between lines and between a line and ground. For how to install protectors, see Appendix A.

Lightning surge protector specifications

Category	Ordering number	Specification	Outline drawing	Remarks
Optional	A06B-6077-K142	For line-to-line installation : RAV-781BYZ-2 For line-to-ground installation : RAV-781BXZ-4	8.1.9(a)	Manufactured by Okaya Electric Industries Co., Ltd. For 200VAC line TÜV approved products
	A06B-6077-K143	For line-to-line installation : RAV-152BYZ-2A For line-to-ground installation : RAV-801BXZ-4	8.1.9(b)	Manufactured by Okaya Electric Industries Co., Ltd. For 400VAC line TÜV approved products
	A06B-6077-K144	Integration type for line-to-line installation/line-to-ground installation: RCM-601BUZ-4	8.1.9(c)	Manufactured by Okaya Electric Industries Co., Ltd. For 200VAC line TÜV approved products

* The line-to-line or line-to-ground installation type (A06B-6077-K144) and the integration type (A06B-6077-K142) are equivalent in performance and specifications.

3.1.3.12 Noise filter

A noise filter must be installed in the PS input section to satisfy the requirements of the EMC Directives which are now being enforced in the EU countries.

Category	Model	Ordering number	Outline drawing	Rated output	Specification
Optional	αi PS _R 3 PS 5.5i	A06B-6077-K155	8.1.10	30A	3SUP-HL30-ER-6: Okaya Electric Industries Co., Ltd.
	αi PS _R 5.5 αi PS 11 ,15	A06B-6077-K156		75A	3SUP-HL75-ER-6: Okaya Electric Industries Co., Ltd.
	αi PS 26, 30	A06B-6077-K157		150A	3SUP-HL150-ER-6: Okaya Electric Industries Co., Ltd.
	αi PS 37	A06B-6077-K158		200A	3SUP-HL200-ER-6: Okaya Electric Industries Co., Ltd.

Category	Model	Ordering number	Outline drawing	Rated output	Specification
Optional	αi PS _R 3 αi PS 5.5, 11HV	A06B-6110-K160	8.1.10	50A	NF3050C-VQ: Soshin Electric Co., Ltd.
	αi PS _R 5.5 αi PS 11 ,15 αi PS 18HV, 30HV	A06B-6110-K161		80A	NF3080C-VQ: Soshin Electric Co., Ltd.
	αi PS 26, 30 αi PS 45HV	A06B-6110-K162		150A	NF3150C-VQ: Soshin Electric Co., Ltd.
	αi PS 37 αi PS 75HV	A06B-6110-K163		200A	NF3200C-VQ: Soshin Electric Co., Ltd.
	αi PS 55 αi PS 100HV	A06B-6110-K164		250A	NF3250C-VQ: Soshin Electric Co., Ltd.

NOTE

- 1 A06B-6110-K160 to A06B-6110-K164 (manufactured by Soshin Electric Co., Ltd.) are high leakage type filters for neutral grounding. They are not used for purposes other than neutral grounding.
- 2 The above models are listed as guidelines for selection. Load currents of the CNC, amplifier, and other devices flow through the noise filter. Obtain these load currents, and select a noise filter so that the obtained load currents do not exceed the rated current of the noise filter.

3.1.3.13 Sensors for servo

αi CZ sensor (separate detector)

Category	Name	Ordering number	Remarks
Optional	αi CZ sensor 512AS	A860-2164-T411	512 teeth / 15,000min ⁻¹
	αi CZ sensor 768AS	A860-2164-T511	768 teeth / 10,000min ⁻¹
	αi CZ sensor 1024AS	A860-2164-T611	1024 teeth / 8,000min ⁻¹

3.1.3.14 Sensors for spindle

αi Positioncoder

Category	Name	Ordering number	Remarks
Optional	αi Positioncoder	A860-2109-T302	☐ 68, 10,000min ⁻¹
	Connector kit	A06B-6088-K211	Straight type

α Positioncoder S (analog output type)

Category	Name	Ordering number	Remarks
Optional	α Positioncoder S	A860-0309-T352	☐ 68, 10,000min ⁻¹
	Connector kit	A06B-6088-K211	Straight type

αi BZ sensor (compact type)

Name	Ordering number		Remarks			
	Waterproof connector specification	Non-waterproof connector specification	Number of teeth	Maximum speed	Detection ring	
αi BZ sensor 128	A860-2150-T201	A860-2155-T201	128	20,000min ⁻¹	$\phi 40$	$\phi 52$
αi BZ sensor 128H	A860-2150-T211	A860-2155-T211		70,000min ⁻¹		
αi BZ sensor 192	A860-2150-T301	A860-2155-T301	192	20,000min ⁻¹	$\phi 60$	$\phi 77.6$
αi BZ sensor 192H	A860-2150-T311	A860-2155-T311		40,000min ⁻¹		
αi BZ sensor 256	A860-2150-T401	A860-2155-T401	256	15,000min ⁻¹	$\phi 82$	$\phi 103.2$
αi BZ sensor 256S	A860-2150-T404	A860-2155-T404			$\phi 88$	
αi BZ sensor 256H	A860-2150-T411	A860-2155-T411		30,000min ⁻¹	$\phi 82$	
αi BZ sensor 384	A860-2150-T511	A860-2155-T511	384	15,000min ⁻¹	$\phi 125$	$\phi 154.4$
αi BZ sensor 512	A860-2150-T611	A860-2155-T611	512	10,000min ⁻¹	$\phi 160$	$\phi 205.6$

αi CZ sensor (for built-in spindle motor *1)

Category	Name	Ordering number	Remarks
Optional	αi CZ sensor 512 I	A860-2161-T411	512 teeth / 15,000min ⁻¹
	αi CZ sensor 768 I	A860-2161-T511	768 teeth / 10,000min ⁻¹
	αi CZ sensor 1024 I	A860-2161-T611	1024 teeth / 8,000min ⁻¹

αi CZ sensor (for spindle *1)

Category	Name	Ordering number	Remarks
Optional	αi CZ sensor 512 IS	A860-2163-T411	512 teeth / 15,000min ⁻¹
	αi CZ sensor 768 IS	A860-2163-T511	768 teeth / 10,000min ⁻¹
	αi CZ sensor 1024 IS	A860-2163-T611	1024 teeth / 8,000min ⁻¹

NOTE

*1 This αi CZ sensor is of the serial interface type.

It is supported by the following αi SP units
(manufactured in May 2007 and later):

Supported unit version: B and later

200-V input series : A06B-6141-H002, H006, H011,
H015, H030, H037,
H055#H580

400-V input series : A06B-6151-H006, H011, H015,
H045, H075, H100#H580

Supported unit version: C and later

200-V input series : A06B-6141-H022, H026,
H045#H580

400-V input series : A06B-6151-H030#H580

3.1.3.15 Power line switch unit

Spindle switch control (Y/Y switch type)

Output switch control (Y/Y switch type, Y/ Δ switch type)

Category	Name	Ordering number	Remarks
Optional	Y/Y switch type	A06B-6078-K034	(Note)
	Y/ Δ switch type	A06B-6078-K035	(Note)
	Y/Y switch type	A06B-6078-K036	(Note)
	Y/ Δ switch type	A06B-6078-K037	(Note)

NOTE

Select one type depending on the peak rated
current of a spindle motor to be applied.
For details, see Subsection 10.2.3.

3.1.3.16 Battery for absolute Pulsecoder

For connection of a battery for an absolute Pulsecoder, two methods are available. For each method, options are available.

NOTE

- 1 A battery needs to be maintained periodically. So, [connection type 1] is recommended because this type uses a battery (consisting of four size D alkaline cells) easily obtainable from the market.
- 2 A built-in battery used with [connection type 2] is not available on the market, but needs to be purchased from FANUC. So, it is recommended to purchase spare built-in batteries.

[Connection type 1]

Power is fed from one battery to multiple αi SV models.

(See Subsection 9.3.1.10.)

Category	Ordering number	Name	Remarks
Optional	A06B-6050-K061	Battery	Four pieces of size D battery
	A06B-6050-K060	Battery case	
	A06B-6110-K211	Battery connection connector	

[Connection type 2]

A battery is built into each αi SV.

(See Subsection 9.3.2.10.)

Category	Ordering number	Name	Remarks
Optional	A06B-6114-K504	Built-in battery	Lithium battery
Optional	A06B-6114-K505	Battery case	For αi SV 60/90 mm wide
Optional	A06B-6114-K506	Battery case	For αi SV 150/300 mm wide αi SV 360 αi SV 180HV αi SV 360HV

4

HOW TO SELECT THE MODULE

Chapter 4, "HOW TO SELECT THE MODULE", consists of the following sections:

4.1	HOW TO SELECT THE αi SV series (SERVO AMPLIFIER).....	80
4.2	HOW TO SELECT THE αi SP series (SPINDLE AMPLIFIER).....	84
4.3	HOW TO SELECT THE αi PS (POWER SUPPLY)	86
4.4	HOW TO SELECT THE αi PS _R series (POWER SUPPLY, RESISTANCE REGENERATION TYPE).....	90
4.5	LIST OF MOTOR OUTPUT CAPACITIES FOR αi PS AND αi PS _R SERIES SELECTION	96

4.1 HOW TO SELECT THE αi SV SERIES (SERVO AMPLIFIER)

Select an appropriate αi SV module for the selected servo motor.

Table 4.1(a) Specification

No	Specification	Number of connected axes	Input voltage	Interface with CNC
1	A06B-6117-H1xx	1	200V	FSSB
2	A06B-6117-H2xx	2	200V	FSSB
3	A06B-6117-H3xx	3	200V	FSSB
4	A06B-6127-H1xx	1	400V	FSSB
5	A06B-6127-H2xx	2	400V	FSSB

4.1.1 200-V Input Series

Amplifier model 200V type		Motor model			Group A	Group B	Group C	Group D	Group E	Group F	Group G	Group H
		HRV2/3	HRV4	Outline								
1-axis	αI SV 4	○	○	TYPE I	○							
	αI SV 20	○	-			○						
	αI SV 20L	○	○			○						
	αI SV 40	○	-	TYPE II			○					
	αI SV 40L	○	○				○					
	αI SV 80	○	-					○				
	αI SV 80L	○	○					○				
	αI SV 160	○	-						○	○		
	αI SV 160L	○	○						○	○		
	αI SV 360	○	○	TYPE IV							○	○ (*2)
2-axes	αI SV 4/4	○	○	TYPE I	L/M							
	αI SV 4/20	○	-		L	M						
	αI SV 20/20	○	-			L/M						
	αI SV 20/20L	○	○	TYPE II		L/M						
	αI SV 20/40	○	-			L	M					
	αI SV 20/40L	○	○			L	M					
	αI SV 40/40	○	-				L/M					
	αI SV 40/40L	○	○				L/M					
	αI SV 40/80	○	-				L	M				
	αI SV 40/80L	○	○	TYPE III			L	M				
	αI SV 80/80	○	-	TYPE II				L/M				
	αI SV 80/80L	○	○	TYPE III				L/M				
	αI SV 80/160	○	-					L	M			
	αI SV 160/160	○	-						L/M			
3-axes	αI SV 4/4/4	○	-	TYPE I	L/M/N							
	αI SV 20/20/20	○	-			L/M/N						
	αI SV 20/20/40	○	-	TYPE II		L/M	N					

*1) "SV" of αI SV means "SerVo".

*2) Two servo amplifiers are necessary to drive one motor.

group A: βiS 0.2/5000, βiS 0.3/5000

group B: αiS 2/5000, αiS 2/6000, αiS 4/5000, αiF 1/5000, αiF 2/5000

βiS 0.4/5000, βiS 0.5/6000, βiS 1/6000, βiS 2/4000, βiS 4/4000, βiS 8/3000, βiS 12/2000

group C: αiF 4/4000, αiF 8/3000, βiS 12/3000, βiS 22/2000

group D: αiS 8/4000, αiS 8/6000, αiS 12/4000, αiF 12/3000, αiF 22/3000

group E: αiS 22/4000, αiS 30/4000, αiS 40/4000, αiF 30/3000, αiF 40/3000

group F: αiS 22/4000, αiS 30/4000, αiS 40/4000, αiF 30/3000, αiF 40/3000, αiF 40/3000 with fan

group G: αiS 50/3000 with fan, αiS 100/2500, αiS 200/2500

group H: αiS 300/2000, αiS 500/2000

4.1.2 400-V Input Series

Amplifier model 400V type		Motor model			Group A	Group B	Group C	Group D	Group E	Group F	Group G
		HRV2/3	HRV4	Outline							
1-axis	αi SV 10HV	○	-	TYPE I	○						
	αi SV 10HVL	○	○	TYPE II	○						
	αi SV 20HV	○	-			○					
	αi SV 20HVL	○	○			○					
	αi SV 40HV	○	-				○				
	αi SV 40HVL	○	○				○				
	αi SV 80HV	○	-					○			
	αi SV 80HVL	○	○	TYPE III				○			
	αi SV 180HV	○	○	TYPE IV					○		
	αi SV 360HV	○	○	TYPE V						○	○ (*2)
2-axes	αi SV 10/10HV	○	-	TYPE I	L/M						
	αi SV 10/10HVL	○	○	TYPE II	L/M						
	αi SV 20/20HV	○	-			L/M					
	αi SV 20/20HVL	○	○	TYPE III		L/M					
	αi SV 20/40HV	○	-			L	M				
	αi SV 20/40HVL	○	○			L	M				
	αi SV 40/40HV	○	-				L/M				
	αi SV 40/40HVL	○	○				L/M				
	αi SV 40/80HV	○	-				L	M			
	αi SV 80/80HV	○	-					L/M			

*1) "SV" of αi SV means "SerVo".

*2) Two servo amplifiers are necessary to drive one motor.

group A: αi S 2/5000HV, αi S 2/6000HV, αi S 4/5000HV, βi S 2/4000HV, βi S 4/4000HV, βi S 8/3000HV

group B: αi F 4/4000HV, αi F 8/3000HV, βi S 12/3000HV, βi S 22/2000HV

group C: αi S 8/4000HV, αi S 8/6000HV, αi S 12/4000HV, αi F 12/3000HV, αi F 22/3000HV

group D: αi S 22/4000HV, αi S3 0/4000HV, αi S 40/4000HV

group E: αi S 50/3000HV with fan, αi S 100/2500HV, αi S 200/2500HV

group F: αi S 300/2000HV, αi S 500/2000HV

group G: αi S 1000/2000HV

4.1.3 How to Select the Dynamic Brake Module (DBM)

When the αi SV 360, αi SV 180HV, or αi SV 360HV is used, an external dynamic brake module (DBM) is required. This module stops the motor immediately at, for example, emergency stop time. The other αi SV models include a feature similar to this module.

Select a dynamic brake module based on the following table:

Dynamic brake module

Category	Ordering number	Name	Remarks
Standard	A06B-6079-H401	DBM	αi SV 360, αi SV 180HV αi SV 360HV
	A06B-6069-H300	DBM	αi SV 360HV (*1)

The dynamic brake module (DBM) is designed based on the energy required to stop the motor rotating at its maximum speed when the load inertia is five times as large as the motor inertia. When this operating condition is exceeded, contact FANUC.

(*1) When the αi S 1000HV, αi S 2000HV, or αi S S3000HV is driven

4.2 HOW TO SELECT THE αi SP series(SPINDLE AMPLIFIER)

Select an appropriate αi SP series for the selected spindle motor.
 αi SP series amplifiers and standard motors that can be used together are shown below. When using a built-in motor or a motor with special specifications, refer to relevant specifications, and select an αi SP series accordingly.

Table 4.2(a) Specification

No	Ordering number	Input voltage	Remarks
1	A06B-6141-Hxxx#H580	200V	TYPE A
2	A06B-6142-Hxxx#H580	200V	TYPE B
3	A06B-6151-Hxxx#H580	400V	TYPE A
4	A06B-6152-Hxxx#H580	400V	TYPE B

4.2.1 200-V Input Series

Amplifier model 200V type	Outline	Motor model
αi SP 2.2	TYPE II	αi I 0.5/10000, αi I 1/10000
S αi P 5.5		αi I 1.5/10000, αi I 2/10000, αi I 3/10000, αi I 1/15000
αi SP 11	TYPE III	αi I 6/10000, αi I 8/8000, αi I 3/12000, αi I 6/12000, αi I 8/10000, αi I _P 12/6000, αi I _P 12/8000, αi I _T 3/12000
αi SP 15		αi I 12/7000, αi I 1.5/20000, αi I 12/12000, αi I _P 15/6000, αi I _P 15/8000, αi I _P 18/6000, αi I _P 18/8000, αi I _T 1.5/20000, αi I _T 6/12000, αi I _T 8/12000
αi SP 22	TYPE IV	αi I 15/7000, αi I 18/7000, αi I 2/20000, αi I 15/12000, αi I 18/12000, αi I _P 22/6000, αi I _P 22/8000, αi I _P 30/6000, αi I _T 2/20000
αi SP 26		αi I 22/7000, αi I 22/12000, αi I _P 40/6000, αi I _P 50/6000, αi I _T 22/10000
αi SP 30		αi I _P 60/4500, αi I _T 15/15000, αi I _L 8/20000, αi I _L 15/15000, αi I _L
αi SP 37		(*4)
αi SP 45	TYPE V	αi I 30/6000, αi I 40/6000
αi SP 55		αi I 50/4500

*3) "SP" of αi SP means "Spindle".

*4) These amplifiers drives Built-in Spindle Motor series.

4.2.2 400-V Input Series

Amplifier model 400V type	Outline	Motor model
αi SP 5.5HV	TYPE II	αi I 0.5/10000HV, αi I 1/10000HV, αi I 1.5/10000HV, αi I 2/10000HV, αi I 3/10000HV
αi SP 11HV	TYPE III	αi I 6/10000HV, αi I 8/8000HV
αi SP 15HV		αi I 12/7000HV, αi I _P 15/6000HV, αi I _P 15/8000HV, αi I _T 1.5/20000HV, αi I _T 6/12000HV, αi I _T 8/12000HV
αi SP 30HV	TYPE IV	αi I 15/7000HV, αi I 22/7000HV, αi I _P 22/6000HV, αi I _P 22/8000HV, αi I _P 40/6000HV, αi I _P 50/6000HV, αi I _P 60/4500HV, αi I _T 2/20000HV, αi I _T 15/15000HV, αi I _T 22/10000HV
αi SP 45HV		αi I 30/6000HV, αi I 40/6000HV, αi I _L 8/20000HV, αi I _L 15/15000HV, αi I _L 26/15000HV
αi SP 75HV	TYPE V	αi I 60/4500HV, αi I 100/4000HV
αi SP 100HV		*4

*3) "SP" of αi SP means "Spindle".

*4) These amplifiers drives Built-in Spindle Motor series.

4.3 HOW TO SELECT THE αi PS series (POWER SUPPLY)

When Power Supply is selected, the conditions described in this section must all be satisfied.

Calculate the required rated output capacity, maximum output capacity, and peak output capacity using the calculation methods in Subsections 4.3.1, 4.3.2, and 4.3.3 and then select an αi PS model that meets all the conditions.

Table 4.2(a) 200-V input

Model	αi PS 5.5	αi PS 11	αi PS 15	αi PS 26	αi PS 30	αi PS 37	αi PS 55
Item							
Rated output capability	5.5kW	11kW	15kW	26kW	30kW	37kW	55kW
Maximum output capability	13kW	24kW	34kW	48kW	64kW	84kW	125kW
Peak output capability	22kW	38kW	51kW	73kW	85kW	106kW	192kW

Table 4.2(b) 400-V input

Model	αi PS 11HV	αi PS 18HV	αi PS 30HV	αi PS 45HV	αi PS 75HV	αi PS 100HV
Item						
Rated output capability	11kW	18kW	30kW	45kW	75kW	100kW
Maximum output capability	24kW	42kW	72kW	102kW	144kW	180kW
Peak output capability	38kW	64kW	96kW	137kW	193kW	220kW

NOTE

The above tables apply to A06B-6140-Hxxx and A06B-6150-Hxxxx. For A06B-6110-Hxxx and A06B-6120-Hxxxx, the maximum output capability and peak output capability values differ as shown in the tables below.

200-V input (for A06B-6110-Hxxx)

Model	αi PS 5.5	αi PS 11	αi PS 15	αi PS 26	αi PS 30	αi PS 37	αi PS 55
Item							
Rated output capability	5.5kW	11kW	15kW	26kW	30kW	37kW	55kW
Maximum output capability	11kW	20kW	28kW	40kW	53kW	70kW	104kW
Peak output capability	20kW	34kW	46kW	66kW	77kW	96kW	174kW

400-V input (for A06B-6120-Hxxx)

Model	αi PS 11HV	αi PS 18HV	αi PS 30HV	αi PS 45HV	αi PS 75HV	αi PS 100HV
Item						
Rated output capability	11kW	18kW	30kW	45kW	75kW	100kW
Maximum output capability	20kW	35kW	60kW	85kW	120kW	150kW
Peak output capability	34kW	58kW	87kW	124kW	175kW	200kW

4.3.1 How to Obtain the αi PS series rated output capability

Select an αi PS with a rated output not less than the sum of the total continuous rated output of the spindle motors times 1.15, plus the total continuous rated output of the servo motors times 0.6.

Rated output capacity of αi PS $\geq \Sigma \text{ Continuous rated output of spindle motor} \times 1.15$ $+ \Sigma \text{ Continuous rated output of servo motor} \times 0.6$
--

When only αi SP is to be connected to Power Supply module, select the αi PS so that the 30-minute rated output of the spindle motor does not exceed the rated output capacity of Power Supply module.

Rated output capacity of an αi PS $\geq$ 30-minute rated output of a spindle motor

Table 4.3 lists the rated output capacities of the αi PS models. Tables 4.5.1(a) to (d) list the continuous rated outputs of the servo motors. Tables 4.5.2(a) and (b) list the continuous rated outputs or 30-minute rated output of the spindle motors.

4.3.2 How to Obtain the αi PS series maximum output capability

Select the αi PS whose maximum output capability will not be exceeded by the total of the sum of the maximum acceleration spindle motor outputs and the sum of the maximum acceleration outputs of the servo motors that are accelerated simultaneously and whose acceleration time exceeds 0.3 seconds.

Maximum output of αi PS $\geq \Sigma \text{ Accelerating maximum output of spindle motor} +$ $\Sigma \text{ Maximum acceleration-time outputs of servo motors whose acceleration time exceeds } \underline{\underline{0.3 \text{ seconds}}}$ (on simultaneous acceleration/deceleration axis)

Table 4.3 lists the maximum output capacities of the αi PS models. Tables 4.5.1(a) to (d) list the accelerating maximum outputs of the servo motors. Tables 4.5.2(a) and (b) list the accelerating maximum outputs of the spindle motors.

4.3.3 How to Obtain the αi PS series peak maximum output capability

Make selection so that a total of maximum acceleration-time outputs of the spindle motors plus a total of maximum acceleration-time outputs of the servo motors that are accelerated concurrently for 0.3 seconds or less are equal to or less than the peak maximum output capacity of the αi PS.

Power Supply peak maximum output capability
 $\geq \Sigma$ spindle motor maximum acceleration outputs
 $+ \Sigma$ Maximum acceleration-time outputs of servo motors whose acceleration time is **0.3 seconds** or less
 (on simultaneously accelerated axes)

Table 4.3 lists the peak output capacities of the αi PS models. Tables 4.5.1(a) to (d) list the continuous rated outputs of the servo motors. Tables 4.5.2(a) and (b) list the according maximum outputs of the spindle motors.



CAUTION

When the acceleration-time constant is not identical to the deceleration-time constant and the maximum motor torque is used during deceleration as in pressing machines or injection molding machines, the maximum acceleration-time outputs in Tables 4.5.1 (a) and (c) are multiplied by 1.1.

4.3.4 Number of Connected αi SV series and αi SP Series

Multiple αi SV and αi SP models can be connected to a single αi PS, provided the above output capacity conditions are satisfied.

The table below lists the maximum number of modules which can be connected.

Table 4.3.4 Maximum number of modules that can be connected

αi SP	αi SV		
	αi SV 1-axis amplifier	αi SV 2-axis amplifier	αi SV 3-axis amplifier
2	6		
		4	
			3

CAUTION

- 1 When different types of αi SV models are connected, the following condition must be satisfied:
Total number of connected amplifiers (6) $\geq$ number of αi SV 1-axis amplifiers $\times$ 1 + number of αi SV 2-axis amplifiers $\times$ 1.5 + number of αi SV 3-axis amplifiers $\times$ 2
The maximum number of αi SV models that can be connected is the same when an αi SP is not used.
- 2 No αi SV 3-axis amplifier is available in the 400-V input series.

4.3.5 Notes on 400-V Input αi PS series selection

When the 400-V input αi PS series is used, a restriction is imposed on the combination with an αi SP.

- (1) For αi SP 30HV, select PSM-30HVi or a higher model.
- (2) For αi SP 45HV, select PSM-45HVi or a higher model.
- (3) For αi PS 75HV and αi PS 100HV, select αi PS 75HV or a higher model.

4.4 HOW TO SELECT THE αi PS_R series (POWER SUPPLY, RESISTANCE DISCHARGE TYPE)

When Power Supply is selected, the conditions described in this section must all be satisfied.

Calculate the required rated output capacity and maximum output capacity using the calculation methods in Subsections 4.4.1 and 4.4.2 and then select an αi PS_R model that meets all the conditions.

Table 4.4 200-V input

Item \ Model	αi PS _R 3	αi PS _R 5.5
Rated output capability	3kW	7.5kW
Maximum output capability	12kW	20kW

NOTE

No specification is defined for the peak output capability of the αi PS_R models.

4.4.1 How to Obtain the αi PS_R series Rated Output Capability

Select an αi PS_R with a rated output not less than the sum of the total continuous rated output of the spindle motors times 1.15, plus the total continuous rated output of the servo motors times 0.6.

Rated output capacity of αi PS_R $\geq \Sigma \text{ Continuous rated output of spindle motor} \times 1.15$ $+ \Sigma \text{ Continuous rated output of servo motor} \times 0.6$
--

When only αi SP is to be connected to an αi PS_R, select Power Supply so that the 30-minute rated output of the spindle motor does not exceed the rated output capacity of the αi PS_R.

Rated output capacity of an αi PS_R $\geq$ 30-minute rated output of a spindle motor

Table 4.3 lists the rated output capacities of the αi PS_R models. Tables 4.5.1(a) to (d) list the continuous rated outputs of the servo motors. Tables 4.5.2(a) and (b) list the continuous rated outputs or 30-minute rated output of the spindle motors.

4.4.2 How to Obtain the αi PS_R series Maximum Output Capability

Select an αi PS_R so that the sum of the total maximum acceleration-time output of the spindle motors and the total maximum acceleration-time output of the servo motors that are accelerated simultaneously does not exceed the maximum output capability of the αi PS_R.

Maximum output of αi PS_R $\geq \Sigma \text{ Accelerating maximum output of spindle motor} +$ $\Sigma \text{ Maximum acceleration-time outputs of the servo motors whose}$ $\text{acceleration time exceeds } \underline{\underline{0.3 \text{ seconds}}}.$ (on simultaneous acceleration/deceleration axis)

Table 4.4 lists the maximum output capacities of the αi PS_R models. Tables 4.5.1(a) to (d) list the accelerating maximum outputs of the servo motors. Tables 4.5.2(a) and (b) list the accelerating maximum outputs of the spindle motors.

4.4.3 Number of Connected αi SV series and αi SP series

Multiple αi SV models and αi SP models can be connected to a single αi PS_R, provided the above output capacity conditions are satisfied. The table below lists the maximum number of modules which can be connected.

Table 4.4.3 Maximum number of amplifiers that can be connected

αi SP	αi SV		
	αi SV 1-axis amplifier	αi SV 2-axis amplifier	αi SV 3-axis amplifier
0	4		
	1	2	
	2	1	
		1	1
1	2		
	1	1	
			1

CAUTION

When αi SV amplifiers are used together, the total number of the connected amplifiers must not exceed 4.

Total number of connected amplifiers (4) $\geq$ number of αi SV 1-axis amplifiers $\times$ 1 + number of αi SV 2-axis amplifiers $\times$ 1.5 + number of αi SV 3-axis amplifiers $\times$ 2

Even when no αi SP unit is used, the number of αi SV amplifiers that can be connected does not change.

4.4.4 Selecting a Regenerative Discharge Unit

In the αi PS_R, the regenerative discharge unit (regenerative resistor) dissipates the energy generated during deceleration of a motor (regeneration).

The amount of heat generated by the regenerative discharge unit varies with the motor type, rotation speed, load inertia, and continuous repetition cycle (duty cycle). Use a regenerative discharge unit of a suitable capacity for the load and operation cycle time.

How to Calculate the Required Capacity for the Regenerative Discharge Unit

Obtain the rotation energy of each servo motor and each spindle motor from the formula shown below. Then, see Table 4.4.4, and select a regenerative discharge unit so that the sum of the rotation energy values of the servo motors and spindle motors does not exceed the capacity of the regenerative discharge unit.

Capacity of regenerative discharge unit $\geq \Sigma$ Rotation energy of motor
--

See Table 4.4.4 for details of the capacity of the regenerative discharge unit.

(1) Servo motor (for horizontal movement)

Amount of regenerative discharge (power [W]) when rapid traverse acceleration/deceleration is performed once every F sec

(a) SI unit system

$$w = \frac{1}{F} \times (5.48 \times 10^{-3} \cdot (Jm + JL) \cdot Vm^2 - 5.23 \times 10^{-2} \cdot ta \cdot Vm \cdot TL) [W]$$

F : Frequency of rapid traverse acceleration/deceleration
[sec/number of times]

Unless otherwise specified, rapid traverse acceleration/deceleration is assumed to be performed about once every 5 seconds.

Jm : Rotor inertia of the motor [kg·m²]

JL : Motor-shaft-converted inertia of the load [kg·m²]

Vm : Motor speed at rapid traverse [min⁻¹]

ta : Rapid traverse acceleration/deceleration time [sec]

TL : Machine frictional torque (motor-converted value)
[N·m]

(b) CGS unit system

$$w = \frac{1}{F} \times (5.37 \times 10^{-4} \cdot (Jm + JL) \cdot Vm^2 - 5.13 \times 10^{-3} \cdot ta \cdot Vm \cdot TL) [W]$$

F : Rapid traverse acceleration/deceleration cycle [s/number of times]

About once every five seconds unless otherwise specified

Jm : Rotor inertia of motor [kg·cm·s²]

JL : Load inertia (value for motor shaft) [kg·cm·s²]

Vm : Motor rotation speed for rapid traverse [min⁻¹]

ta : Rapid traverse acceleration/deceleration time [s]

TL : Friction torque of machine (value for motor) [kg·cm]

(2) Servo motor (for vertical movement)

The amount of regenerative discharge (power [W]) when the operation duty for downward rapid traverse is D(%)

(a) SI unit system

$$w = 1.047 \times 10^{-1} \cdot Th \cdot Vm \times \frac{D}{100} [W]$$

Th : Upward torque that the motor applies at the time of downward rapid traverse [N·m]

Vm : Motor speed at rapid traverse [min^{-1}]

D : Operation duty [%] for downward rapid traverse

D is set to 50% maximum. Usually, D is less than 50%.

(b) CGS unit system

$$w = 1.026 \times 10^{-2} \cdot Th \cdot Vm \times \frac{D}{100} [W]$$

Th : Upward torque of motor during lowering by rapid traverse [kg·cm]

Vm : Motor rotation speed for rapid traverse [min^{-1}]

D : Downward operation duty during lowering by rapid traverse [%]

D is a maximum of 50% and usually less.

(3) Spindle motor

(a) SI unit system

$$w = 5.48 \times 10^{-3} \cdot (Jm + JL) \cdot N^2 \times \frac{1}{Dt} [W]$$

Jm : Rotor inertia of the motor [$\text{kg} \cdot \text{m}^2$]

JL : Motor-shaft-converted inertia of the load [$\text{kg} \cdot \text{m}^2$]

N : Motor speed [min^{-1}]

Dt : Duty cycle [sec]

(b) CGS unit system

$$w = 5.37 \times 10^{-2} \cdot (Jm + JL) \cdot N^2 \times \frac{1}{Dt} [W]$$

Jm : Rotor inertia of motor [$\text{kg} \cdot \text{cm} \cdot \text{s}^2$]

JL : Load inertia (value for motor shaft) [$\text{kg} \cdot \text{cm} \cdot \text{s}^2$]

N : Motor rotation speed [min^{-1}]

Dt : Duty cycle [s]

Cautions for selecting a regenerative discharge unit

Table.4.4.4 Required capacity for the Regenerative Discharge unit

Regenerative discharge unit	Capacity			Remarks
	Wind speed			
	0m/sec	2m/sec	4m/sec	
A06B-6089-H510	100W	250W	-	Resistance : 16Ω
A06B-6089-H500	200W	400W	600W	Resistance : 16Ω
A06B-6089-H713	-	-	800W	Forced cooling fan motor is included Resistance : 16Ω
A06B-6089-H711	-	-	800W	Forced cooling fan motor is included Resistance : 8Ω
A06B-6089-H712	-	-	1200W	Forced cooling fan motor is included Resistance : 8Ω

NOTE

- 1 The "maximum output at acceleration" value is provided only to aid in the selection of an αi PS_R; this is not a guaranteed value.
- 2 When a spindle motor with a maximum output of 5kW or more is used, the resistance of the regenerative discharge unit must be 8Ω. If a regenerative discharge unit with a resistance of 16Ω is used for a spindle motor with a maximum output of 5 kW or more, a regeneration excess alarm (alarm No. 08) may be generated in the αi PS_R when the spindle is decelerated.

4.5 LIST OF MOTOR OUTPUT CAPACITIES FOR αi PS AND αi PS_R series SELECTION

4.5.1 Servo Motor Continuous Rated Outputs and Maximum Outputs at Acceleration

This section gives the output data for servo motor. These data are used for selecting an αi PS or αi PS_R. See FANUC AC SERVO MOTOR αi s/ αi series DESCRIPTIONS (B-65262EN) for details.

(1) Servo motor αi s/ αi series (200-V input series)

Table 4.5.1(a)

Motor model	Continuous rated output	Maximum output at acceleration
αi F 1/5000	0.50kW	2.0kW
αi F 2/5000	0.75kW	2.9kW
αi F 4/4000	1.4kW	4.5kW
αi F 8/3000	1.6kW	5.7kW
αi F 12/3000	3.0kW	7.6kW
αi F 22/3000	4.0kW	9.6kW
αi F 30/3000	7.0kW	21kW
αi F 40/3000	6.0kW	18kW
αi F 40/3000+FAN	9.0kW	18kW
αi S 2/5000	0.75kW	2.8kW
αi S 2/6000	1.0kW	2.4kW
αi S 4/5000	1.0kW	3.1kW
αi S 8/4000	2.5kW	8.0kW
αi S 8/6000	2.2kW	11kW
αi S 12/4000	2.7kW	12kW
αi S 22/4000	4.5kW	17kW
αi S 22/6000	4.5kW	21kW
αi S 30/4000	5.5kW	22kW
αi S 40/4000	5.5kW	24kW
αi S 50/3000	5kW	39kW
αi S 50/3000 +FAN	14kW	39kW
αi S 100/2500	11kW	38kW
αi S 100/2500+FAN	22kW	38kW
αi S 200/2500	16kW	48kW
αi S 200/2500+FAN	30kW	48kW
αi S 300/2000	52kW	96kW
αi S 500/2000	60kW	104kW

NOTE

There is a possibility to change the data.

(2) Servo motor β iS series (200-V input series)**Table 4.5.1(b)**

Motor model	Continuous rated output	Maximum output at acceleration
β iS 0.2/5000	0.05kW	0.24kW
β iS 0.3/5000	0.1kW	0.4kW
β iS 0.4/5000	0.13kW	0.5kW
β iS 0.5/6000	0.35kW	1.3kW
β iS 1/6000	0.5kW	2.3kW
β iS 2/4000	0.5kW	2.3kW
β iS 4/4000	0.75kW	2.5kW
β iS 8/3000	1.2kW	2.8kW
β iS 12/2000	1.4kW	2.8kW
β iS 12/3000	1.8kW	5.4kW
β iS 22/2000	2.5kW	5.2kW
β iS 22/3000	3.0kW	8.8kW

NOTE

There is a possibility to change the data.

(3) Servo motor αi series (400-V input series)

Table 4.5.1(c)

Motor model	Continuous rated output	Maximum output at acceleration
αiF 4/4000HV	1.4kW	4.5kW
αiF 8/3000HV	1.6kW	5.7kW
αiF 12/3000HV	3.0kW	7.5kW
αiF 22/3000HV	4.0kW	9.6kW
αiS 2/5000HV	0.75kW	2.8kW
αiS 2/6000HV	1.0kW	2.4kW
αiS 4/5000HV	1.0kW	3.1kW
αiS 8/4000HV	2.3kW	8.0kW
αiS 8/6000HV	2.2kW	11kW
αiS 12/4000HV	2.5kW	12kW
αiS 22/4000HV	4.5kW	19kW
αiS 22/6000HV	4.5kW	21kW
αiS 30/4000HV	5.5kW	22kW
αiS 40/4000HV	5.5kW	24kW
αiS 50/3000HV	5kW	39kW
αiS 50/3000HV +FAN	14kW	39kW
αiS 100/2500HV	11kW	38kW
αiS 100/2500HV+FAN	22kW	38kW
αiS 200/2500HV	16kW	48kW
αiS 200/2500HV+FAN	30kW	48kW
αiS 300/2000HV	52kW	96kW
αiS 500/2000HV	60kW	104kW
αiS 1000/2000HV	100kW	189kW
αiS 1000/2000HV	110kW	190kW
αiS 2000/2000HV	200kW	400kW
αiS 3000/2000HV	220kW	690kW

NOTE

There is a possibility to change the data.

(4) Servo motor β iS series (400-V input series)**Table 4.5.1(c)**

Motor model	Continuous rated output	Maximum output at acceleration
β iS 2/4000HV	0.5kW	2.3kW
β iS 4/4000HV	0.75kW	2.5kW
β iS 8/3000HV	1.2kW	2.8kW
β iS 12/3000HV	1.8kW	5.4kW
β iS 22/2000HV	2.5kW	5.2kW
β iS 22/3000HV	3.0kW	8.8kW

NOTE

There is a possibility to change the data.

4.5.2 Spindle Motor Continuous Rated Outputs and Maximum Outputs at Acceleration

This section gives the output data for spindle motor. These data are used for selecting Power Supply module of the αi PS and αi PS_R. See FANUC AC SPINDLE MOTOR αi series DESCRIPTIONS (B-65272EN) for details.

(1) Spindle motor αi series (200-V input series)

Table 4.5.2(a)

Motor model	Continuous rated output	30-minute rated output	Maximum output at acceleration
αi I 0.5/10000	0.55kW	1.1kW(15-minute rated)	1.32kW
αi I 1/10000	1.5kW	2.2kW(15-minute rated)	2.64kW
αi I 1/15000	1.5kW	2.2kW(15-minute rated)	5.6kW
αi I 1.5/10000	1.1kW	3.7kW(10-minute rated)	4.44kW
αi I 1.5/15000	1.5kW	2.2kW(15-minute rated)	13kW
αi I 2/10000	2.2kW	3.7kW(15-minute rated)	4.44kW
αi I 2/15000	2.2kW	3.7kW(15-minute rated)	20kW
αi I 3/10000	3.7kW	5.5kW	6.6kW
αi I 3/12000	3.7kW	5.5kW	13kW
αi I 6/10000 αi I 6/12000	5.5kW	7.5kW	9kW
αi I 8/8000 αi I 8/10000	7.5kW	11kW	13.2kW
αi I 12/7000 αi I 12/10000	11kW	15kW	18kW
αi I 15/7000 αi I 15/10000	15kW	18.5kW	22.2kW
αi I 18/7000 αi I 18/10000	18.5kW	22kW	26.4kW
αi I 22/7000 αi I 22/10000	22kW	26kW	31.2kW
αi I 30/6000	30kW	37kW	44.4kW
αi I 40/6000	37kW	45kW	54kW
αi I 50/6000	45kW	55kW	66kW
αi I _P 12/6000 αi I _P 12/8000	5.5kW	7.5kW	12.3kW
αi I _P 15/6000 αi I _P 15/8000	7.5kW	9kW	13.5kW
αi I _P 18/6000 αi I _P 18/8000	9kW	11kW	15.1kW
αi I _P 22/6000 αi I _P 22/8000	11kW	15kW	20kW
αi I _P 30/6000	15kW	18.5kW	25kW
αi I _P 40/6000	18.5kW	22kW	29kW
αi I _P 50/6000	22kW	30kW	35.4kW
αi I _P 60/4500	22kW	30kW	36kW

NOTE

There is a possibility to change the data.

(2) Spindle motor αi series (400-V input series)

Table 4.5.2(b)

Motor model	Continuous rated output	30-minute rated output	Maximum output at acceleration
αi I 0.5/10000HV	0.55kW	1.1kW(15-minute rated)	1.32kW
αi I 1/10000HV	1.5kW	2.2kW(15-minute rated)	2.64kW
αi I 1.5/10000HV	1.1kW	3.7kW(10-minute rated)	4.44kW
αi I 2/10000HV	2.2kW	3.7kW(15-minute rated)	4.44kW
αi I 3/10000HV	3.7kW	5.5kW	6.6kW
αi I 6/10000HV	5.5kW	7.5kW	9kW
αi I 8/8000HV	7.5kW	11kW	13.2kW
αi I 12/7000HV	11kW	15kW	18kW
αi I 15/7000HV	15kW	18.5kW	22.2kW
αi I 22/7000HV	22kW	26kW	31.2kW
αi I 30/6000HV	30kW	37kW	44.4kW
αi I 40/6000HV	37kW	45kW	54kW
αi I 60/4500HV	60kW	75kW	90kW
αi I 100/4000HV	100kW	—	117kW
αi I _P 15/6000HV	7.5kW	9kW	13.5kW
αi I _P 22/6000HV	11kW	15kW	20kW
αi I _P 40/6000HV	18.5kW	22kW	29kW
αi I _P 50/6000HV	22kW	30kW	35.4kW
αi I _P 60/4500HV	22kW	30kW	36kW

NOTE

There is a possibility to change the data.

5

INSTALLATION

Chapter 5, "INSTALLATION", consists of the following sections:

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5.1 LEAKAGE CURRENT

The servo amplifier αi series drives the motor by using the transistor PWM inverter method. This causes a high-frequency leakage current to flow via the ground drift capacitance in the motor winding, power cable, and amplifier. This may cause a device installed on Power supply side, such as a ground fault interrupter or leakage-protection relay, to malfunction.

When a circuit breaker with a ground fault interrupter is used, it must be selected so that the sum of the values calculated according to (a) and (b) described below is not greater than the non-operating current value.

- (a) Selection criterion per amplifier

Model : αi SV and αi SP

Criterion for selection : 2 mA per amplifier (Note 1)

- (b) Selection criterion per motor

Criterion for selection : 1 mA per motor (Note 1)

The following example shows how to use selection criteria (a) and (b):
Example :

When the system consists of αi SV 1-axis $\times$ 1, αi SV 3-axis $\times$ 1 (three motors), and αi SP $\times$ 1

$2 \text{ mA} \times 3 \text{ (for the amplifiers)} + 1 \text{ mA} \times 5 \text{ (for the motors)} = 11 \text{ mA}$

→ Select a circuit breaker (Note 2) with a non-operating current of 11 mA or higher. (A general ground fault interrupter that can be used for the above example is the one with a rated sensitivity current of 30 mA and a non-operating current of 15 mA.)

NOTE

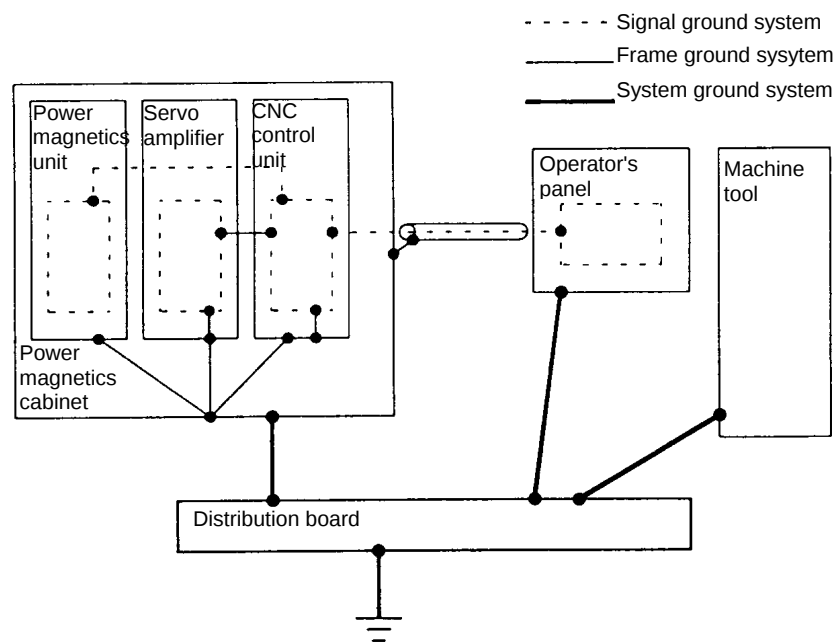
- 1 These criteria are for selecting a circuit breaker with a ground fault interrupter; they do not indicate accurate leakage currents.
- 2 A circuit breaker may malfunction depending on the frequency characteristic of the ground fault interrupter. Therefore, use a ground fault interrupter supporting the use of inverters.
- 3 The above criteria are values in the commercial frequency band. Some measuring instruments for measuring leakage current may sense a high frequency band, thus showing a larger value.

5.2 GROUND

5.2.1 Ground Systems

There are three ground systems for CNC system grounding.

- (a) Signal ground system (SG)
The signal ground (SG) supplies the reference voltage (0V) of the electrical signal system.
- (b) Frame ground system (FG)
The frame ground system (FG) is used for safety, and suppressing external and internal noises. In the frame ground system, the frames, panels, and shields for the interface cables between the units are connected.
- (c) System ground system (PE)
In the system ground system (PE), frame ground provided for each device or among units is connected systematically to ground at one place.



5.2.2 Grounding Method

Generally, noise that causes problems is high-frequency noise. Grounding each device with a low impedance(NOTE) is a key to suppression of high-frequency noise. Methods of grounding for this purpose are explained below.

NOTE

In addition to a resistance component, which converts current to heat, impedance contains a reactance component, which prevents the flow of AC current at a certain frequency.

(1) Multi-point grounding

If a metal plate of a cabinet is grounded with a sufficiently low impedance, the metal plate is used as a ground plate, and each device is grounded nearby. This method allows grounding to a low-impedance metal plate of the cabinet over a shortest distance, and can therefore effectively suppress high-frequency noise. On the other hand, because a metal plate of a cabinet is used as a ground plate, noise suppression efficiency depends on the structure of the cabinet. For cabinets, see Subsection 1.1.4. Fig. 1 shows a cabling schematic.

When the multi-point grounding method is used, units can be grounded with a low impedance, and the lengths of ground cables can also be reduced, so cabling can be simplified.

NOTE

If a metal plate of a cabinet does not show a low impedance, a noise problem may arise between the power ground line and signal ground line.

(2) Single-point grounding

Signal lines and power lines are grounded separately, and grounding is performed at a single point to suppress noise from a power line to signal line. With this method, the length of a cable for grounding a unit tends to be long. So, to suppress high-frequency noise sufficiently, the cable diameter must be increased, or more than one connection cable must be used. Fig. 2 shows a cabling schematic.

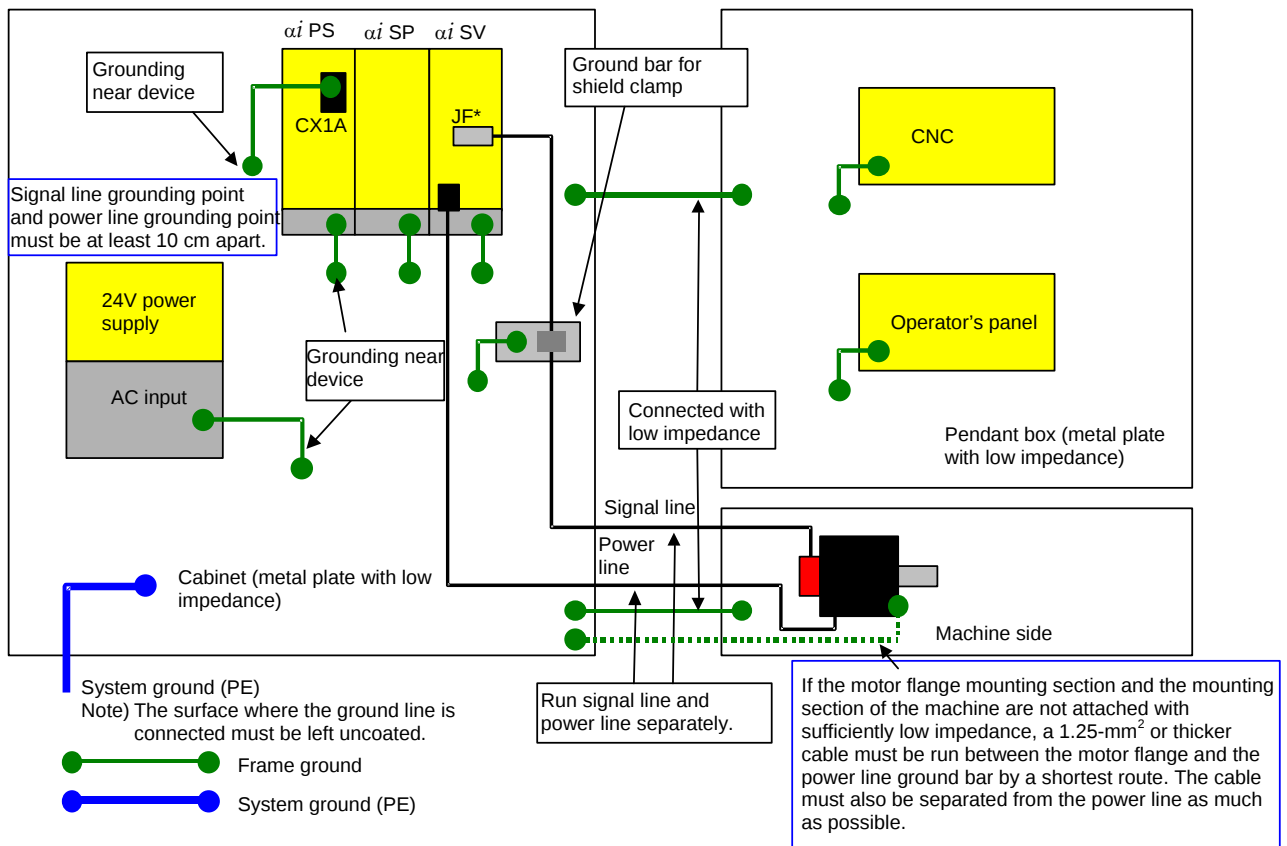


Fig. 1 Schematic of multi-point grounding

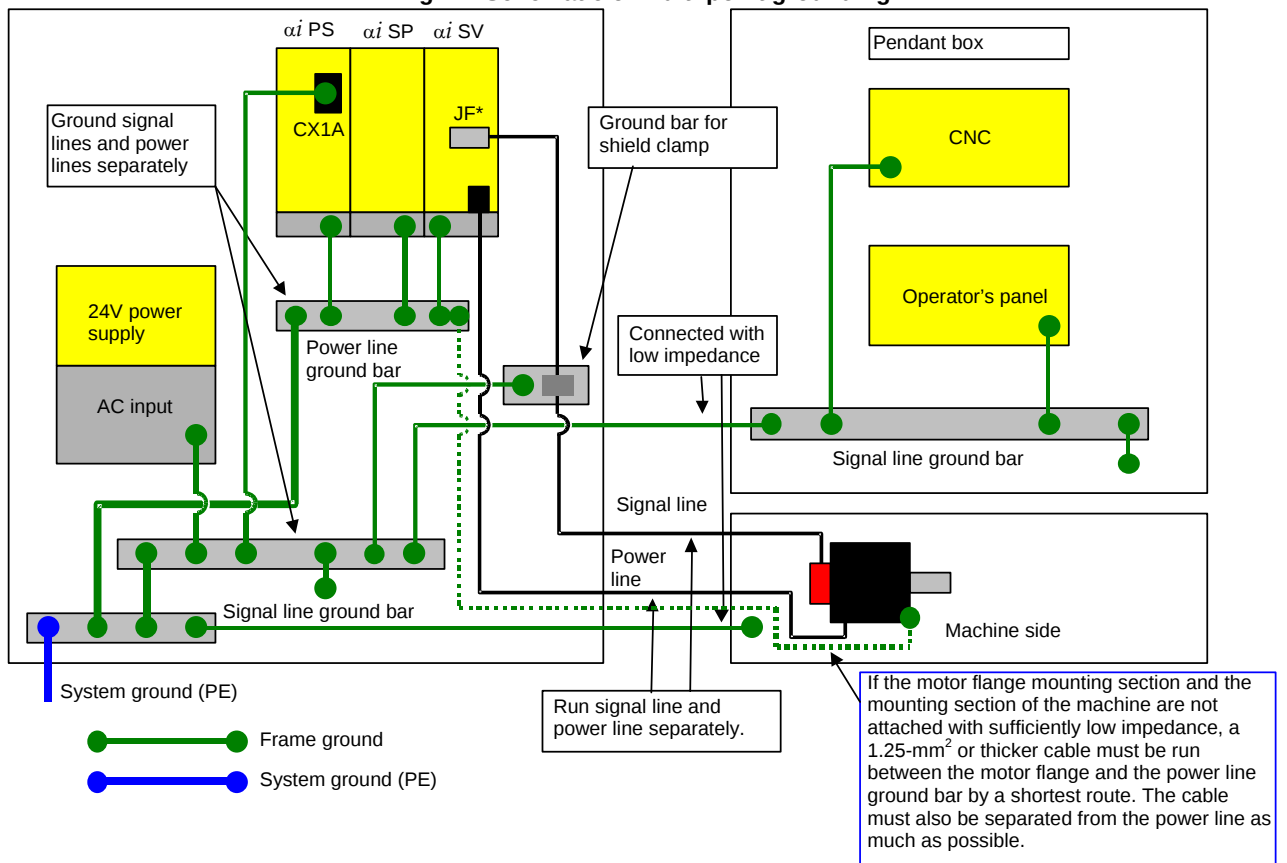


Fig. 2 Schematic of single-point grounding

5.2.3 Notes on Connecting

- Connect the signal ground (0V) with the frame ground (FG) at only one place in the αi PS.
- The grounding resistance of the system ground shall be 100 ohms or less (class D grounding).
- The system ground cable must have enough cross-sectional area to safely carry the accidental current flow into the system ground when an accident such as a short circuit occurs. (Generally, it must have the cross-sectional area of the AC power cable or more.)
- Use the cable containing the AC power wire and the system ground wire so that power is supplied with the ground wire connected.

NOTE

- 1 Securing the ground terminal and a cable together is not permitted.
- 2 The motor flange mounting section may not be able to be connected to the machine mounting section of the power magnetics cabinet via the mechanical unit at sufficiently low impedance in a machine. In this case, a cable of a minimum required length that is at least 1.25 mm² thick must be run from the motor flange to the frame ground of the power magnetics cabinet. The cable must also be separated from the motor power line as much as possible.

5.3 NOISE PREVENTION

5.3.1 Separation of Signal Lines

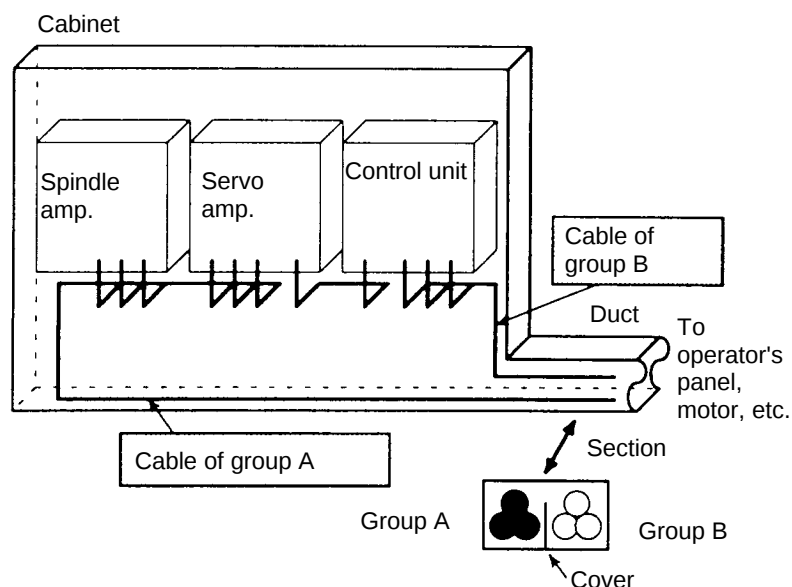
If a signal cable is near a power cable, noise may be induced. The signal cables must be separated from the power cables when routed. When power and signal cables cannot possibly be separated from each other, the cables must be run in parallel in the minimum distance. When a conduit is used, it is recommended that the signal cables be separated from the power cables in it.

[Types of cables]

Group	Signal type	Action
A	Amplifier input power line	Separate binding (Note 1) or electromagnetic shielding (Note 2) is necessary for group B cables.
	Motor power line	
	Magnetic contactor driving coil (Note 3)	
B	Cable between CNC and SPM	Separate binding or electromagnetic shielding is necessary for group A cables. All cables must be shielded.
	Cable for position feedback or velocity feedback	
	Cable for Positioncoder	
	Other cable related to sensor	

NOTE

- 1 The groups must be 10 cm or more apart from one another when binding the cables in each group.
- 2 The electromagnetic shield refers to shielding between groups with grounded steel plates.
- 3 Attach a noise suppressor such as a spark killer to the magnetic contactor driving coil.



5.3.2 Cable Clamp and Shield Processing

Basically, signal lines require shield clamping. Correct shield clamping can suppress noise from the outside.

Strip part of the cable jacket to expose the shield sheath, and secure that part of the cable to the ground bar by using a clamp. At this time, the ground bar must be in contact with the surface of the shield so that the contact area becomes wide. (See the figure.)

When using the multi-point grounding method, remove the coating of the part where the shield clamp ground bar is connected to the cabinet, to allow surface contact.

- Terminal processing of the shield sheaths
Perform terminal processing of the shield sheaths of the signal cables according to the description in Section 9.3.
- Cable clamp
The cables that run into the amplifier and which require shield processing, with the exception of K14, K15, K17, K18, K19, K31, and K33, must be clamped as indicated in Fig. 5.3.2(a).

Clamping secures a cable and also provides shielding. Clamping must always be performed since it is very important for stable system operation.

Connect the cable clamp of the signal cables of αi SV connected to common αi PS to common the ground plate for signals.

- Grounding
The ground plate must be created and installed by the user as shown in Figs.5.3.2(b) to (e).

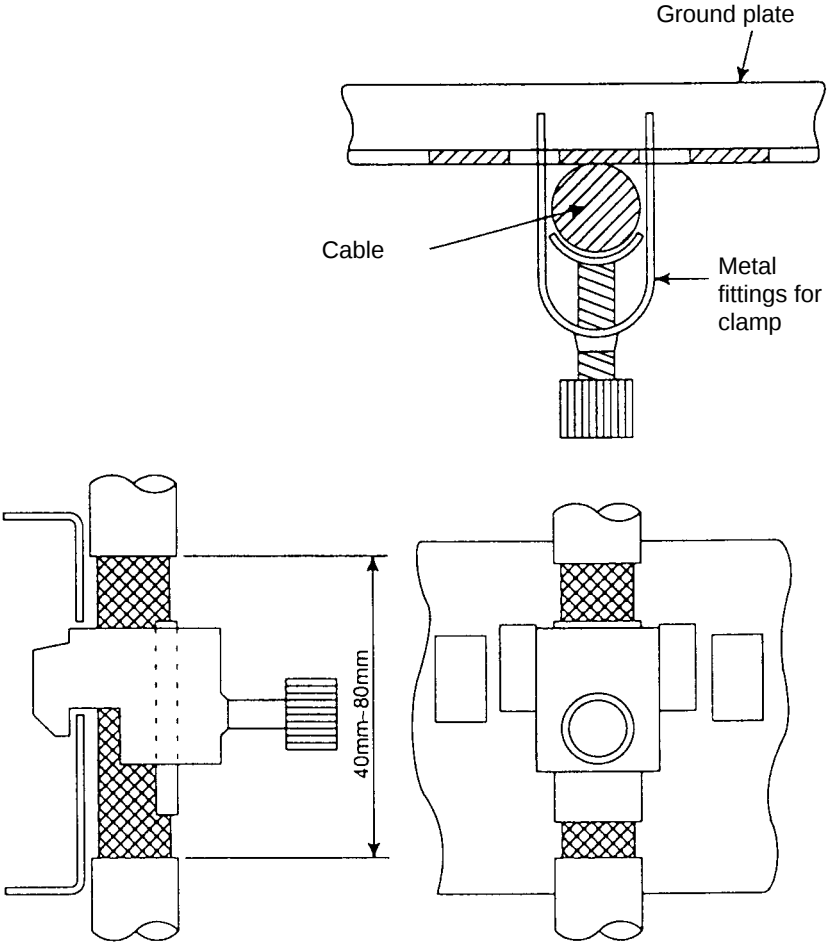


Fig.5.3.2(a) Cable clamp (1)

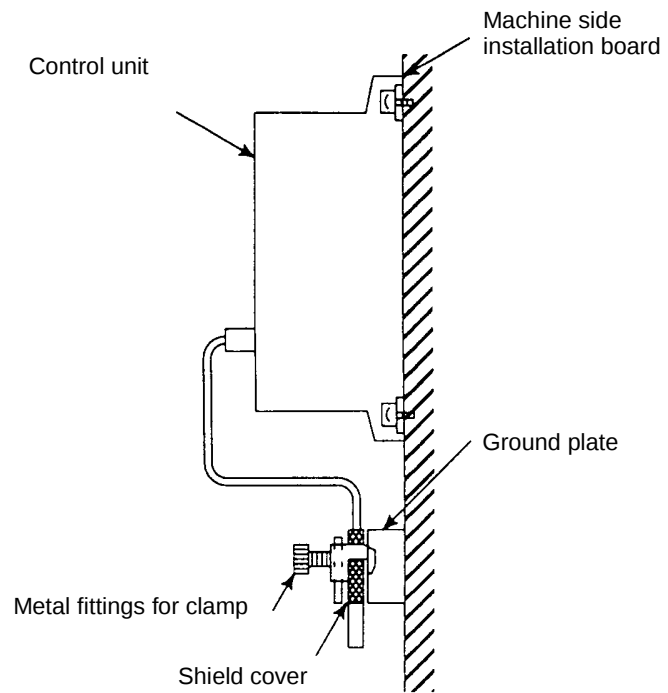


Fig.5.3.2(b) Cable clamp (2)

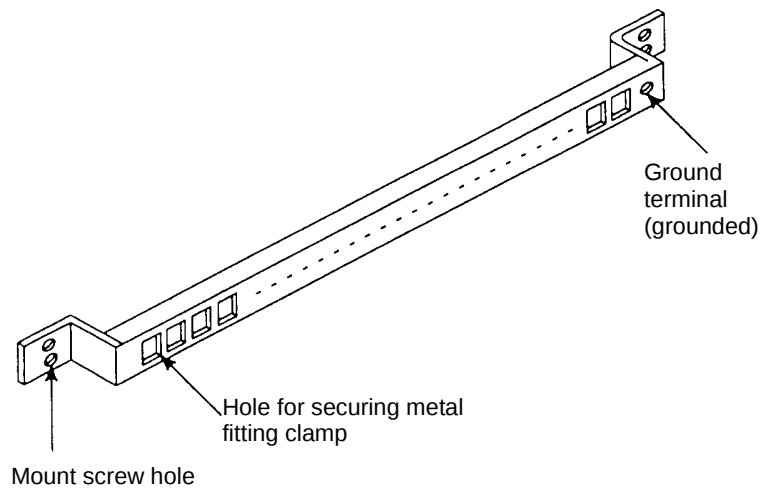


Fig.5.3.2(c) Ground plate

For the ground plate, use a metal plate of 2 mm or thicker, which surface is plated with nickel.

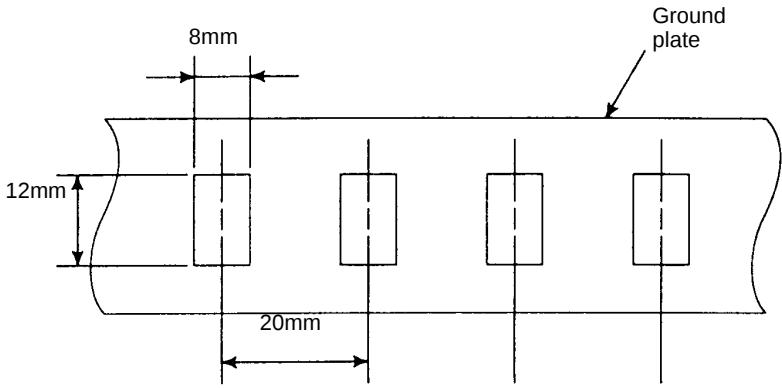


Fig.5.3.2(d) Ground plate holes

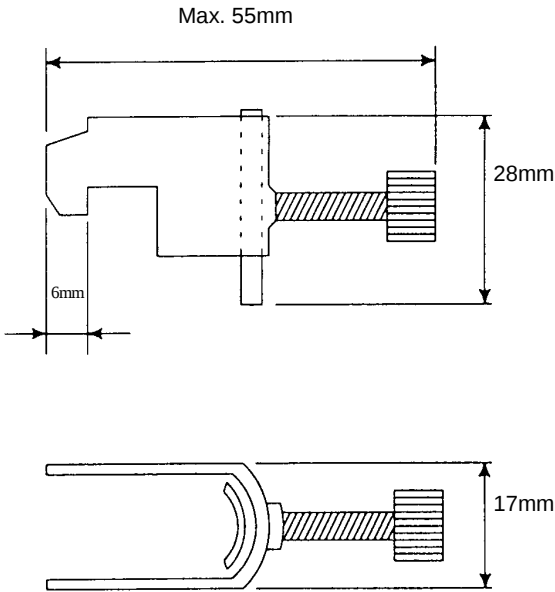


Fig.5.3.2(e) Outer drawings of metal fittings for clamp

5.3.3 Cabinet

A cabinet is a key element for improving noise resistance and suppressing radiation noise.

One factor of noise resistance and radiation noise problems is insufficient electrical conductivity between metal plates of a cabinet. Generally, noise that causes problems is high-frequency noise. Therefore, a cabinet needs to be designed considering high-frequency noise.

(1) Basic structure of a cabinet

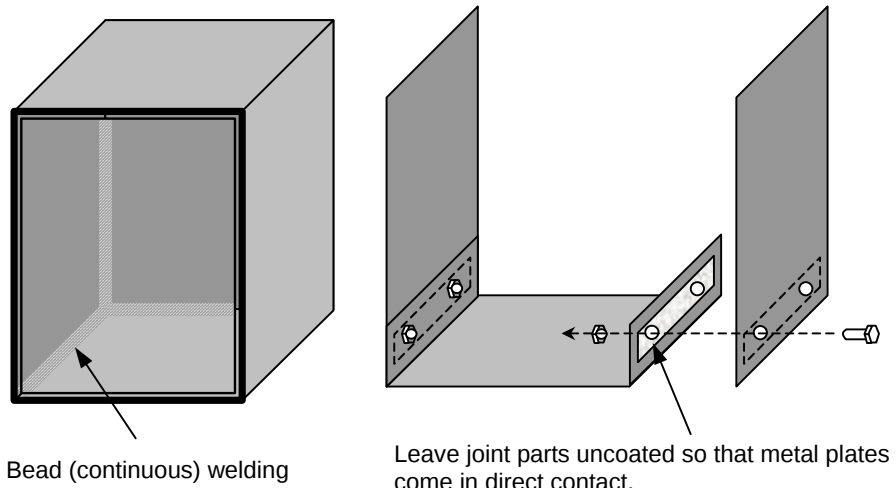
Basically, cabinets should be made of metal.

To improve noise resistance, the metal plates of the side walls, top plate, and bottom plate of a cabinet must be electrically low-impedance conductive. So, welding is recommended for the cabinet.

Bead (continuous) welding, rather than spot welding, should be applied to the cabinet to enhance low-impedance electrical conductivity among the metal plates.

When the cabinet uses a built-up structure, joint part of each metal plate must be left uncoated, so that the plates come in direct contact with each other to provide electrical conductivity.

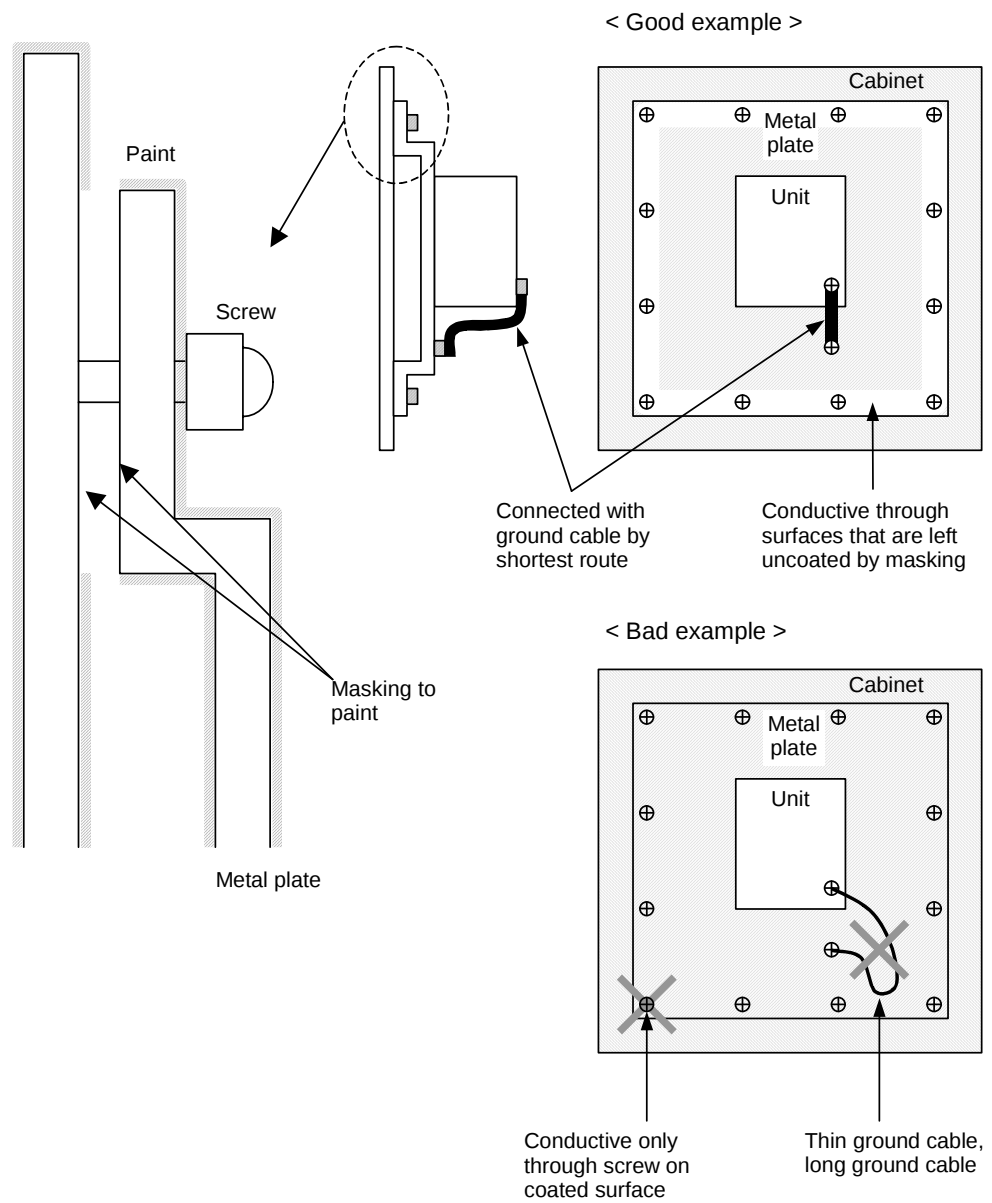
When metal plates are connected only via cables because of structural restrictions, it becomes more difficult to achieve low-impedance connection than when the metal plates are welded or are in direct contact. It is necessary to ensure large sectional areas of the cables used, sufficient conductivity of the connection parts, and large contact areas.



NOTE

The purpose of the description in this subsection is to provide a cabinet with low-impedance electric conductivity to improve noise resistance. To implement a protection circuit, a cable having an appropriate sectional area for the AC input power capacity of the unit mounted on each metal plate needs to be used to connect the metal plates to perform protective grounding.

- (2) Installing a unit in a cabinet
- Run the ground cable of the unit by a shortest route. If the conductive wire of the ground cable is thin, impedance to high-frequency noise in particular becomes high, so grounding becomes less effective. For the position of the ground terminal of each unit, see the relevant manual. When a metal plate is installed in the cabinet after a unit is attached to the metal plate, the following method should be used. Attach the metal plate to the cabinet so that their wide areas left uncoated by masking come in contact with each other. The method of using only screws to provide electric conductivity is not recommended because impedance to high frequencies cannot be decreased sufficiently.



5.3.4 Others

Cable length

If a cable is longer than required, a loss of power increases, and the signal line becomes likelier to be affected by noise. Use each cable of the minimum required length.

Use of shield cables

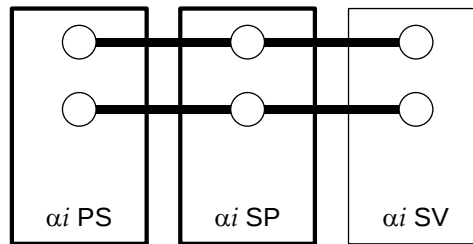
- Satisfying the requirements of the EMC Directives
For details, refer to "Satisfying the Requirements of the EMC Directive" (A-72937).
- Protection against noise
Noise generated from the shielded wire of a power shield cable may affect signals via the shielded wire of a signal cable. For this reason, separate the ground of the shielded wire of a power cable from that of the shielded wire of a signal cable. Use different ground clamping plates (ground plates) for power cables and signal cables to improve safety.

5.4 AMPLIFIER INSTALLATION

A restriction is imposed on the order of amplifier installation as described below.

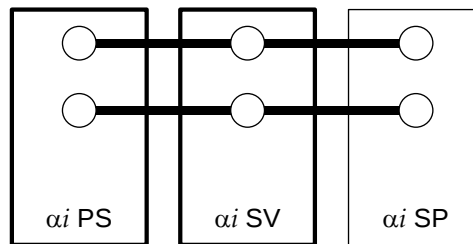
- (1) When an αi SP 45, αi SP 55, αi SP 30HV, αi SP 45HV, αi SP 75HV, or αi SP 100HV is used

Install the αi PS and αi SP close to each other.



- (2) When an αi SV 360HV is used

Install the αi PS and αi SV 360HV close to each other.



5.5 AMPLIFIER INSTALLATION NOTES RELATING TO SAFETY STANDARDS

The αi series servo amplifiers are designed to meet the following safety standards:

EN50178 1997

UL508C Second Edition or Third Edition

To verify the conformity to these standards, the amplifiers are certified by TÜV Rheinland, a third certification organization, and UL.

When performing the CE Marking or UL Marking process, in design of the power magnetics cabinet, pay special attention to the installation conditions described in this section.

5.5.1 Requirements of EN and IEC Standards

5.5.1.1 Classification in standards on insulation design

- (1) Insulation between circuits and between a circuit and protective ground

According to EN50178 5.2, insulation design of the amplifier conforms to the related standards in IEC60664 Part 1.

- The primary (the power supply and main circuit side) and the secondary (control circuit side) are separated by enforced insulation to ensure safety.
- Basic insulation is applied to the protective ground side.

Basic insulation is also applied between the main circuit of the power supply and the aluminum flanges (integrated with the heat sink), so connect a protective ground cable to the ground terminal of the lower aluminum flange.

- (2) Installation category (overvoltage category)

In EN50178 5.2.16.2, power supply facilities are classified according to the impulse voltage to ground, included in the power supply to which the amplifier is connected.

This amplifier is designed to fall into installation category (overvoltage category) II.

Space distance is designed on the assumption that the rated impulse withstanding voltage (impulse voltage to ground) that appears in the power supply to which the amplifier is connected is 2.5 kV or less. If an impulse to ground that is higher than the assumed value appears in the power supply, it needs to be suppressed. In general, this condition is considered to be satisfied if an insulation transformer is used in the power supply input section of the machine. If an insulation transformer is not used, a surge protector (lightning surge absorber) must be inserted before ground to suppress impulse higher than 2.5 kV to ground.

- (3) Pollution degree of the installation environment and protection class of the power magnetics cabinet
 EN 50178 5.2.15.2 requires that when the machine is installed in the environment of ordinary plants, the class of protection against dust, coolant, chips, and so on be IP54 or higher.
 If the power magnetics cabinet satisfies this requirement, the degree of pollution inside the power magnetics cabinet is considered to be class 2.

Insulation design of this amplifier assumes that the amplifier is installed in an environment with pollution degree 2.

When the amplifier is used in a general machine installation environment, install the amplifier in a power magnetics cabinet that satisfies protection class IP54 or higher.

The IP level, however, is determined by the environment (atmosphere) in which the machine is installed. So, the protection class of the power magnetics cabinet should be selected according to the environment.

When an external heat sink cooling type amplifier of which heat sink fin protrudes behind the mounting flange is used, the fin section must be in a cooling area (duct) conforming to around IP22 to IP33, and must be protected from being exposed to direct splashes of coolant, chips, and so forth.

5.5.1.2 Protection against electric shock

- (1) Protection against direct contact with charged parts (EN50178 7.2.1)
 The electric shock protection level of this amplifier after it is installed is equivalent to IP1X (hand protection), which requires protection against unintentional or careless contact.

This amplifier must be installed in a power magnetics cabinet. According to Section 6.2.1, "Electric shock protection by cabinets", in EN 60204-1, the power magnetics cabinet must be equipped with a lock so that when the power to the amplifier is on, the power magnetics cabinet cannot be opened by persons except special maintenance personnel or persons authorized to do maintenance work who have been sufficiently trained in prevention of electric shock.

If the operator of the machine needs to open the power magnetics cabinet for some operations, the operator must be given thorough safety training, or a protection cover must be provided to prevent the operator from touching the amplifier.

- (2) Confirmation of discharge of the electrolytic capacitor (EN50178 7.2.1)
 This amplifier includes a large-capacity electrolytic capacitor for the power smoothing circuit. Even after the power supply input circuit is shut off, this capacitor remains charged for a while.

When it becomes necessary to touch the amplifier to do maintenance work or for other purposes, wait until the discharge time indicated on the face plate of the amplifier is passed, or start work after ensuring safety by measuring the residual voltage of the DC link section with a volt-ohm meter and checking that the LED (red) indicating charging is turned off.

- (3) Leakage current to the protective ground cable (EN50178 7.2.11)
The motor is controlled by changing the average amplitude and frequency of voltage by pulse duration modulation and applying the modulated voltage to the armature. To do this, chopper voltage at a frequency of several kilohertz, which is the carrier frequency for the pulse duration modulation, is applied to the power line of the motor.

Ground stray capacitance mainly between the motor winding and casing and between the power line and protective ground line of the motor power cable causes leakage current to flow through the protective ground line of the motor power cable and machine ground, part of which flows also to the protective ground line of the machine.

The resultant leakage current value is around 1 to 2 mA per motor axis at the commercial power frequency component (50/60Hz). However, with the measurement circuit defined by EN 50178 5.2.11, the sensitivity of high-frequency components cannot be reduced sufficiently, so a value greatly exceeding 3.5 mA is sometimes observed.

If the machine is not grounded, making contact with the machine can result in electric shock. Therefore, provide sufficient protection against electric shock by taking one of the following measures:

- (a) Use a protective ground cable with a copper wire having a sectional area of 10 mm² or more.
- (b) Install a ground-fault circuit interrupter to shut off power as soon as a ground fault occurs.
- (c) Add a protective ground terminal to the cabinet to duplicate protective ground cable connection.
- (d) When installing an RCD unit, use RCD type B.

When using a ground-fault circuit interrupter, select an electromagnetic type with low high-frequency component sensitivity or an electronic type supporting inverters to prevent troubles due to high-frequency components. Measure (a) or (d), which can detect leakage current, is recommended.

5.5.1.3 Protective grounding

The amplifier has several protective ground terminals (marked according to 417-IEC-5019). These terminals are used not only for protection against electric shock due to dielectric breakdown but also for functional grounding to prevent noise.

Connect all the protective ground terminals to the protective ground (PE) terminal in the power magnetics cabinet.

For how to connect a protective ground cable and its cable diameter, refer to Section 5.2, "GROUND", and Subsection 9.3.1.7, "Details of cable K70", in B-65282EN/06.

Note that connecting a cable terminal to a protective ground point is not permitted.

5.5.1.4 EMC

For CE Marking, the EMC Directive must be observed. FANUC's products have obtained certificates of conformance to EN61000 6.2:2001 and EN55011:1998+A1+A2 (EMC Directive (EC Directive 89/336/EEC) from a third certification organization.

In addition, EMC of the machine and system units must be evaluated according to the above EU and (or) other requirements.

5.5.1.5 Notes on the emergency stop circuit configuration

The power system in the amplifier is shut off by IGBT (transistor) and not by electro-mechanical means.

When configuring an emergency stop circuit, therefore, be sure to insert a line contactor to the power input line of Power Supply for power feeding to allow electro-mechanical shut-off operation, so that voltage is applied to the control coil of the contactor via the contactor control output of Power Supply.

If the amplifier fails, even when the emergency stop command input (*ESP) of the amplifier is driven low, the output relay of Power Supply cannot sometimes be turned off, disabling the line contactor from being shut off.

To surely shut off power, besides the shut-off feature of the amplifier, the emergency stop circuit must have a redundant circuit structure that has an independent route for directly shutting off the line contactor when a command is issued from the emergency stop switch.

When a spindle amplifier module is used, if the power line is shut off during spindle rotation, the power regeneration function may not be able to stop the spindle immediately, allowing the spindle to coast for a long time. So, the redundant circuit mentioned above must have a delay feature using an off-delay timer with a normal stop time taken into account.

5.5.1.6 Reduction of load ratio to ambient temperature

Some servo amplifier models have been approved as products conforming to standards with a load reduction ratio described below set.

If the load ratio is exceeded during use, the permissible temperature range of a part used may be exceeded, which can result in the issuance of an overheat alarm or decrease of the life of the part. So, the amplifier must be used so that the reduction characteristic is not exceeded.

For the load reduction ratio, refer to "(6) Derating" in Section 2.2.

5.5.1.7 Overload protection

An overload protection feature is provided as follows:

In the αi SP, the protection feature works when the maximum output continues for 30 s or longer.

In the αi SV, the protection feature works when the current level becomes 1.3 times as high as the rated current of the motor.

5.5.1.8 External overload protection device

The servo amplifier is not equipped with a special protection device. To protect conductors, pay attention to the specifications of the power supply unit.

5.5.1.9 Over-speed protection

The αi series servo amplifiers are not equipped with an over-speed protection device.

5.5.1.10 24-V power supply

Normally, the power for controlling the αi SV and αi SP is supplied from the αi PS. When supplying the power from another external power supply, use a class 2 power supply. The class 2 power supply uses a transformer and other parts that are proven safety. For details, contact the power supply manufacturer.

5.5.1.11 Screw tightening torque

The screws of the servo amplifier are tightened with the following torque:

Screw size	Tightening torque (Nm)
M4	1.1 to 1.5
M5	2.0 to 2.5
M6	3.5 to 4.5
M10	15 to 16

5.5.2 Requirements of UL Standards

5.5.2.1 Classification in standards on insulation design

- (1) Insulation between circuits and between a circuit and protective ground (UL508C 36)

According to UL508C, insulation design of the amplifier conforms to the requirements of UL840. Connect a protective ground cable to the ground terminal of the lower aluminum flange.

- (2) Installation category (overvoltage category)

According to UL508C 36.9.4.(C), this amplifier is designed to fall into installation category (overvoltage category) III, so a surge absorber must be installed in the power input section of the machine. (UL-compliant product, clamp voltage: 6 kV or lower between phases) For details of the installation of a surge absorber, see Appendix A.

- (3) Pollution degree of the installation environment and protection class of the power magnetism cabinet

UL508C requires that when the machine is installed in the environment of ordinary plants, the power magnetism cabinet in which this amplifier is to be installed meet pollution degree class 2.

The α i series servo amplifiers are open type devices that are not equipped with a complete enclosure. If the power magnetism cabinet satisfies the above requirement, the degree of pollution inside the cabinet is considered to be class 2.

Insulation design of this amplifier assumes that the amplifier is installed in an environment with pollution degree 2.

When an external heat sink cooling type amplifier of which heat sink fin protrudes behind the mounting flange is used, the fin section must be in a cooling area (duct) conforming to around IP22 to IP33, and must be protected from being exposed to direct splashes of coolant, chips, and so forth.

5.5.2.2 Protection against electric shock

- (1) Protection against direct contact with charged parts
This amplifier must be installed in a power magnetics cabinet. The power magnetics cabinet must be equipped with a lock so that when the power to the amplifier is on, the power magnetics cabinet cannot be opened by persons except special maintenance personnel or persons authorized to do maintenance work who have been sufficiently trained in prevention of electric shock.

If the operator of the machine needs to open the power magnetics cabinet for some operations, the operator must be given thorough safety training, or a protection cover must be provided to prevent the operator from touching the amplifier.

- (2) Confirmation of discharge of the electrolytic capacitor (UL508C 21)
This amplifier includes a large-capacity electrolytic capacitor for the power smoothing circuit. Even after the power supply input circuit is shut off, this capacitor remains charged for a while. When it becomes necessary to touch the amplifier to do maintenance work or for other purposes, wait until the discharge time indicated on the face plate of the amplifier is passed, or start work after ensuring safety by measuring the residual voltage of the DC link section with a volt-ohm meter and checking that the LED (red) indicating charging is turned off.

5.5.2.3 Protective grounding

Connect all of the protective ground terminals to the protective ground (PE) terminal in the power magnetics cabinet.

For how to connect a protective ground cable and its cable diameter, refer to Section 5.2, "GROUND" and Subsection, "Details of cable K70".

Note that connecting a cable terminal to a protective ground point is not permitted.

5.5.2.4 Overload protection

The αi SP and αi SV are equipped with an overload protection feature.

In the αi SP, the protection feature works when the maximum output continues for 30 s or longer.

In the αi SV, the protection feature works when the current level becomes 1.3 times as high as the rated current of the motor.

5.5.2.5 External overload protection device

The servo amplifier is not equipped with a special protection device. To protect conductors, pay attention to the specifications of the power supply unit.

5.5.2.6 Short-circuit protection

The 200-V input αi series servo amplifiers are suitable for use with a power supply facility with 85,000 Arms or less/240 V (max).

The 400-V input αi series servo amplifiers are suitable for use with a power supply facility with 85,000 Arms or less//480 V (max).

5.5.2.7 Over-speed protection

The αi series servo amplifiers are not equipped with an over-speed protection device.

5.5.2.8 24-V power supply

Normally, the power for controlling the αi SV and αi SP is supplied from the αi PS. When supplying the power from another external power supply, use a class 2 power supply. The class 2 power supply uses a transformer and other parts that are proven safety. For details, contact the power supply manufacturer.

5.5.2.9 Screw tightening torque

The screws of the servo amplifier are tightened with the following torque:

Screw size	Tightening torque (Nm)
M4	1.1 to 1.5
M5	2.0 to 2.5
M6	3.5 to 4.5
M10	15 to 16

5.6 NOTES ON COOLANT (REFERENCE)

Coolant including highly active sulfur, oil-free coolant called synthetic coolant, and water-soluble strong alkali coolant particularly affect the CNC, motor, and amplifier. Even when they are protected from being exposed to direct splashes of such coolant, problems described below may occur. So, special care should be taken.

- **Coolant including highly active sulfur**
Some of coolants including sulfur include extremely highly active sulfur. If such a coolant penetrates into the CNC, motor, or amplifier, it can corrode copper, silver and other metallic materials of components, therefore resulting in component failures.
- **Infiltrative synthetic coolant**
Some of synthetic type coolants using polyalkylene glycol (PAG) as a lubricant component have extremely high infiltration. Such coolants easily penetrate into a motor even if it is well closed. When this kind of coolant penetrates into the CNC, motor, or amplifier, it can lead to insulation degrading and component failures.
- **Water-soluble strong alkali coolant**
Some of coolants using alkanolamine to increase the pH level are so strongly alkaline that an alkalinity of pH10 or more is measured when diluted by the standard ratio. If such a coolant penetrates into the CNC, motor, or amplifier, it can cause a chemical reaction with plastic or other materials, therefore degrading the materials.

6

HEAT DISSIPATION

Chapter 6, "HEAT DISSIPATION", consists of the following sections:

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6.1 200-V INPUT SERIES

The amount of heat dissipation by each module of the servo amplifier αi series is described below.

6.1.1 αi PS series

Table 6.1.1(a) αi PS

Name	Rated output	Total amount of heat dissipation	Residual amount of heat in the cabinet
αi PS 5.5	5.5kW	100W	53W
αi PS 11	11kW	158W	53W
αi PS 15	15kW	333W	61W
αi PS 26	26kW	597W	75W
αi PS 30	30kW	681W	79W
αi PS 37	37kW	706W	81W
αi PS 55	45kW	921W	91W
	55kW	1115W	101W

Table 6.1.1(b) AC reactor for αi PS

Name	Ordering number	Rated output	Total amount of heat dissipation
For αi PS 5.5	A81L-0001-0155	5.5kW	16W
For αi PS 11		11kW	38W
For αi PS 15	A81L-0001-0156	15kW	50W
For αi PS 26	A81L-0001-0157	26kW	70W
For αi PS 30	A81L-0001-0158	30kW	65W
For αi PS 37	A81L-0001-0159	37kW	55W
For αi PS 55	A81L-0001-0160	55kW	79W
For αi PS 5.5	A81L-0001-0170	2.2kW	35W

Table 6.1.1(c) αi PS_R

Name	Ordering number	Rated output	Total amount of heat dissipation	Residual amount of heat in the cabinet
αi PS _R 3	A06B-6115-H003	3kW	60W	60W
αi PS _R 5.5	A06B-6115-H006	5.5kW	105W	55W
		7.5kW	130W	60W

Table 6.1.1(d) AC line filter for αi PS_R

Name	Ordering number	Rated output	Total amount of heat dissipation
αi PS _R 3	A81L-0001-0083#3C	2.0kW	10W
	A81L-0001-0171	3.0kW	15W
αi PS _R 5.5	A81L-0001-0101#C	5.5kW	40W
		7.5kW	50W

6.1.2 αi SV series

The amount of heat dissipation by the αi SV depends on the αi SV model and the current that flows through the servo motor. For the current that flows through a servo motor, reference the continuous rated current of each servo motor. (For the continuous rated current of each servo motor, refer to the servo motor descriptions. For servo motors, the continuous rated current is referred to as the stall current.) As the current that flows through a servo motor, the root-mean-square value of the current that flows through an actual servo motor on a machine can be used.

(1) Total amount of heat dissipation

The total amount of heat dissipation by the αi SV is calculated according to the following expression:

Total amount of heat dissipation

$$= a + K_{a1} \times b_1 + K_{a2} \times b_2 + K_{a3} \times b_3$$

a : Amount of heat dissipation determined by the αi SV model [W]

K_{a1} : Coefficient determined by the αi SV [W/Arms]

b₁ : Current flowing through the servo motor [Arms]

K_{a2} : Coefficient determined by the αi SV [W/Arms]

b₂ : Current flowing through the servo motor [Arms]

K_{a3} : Coefficient determined by the αi SV [W/Arms]

b₃ : Current flowing through the servo motor [Arms]

αi SV 1-axis (Total amount of heat dissipation)

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 4	H101	13	L	5.0	6.5	-
αi SV 20	H103	13	L	5.0	6.5	-
αi SV 40	H104	13	L	4.6	5.9	-
αi SV 80	H105	13	L	4.3	5.8	-
αi SV 160	H106	17	L	4.7	6.1	-
αi SV 360	H109	25	L	4.9	5.8	7.9
αi SV 20L	H153	14	L	5.0	6.5	9.4
αi SV 40L	H154	14	L	4.6	5.9	8.4
αi SV 80L	H155	18	L	4.3	5.8	8.5
αi SV 160L	H156	16	L	4.7	6.1	8.8

αi SV 2-axis (Total amount of heat dissipation)

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 4/4	H201	17	L	5.0	6.5	-
			M	5.0	6.5	-
αi SV 4/20	H203	17	L	5.0	6.5	-
			M	5.0	6.5	-
αi SV 20/20	H205	17	L	5.0	6.5	-
			M	5.0	6.5	-
αi SV 20/40	H206	17	L	5.0	6.5	-
			M	4.6	5.9	-
αi SV 40/40	H207	19	L	4.6	5.9	-
			M	4.6	5.9	-
αi SV 40/80	H208	19	L	4.6	5.9	-
			M	4.3	5.8	-
αi SV 80/80	H209	19	L	4.3	5.8	-
			M	4.3	5.8	-
αi SV 80/160	H210	19	L	4.3	5.8	-
			M	4.7	6.1	-
αi SV 160/160	H211	19	L	4.7	6.1	-
			M	4.7	6.1	-
αi SV 20/20L	H255	21	L	5.0	6.5	9.4
			M	5.0	6.5	9.4
αi SV 20/40L	H256	21	L	5.0	6.5	9.4
			M	4.6	5.9	8.4
αi SV 40/40L	H257	23	L	4.6	5.9	8.4
			M	4.6	5.9	8.4
αi SV 40/80L	H258	21	L	4.6	5.9	8.4
			M	4.3	5.8	8.5
αi SV 80/80L	H259	21	L	4.3	5.8	8.5
			M	4.3	5.8	8.5

 αi SV 3-axis (Total amount of heat dissipation)

Name	Specification	a [W]	Axis	K [W/Arms]	
				HRV2	HRV3
αi SV 4/4/4	H301	24	L	5.0	6.5
			M	5.0	6.5
			N	5.0	6.5
αi SV 20/20/20	H303	24	L	5.0	6.5
			M	5.0	6.5
			N	5.0	6.5
αi SV 20/20/40	H304	24	L	5.0	6.5
			M	5.0	6.5
			N	4.6	5.9

(2) Residual amount of heat in the cabinet

By placing the heat sink section of the αi SV outside the cabinet, the residual amount of heat in the cabinet can be calculated according to the expression below.

Residual amount of heat in the cabinet

$$= a + Kb1 \times b1 + Kb2 \times b2 + Kb3 \times b3$$

a : Amount of heat dissipation determined by the αi SV model [W]

Kb1 : Coefficient determined by the αi SV [W/Arms]

b1 : Current flowing through the servo motor [Arms]

Kb2 : Coefficient determined by the αi SV [W/Arms]

b2 : Current flowing through the servo motor [Arms]

Kb3 : Coefficient determined by the αi SV [W/Arms]

b3 : Current flowing through the servo motor [Arms]

 αi SV 1-axis

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 4	H101	13	L	5.0	6.5	-
αi SV 20	H103	13	L	5.0	6.5	-
αi SV 40	H104	13	L	0.92	1.18	-
αi SV 80	H105	13	L	0.86	1.16	-
αi SV 160	H106	17	L	0.47	0.61	-
αi SV 360	H109	25	L	0.25	0.33	0.4
αi SV 20L	H153	14	L	5.0	6.5	9.4
αi SV 40L	H154	14	L	0.92	1.18	1.68
αi SV 80L	H155	18	L	0.43	0.58	0.85
αi SV 160L	H156	16	L	0.47	0.61	0.88

αi SV 2-axis

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 4/4	H201	17	L	5.0	6.5	-
			M	5.0	6.5	-
αi SV 4/20	H203	17	L	5.0	6.5	-
			M	5.0	6.5	-
αi SV 20/20	H205	17	L	5.0	6.5	-
			M	5.0	6.5	-
αi SV 20/40	H206	17	L	1.0	1.3	-
			M	0.92	1.18	-
αi SV 40/40	H207	19	L	0.46	0.59	-
			M	0.46	0.59	-
αi SV 40/80	H208	19	L	0.46	0.59	-
			M	0.43	0.58	-
αi SV 80/80	H209	19	L	0.43	0.58	-
			M	0.43	0.58	-
αi SV 80/160	H210	19	L	0.43	0.58	-
			M	0.47	0.61	-
αi SV 160/160	H211	19	L	0.47	0.61	-
			M	0.47	0.61	-
αi SV 20/20L	H255	21	L	1.0	1.3	1.88
			M	1.0	1.3	1.88
αi SV 20/40L	H256	21	L	0.5	0.65	0.94
			M	0.46	0.59	0.84
αi SV 40/40L	H257	23	L	0.46	0.59	0.84
			M	0.46	0.59	0.84
αi SV 40/80L	H258	21	L	0.46	0.59	0.84
			M	0.43	0.58	0.85
αi SV 80/80L	H259	21	L	0.43	0.58	0.85
			M	0.43	0.58	0.85

 αi SV 3-axis

Name	Specification	a [W]	Axis	K [W/Arms]	
				HRV2	HRV3
αi SV 4/4/4	H301	24	L	5.0	6.5
			M	5.0	6.5
			N	5.0	6.5
αi SV 20/20/20	H303	24	L	5.0	6.5
			M	5.0	6.5
			N	5.0	6.5
αi SV 20/20/40	H304	24	L	5.0	6.5
			M	5.0	6.5
			N	0.92	1.18

6.1.3 αi SP series

Table 6.1.3(a) αi SP

Name	Rated output (Note 1)	Total amount of heat dissipation	Residual amount of heat in the cabinet
αi SP2.2	1.5kW	75W	37W
αi SP 5.5	2.2kW	112W	36W
	3.7kW	120W	36W
αi SP 11	5.5kW	171W	41W
	7.5kW	218W	44W
αi SP 15	11kW	273W	45W
αi SP 22	15kW	435W	53W
	18.5kW	515W	57W
αi SP 26	22kW	684W	62W
αi SP 30	26kW	739W	65W
αi SP 37	26kW	739W	65W
αi SP 45	30kW	911W	75W
	37kW	1123W	85W
αi SP 55	45kW	1360W	98W

NOTE

- 1 "Rated output" indicates the continuous rated output of the motor.
- 2 The indicated amounts of heat dissipation assume the use of αi I series spindle motor.

6.2 400-V INPUT SERIES

The amount of heat dissipation by each amplifier of the 400-V input αi series servo amplifier is described below.

6.2.1 αi PS series

Table 6.2.1(a) αi PS

Name	Rated output	Total amount of heat dissipation	Residual amount of heat in the cabinet
αi PS 11HV	11kW	136W	51W
αi PS 18HV	18kW	274W	57W
αi PS 30HV	30kW	380W	64W
αi PS 45HV	30kW	394W	64W
	37kW	475W	68W
	45kW	567W	75W
αi PS 75HV	60kW	600W	75W
	75kW	738W	82W
αi PS 100HV	100kW	1380W	110W

Table 6.2.1(b) AC reactor for αi PS

Name	Ordering number	Rated output	Total amount of heat dissipation
For αi PS 11HV	A81L-0001-0163	11kW	38W
For αi PS 18HV		18kW	70W
For αi PS 30HV	A81L-0001-0164	30kW	60W
For αi PS 45HV		45kW	100W
For αi PS 75HV	A81L-0001-0165	75kW	120W
For αi PS 100HV		100kW	180W
For αi PS 11HV	A81L-0001-0167	11kW	55W

6.2.2 αi SV series

The amount of heat dissipation by the αi SV depends on the αi SV model and the current that flows through the servo motor. For the current that flows through a servo motor, reference the continuous rated current of each servo motor. (For the continuous rated current of each servo motor, refer to the servo motor descriptions.) As the current that flows through a servo motor, the root-mean-square value of the current that flows through an actual servo motor on a machine can be used.

(1) Total amount of heat dissipation

The total amount of heat dissipation by the αi SV is calculated according to the following expression:

$$\text{Total amount of heat dissipation} = a + K_{a1} \times b1 + K_{a2} \times b2$$

a : Amount of heat dissipation determined by the αi SV model [W]

K_{a1} : Coefficient determined by the αi SV [W/Arms]

b1 : Current flowing through the servo motor [Arms]

K_{a2} : Coefficient determined by the αi SV [W/Arms]

b2 : Current flowing through the servo motor [Arms]

αi SV 1-axis (Total amount of heat dissipation)

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 10HV	H102	13	L	8.2	14.8	-
αi SV 20HV	H103	13	L	8.8	14.5	-
αi SV 40HV	H104	13	L	8.8	15.3	-
αi SV 80HV	H105	17	L	9.0	12.3	-
αi SV 180HV	H106	25	L	8.8	12.3	23.4
αi SV 360HV	H109	34	L	7.8	11.0	18.2
αi SV 10HVL	H152	14	L	8.2	14.8	26.4
αi SV 20HVL	H153	14	L	8.8	14.5	25.2
αi SV 40HVL	H154	18	L	8.8	15.3	27.2
αi SV 80HV	H155	16	L	9.0	12.3	23.7

αi SV 2-axis (Total amount of heat dissipation)

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 10/10HV	H202	17	L	8.2	14.8	-
			M	8.2	14.8	-
αi SV 20/20HV	H205	17	L	8.8	14.5	-
			M	8.8	14.5	-
αi SV 20/40HV	H206	19	L	8.8	14.5	-
			M	8.8	15.3	-
αi SV 40/40HV	H207	19	L	8.8	15.3	-
			M	8.8	15.3	-
αi SV 40/80HV	H208	19	L	8.8	15.3	-
			M	9.0	12.3	-
αi SV 80/80HV	H209	19	L	9.0	12.3	-
			M	9.0	12.3	-
αi SV 10/10HVL	H252	19	L	8.2	14.8	26.4
			M	8.2	14.8	26.4
αi SV 20/20HVL	H255	21	L	8.8	14.5	25.2
			M	8.8	14.5	25.2
αi SV 20/40HVL	H256	21	L	8.8	14.5	25.2
			M	8.8	15.3	27.2
αi SV 40/40HVL	H257	21	L	8.8	15.3	27.2
			M	8.8	15.3	27.2

(2) Residual amount of heat in the cabinet

By placing the heat sink section of the αi SV outside the cabinet, the residual amount of heat in the cabinet can be calculated according to the expression below.

Residual amount of heat in the cabinet

$$= a + Kb1 \times b1 + Kb2 \times b2$$

a : Amount of heat dissipation determined by the αi SV model [W]

Kb1 : Coefficient determined by the αi SV [W/Arms]

b1 : Current flowing through the servo motor [Arms]

Kb2 : Coefficient determined by the αi SV [W/Arms]

b2 : Current flowing through the servo motor [Arms]

αi SV 1-axis (Residual amount of heat in the cabinet)

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 10HV	H102	13	L	8.2	14.8	-
αi SV 20HV	H103	13	L	1.76	2.9	-
αi SV 40HV	H104	13	L	1.76	2.9	-
αi SV 80HV	H105	17	L	0.90	1.23	-
αi SV 180HV	H106	25	L	0.44	0.62	1.17
αi SV 360HV	H109	34	L	7.8	11	18.2
αi SV 10HVL	H152	14	L	1.64	1.53	2.64
αi SV 20HVL	H153	14	L	0.88	1.53	2.52
αi SV 40HVL	H154	18	L	0.88	1.53	2.72
αi SV 80HV	H155	16	L	0.90	1.23	2.37

αi SV 2-axis (Residual amount of heat in the cabinet)

Name	Specification	a [W]	Axis	K [W/Arms]		
				HRV2	HRV3	HRV4
αi SV 10/10HV	H202	17	Ka1	8.2	14.8	-
			Ka2	8.2	14.8	-
αi SV 20/20HV	H205	17	Ka1	1.76	2.9	-
			Ka2	1.76	2.9	-
αi SV 20/40HV	H206	19	Ka1	0.88	1.45	-
			Ka2	0.88	1.53	-
αi SV 40/40HV	H207	19	Ka1	0.88	1.53	-
			Ka2	0.88	1.53	-
αi SV 40/80HV	H208	19	Ka1	0.88	1.53	-
			Ka2	0.90	1.23	-
αi SV 80/80HV	H209	19	Ka1	0.90	1.23	-
			Ka2	0.90	1.23	-
αi SV 10/10HVL	H252	19	Ka1	0.82	1.48	2.64
			Ka2	0.82	1.48	2.64
αi SV 20/20HVL	H255	21	Ka1	0.88	1.45	2.52
			Ka2	0.88	1.45	2.52
αi SV 20/40HVL	H256	21	Ka1	0.88	1.45	2.52
			Ka2	0.88	1.53	2.37
αi SV 40/40HVL	H257	21	Ka1	0.88	1.53	2.37
			Ka2	0.88	1.53	2.37

6.2.3 αi SP series

Table 6.2.3 αi SP

Name	Rated output (Note 1)	Total amount of heat dissipation	Residual amount of heat in the cabinet
αi SP 5.5HV	0.55kW	26W	18W
	1.5kW	44W	22W
	2.2kW	59W	24W
	3.7kW	87W	29W
αi SP 11HV	5.5kW	122W	37W
	7.5kW	156W	39W
αi SP 15HV	11kW	189W	40W
αi SP 30HV	15kW	247W	41W
	22kW	349W	45W
αi SP 45HV	30kW	482W	52W
	37kW	588W	57W
αi SP 75HV	60kW	1264W	91W
αi SP 100HV	100kW	2100W	150W

NOTE

- 1 "Rated output" indicates the continuous rated output of the motor.
- 2 The indicated amounts of heat dissipation assume the use of αi I series spindle motor.

7

COOLING

The *ai* series has a built-in fan for external fin cooling, so that external forced air cooling is unnecessary.

To maintain cooling efficiency, be sure to provide maintenance areas as described in Section 8.1.

8

EXTERNAL DIMENSIONS AND MAINTENANCE AREA

Chapter 8 "EXTERNAL DIMENSIONS AND MAINTENANCE AREA", consists of the following sections:

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8.1 OUTLINE DRAWINGS

8.1.1 Outline Drawings of Amplifiers, Panel Cut-out, and Maintenance Area

(1) αi PS series

Model			Outline drawing	Panel cut-out	Maintenance area	Internal fan*1	Internal fan*2	External fan
Power regeneration type	200-V input series	αi PS 5.5	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-	-
		αi PS 11	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	-	Provided
		αi PS 15	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	-	Provided
		αi PS 26	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	-	Provided
		αi PS 30	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	-	Provided
		αi PS 37	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	-	Provided
		αi PS 55	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided	Provided
	400-V input series	αi PS 11HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	-	Provided
		αi PS 18HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	-	Provided
		αi PS 30HV	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided	Provided
		αi PS 45HV	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided	Provided
		αi PS 75HV	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided	Provided
		αi PS 100HV	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided	Provided
Resistance regeneration type	200-V input series	αi PS _R 3	Outline drawing 1	Panel cut-out 1	Maintenance area 1	-	Provided	-
		αi PS _R 5.5	Outline drawing 2	Panel cut-out 2	Maintenance area 1	-	Provided	-

*1 Internal cooling fan

*2 Radiator cooling fan

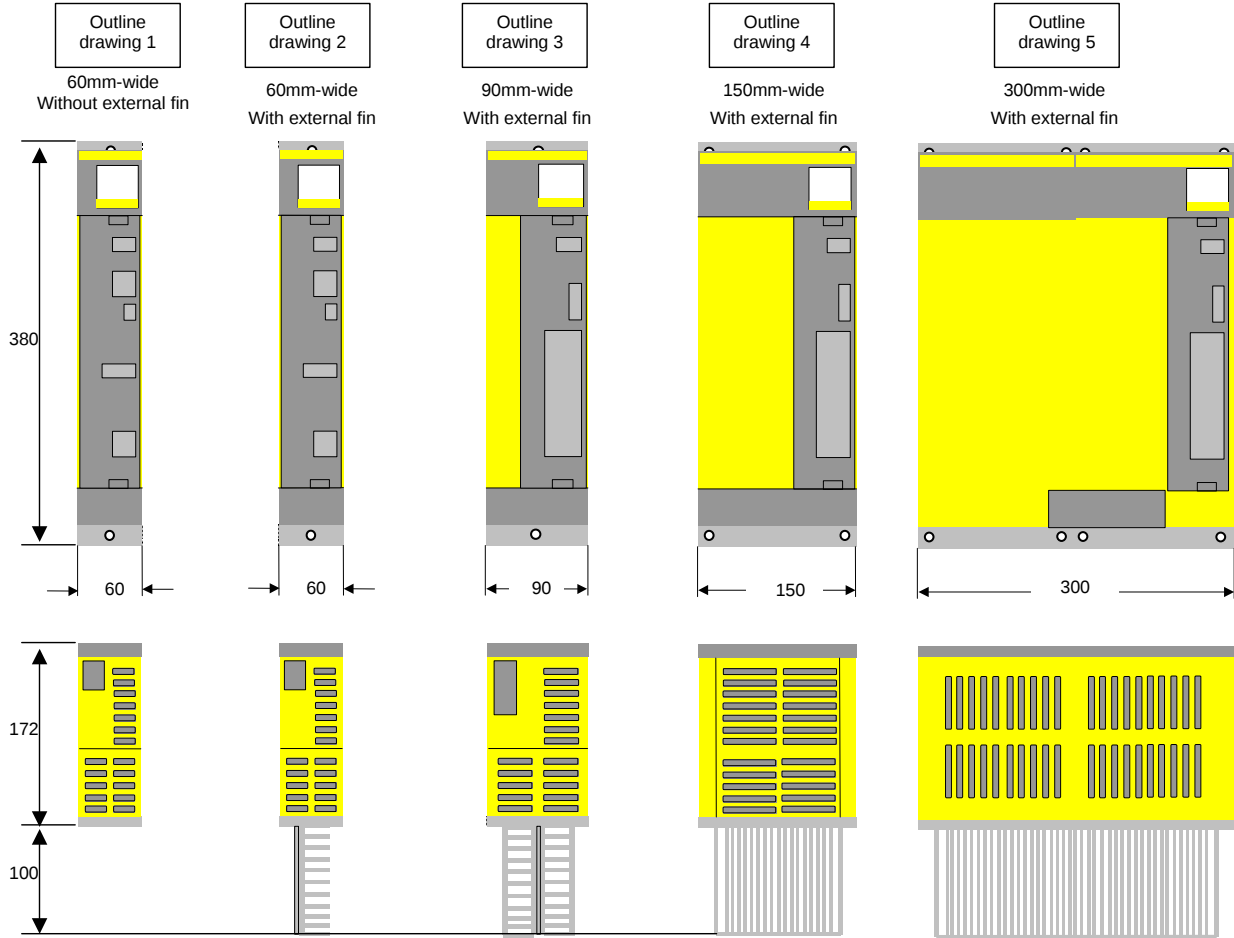
(2) αi SV series

Model			Outline drawing	Panel cut-out	Maintenance area	Internal fan	External fan
200-V input series	1-axis	αi SV 4	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 80	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 160	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 360	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SV 20L	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 40L	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 80L	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 160L	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
	2-axis	αi SV 4/4	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 4/20	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20/20	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20/40	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 40/40	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 40/80	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 80/80	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 80/160	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 160/160	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 20/20L	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 20/40L	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 40/40L	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 40/80L	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 80/80L	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
	3-axis	αi SV 4/4/4	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20/20/20	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20/20/40	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
400-V input series	1-axis	αi SV 10HV	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20HV	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 40HV	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 80HV	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 180HV	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SV 360HV	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided
		αi SV 10HVL	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 20HVL	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SV 40HVL	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
	2-axis	αi SV 80HVL	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 10/10HV	Outline drawing 1	Panel cut-out 1	Maintenance area 1	Provided	-
		αi SV 20/20HV	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 20/40HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 40/40HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 40/80HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 80/80HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 10/10HVL	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SV 20/20HVL	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 20/40HVL	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SV 40/40HVL	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided

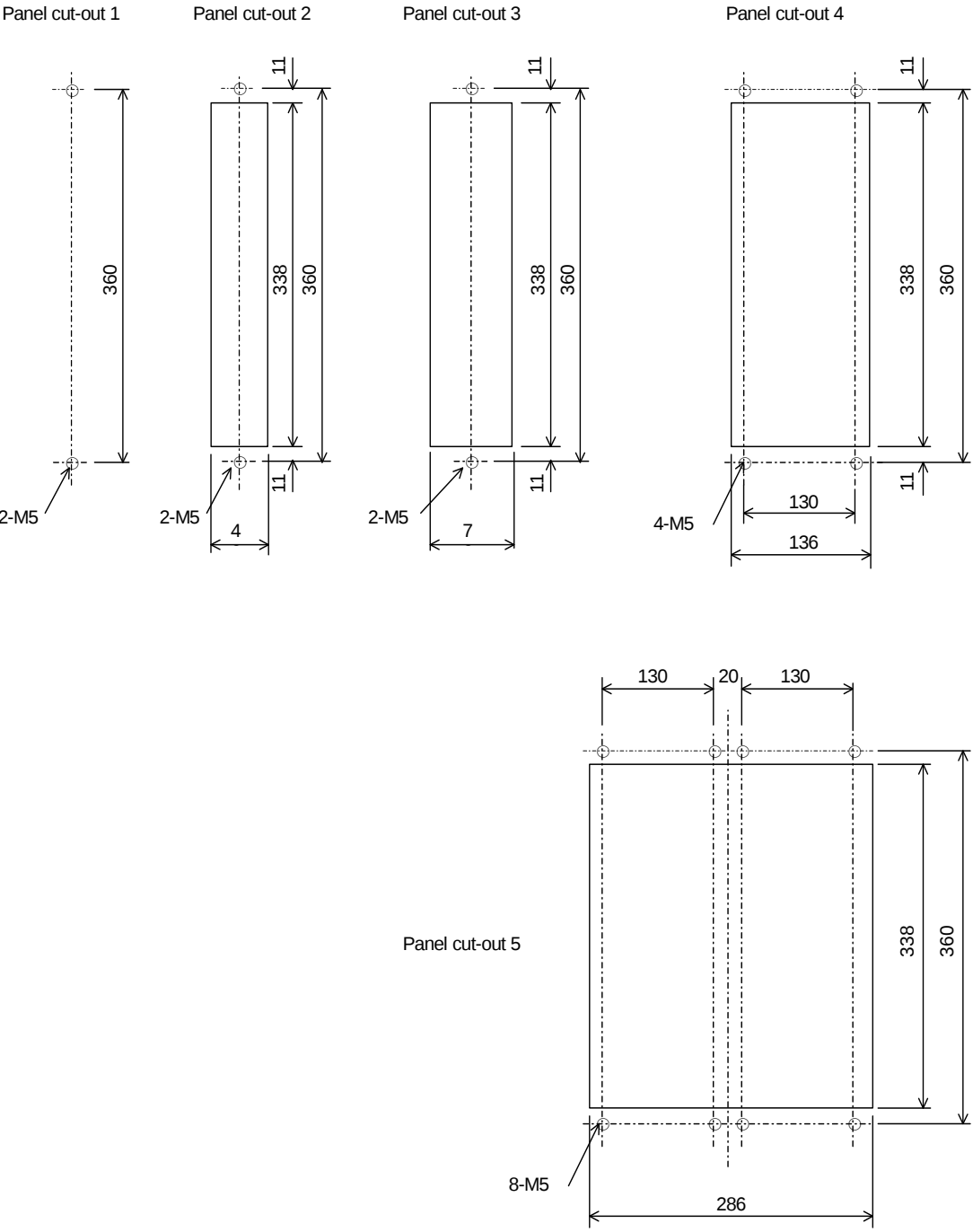
(3) αi SP series

Model			Outline drawing	Panel cut-out	Maintenance area	Internal fan	External fan
αi series	200-V input series	αi SP 2.2	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	-
		αi SP 5.5	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SP 11	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SP 15	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SP 22	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SP 26	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SP 30	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SP 37	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SP 45	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided
		αi SP 55	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided
	400-V input series	αi SP 5.5HV	Outline drawing 2	Panel cut-out 2	Maintenance area 1	Provided	Provided
		αi SP 11HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SP 15HV	Outline drawing 3	Panel cut-out 3	Maintenance area 2	Provided	Provided
		αi SP 30HV	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SP 45HV	Outline drawing 4	Panel cut-out 4	Maintenance area 3	Provided	Provided
		αi SP 75HV	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided
		αi SP 100HV	Outline drawing 5	Panel cut-out 5	Maintenance area 4	Provided	Provided

(4) Amplifier outline drawings



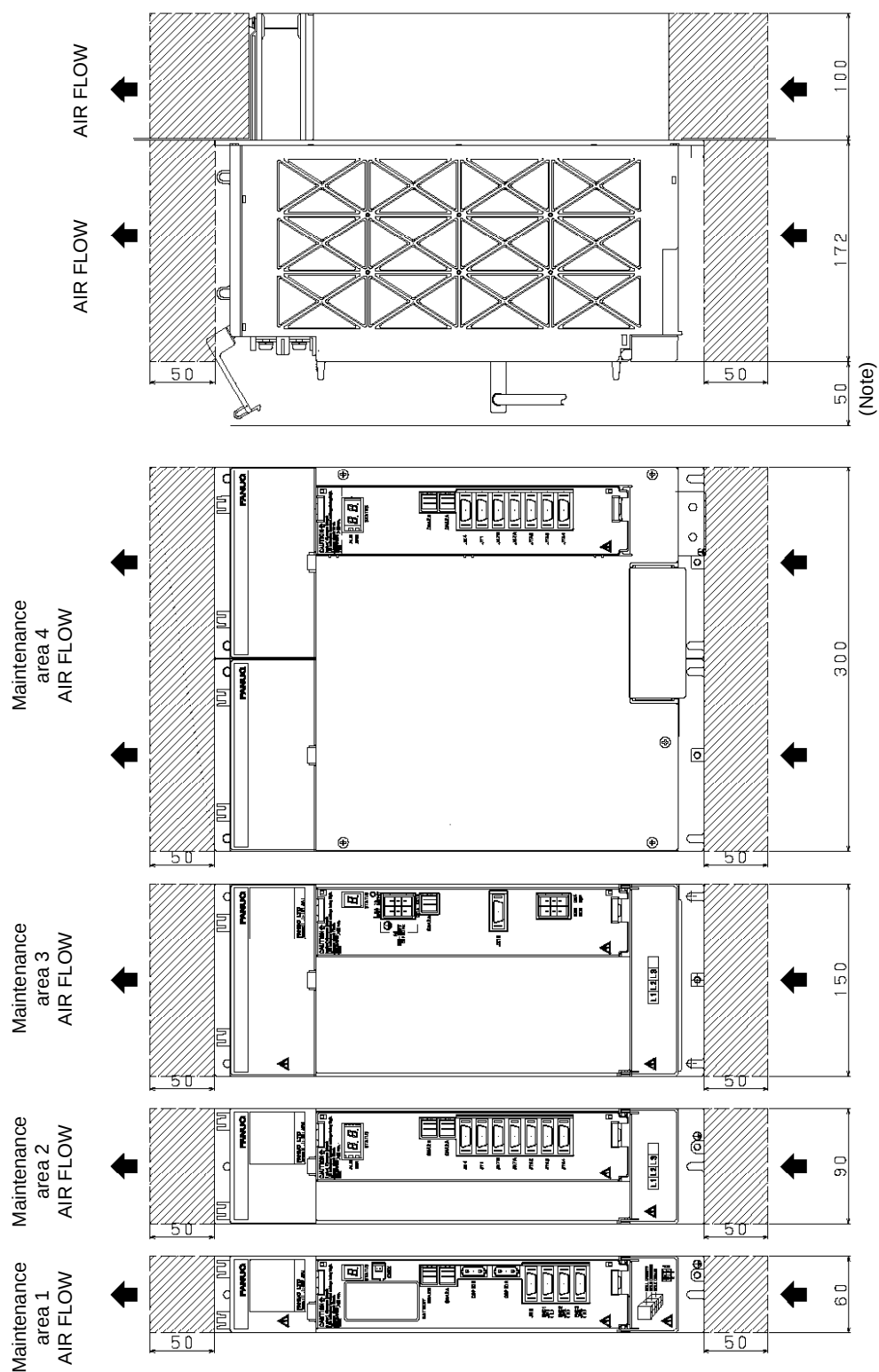
(5) Panel cut-out drawings



See Section 8.2 for details.

(6) Maintenance area drawings

An amplifier contains a fan motor for internal stirring. To allow air to flow and make replacement of a fan unit easy, be sure to reserve the shaded areas shown in the figure below.



For the ω series, the internal stirring fan can be pulled out from the top of the amplifier.

(Note) Add 30 mm when using the conventional connector instead of side cable type connector.

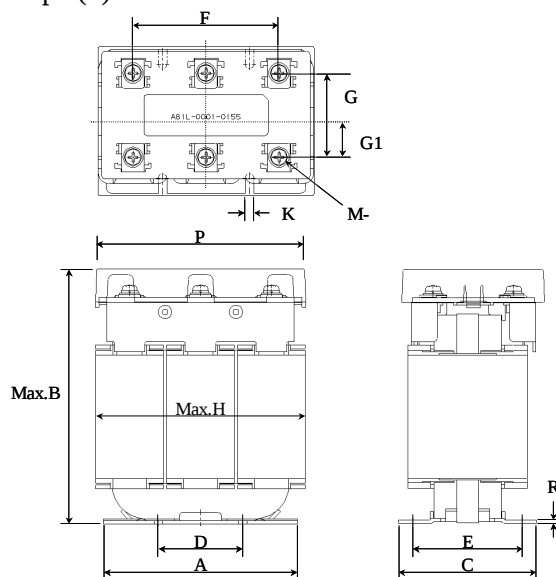
8.1.2 AC Reactor Unit

(a) A81L-0001-0155

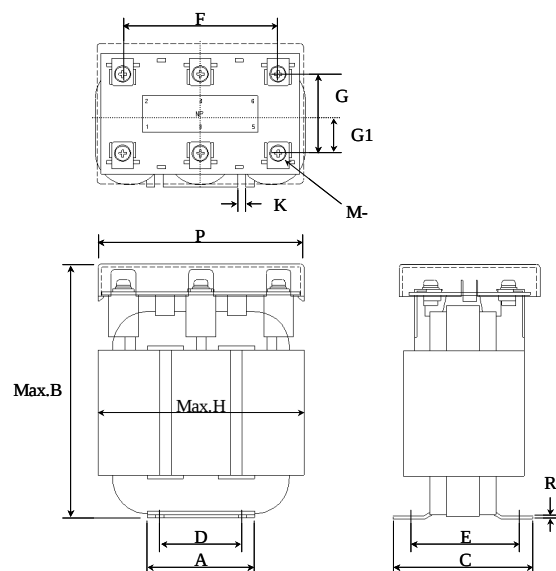
There are two types of shapes under the same specification drawing number. Both types use the same mounting pitches and other dimensions for mounting.

Specifying shape (1) or (2) is not possible.

Shape (1)



Shape (2)

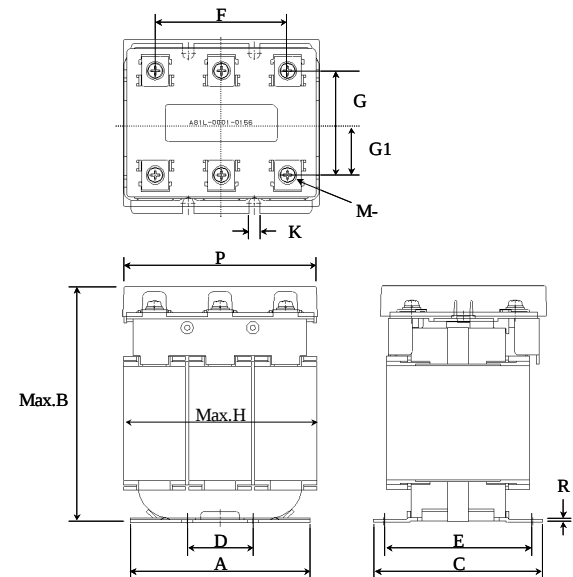


	A	B	C	D	E	F	G	G1	H	K	P	R	M
Shape (1)	115	155	82	50	65	84	48	20.5	135	5	135	2	M5
Shape (2)	65	155	85	50	65	94	48	20.5	127	5	125	2	M5

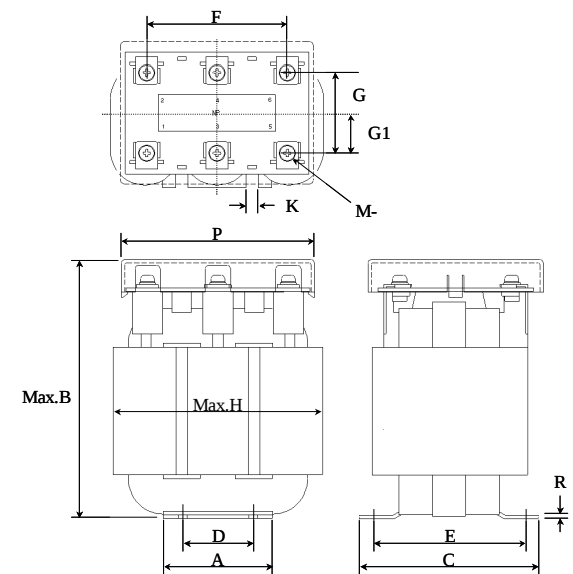
(b) A81L-0001-0156

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Specifying shape (1) or (2) is not possible.

Shape (1)



Shape (2)

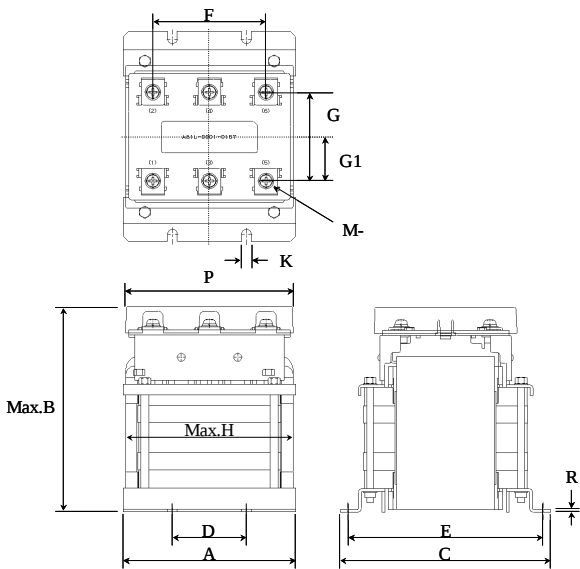


	A	B	C	D	E	F	G	G1	H	K	P	R	M
外形 (1)	115	155	108	42	95	84	66	29.5	135	7.2	135	2	M5
外形 (2)	65	155	107	42	95	84	66	29	131	7.2	115	2	M5

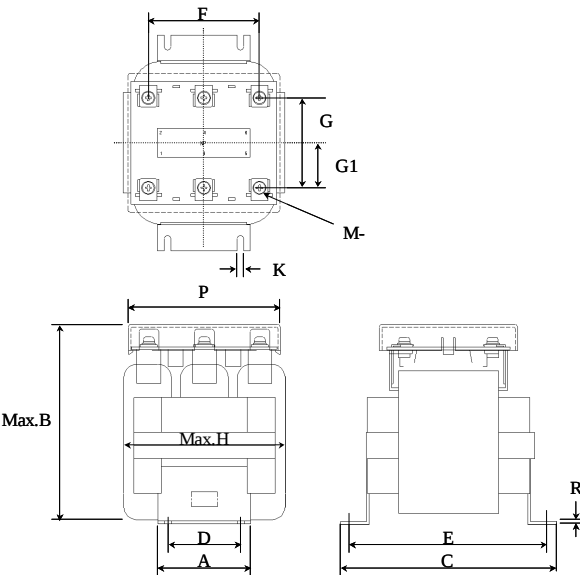
(c) A81L-0001-0157

There are two types of shapes under the same specification drawing number. Both types use the same mounting pitches and other dimensions for mounting.
Specifying shape (1) or (2) is not possible.

Shape (1)



Shape (2)

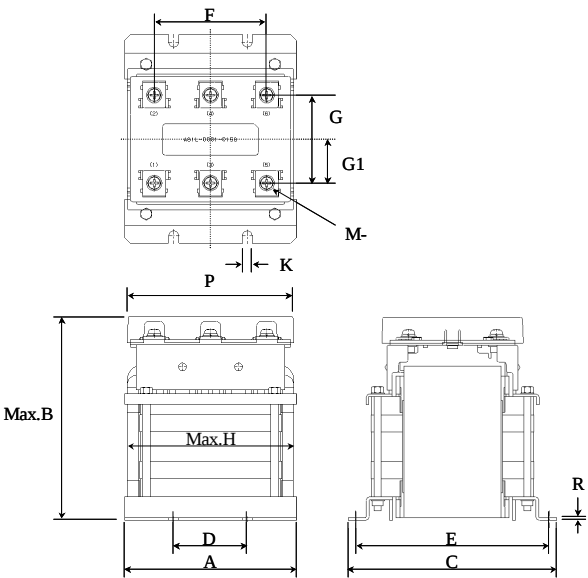


	A	B	C	D	E	F	G	G1	H	K	P	R	M
Shape (1)	128	155	165	55	145	84	66	33	135	7.2	135	2	M5
Shape (2)	70	155	165	55	145	84	66	33	135	7.2	115	2	M5

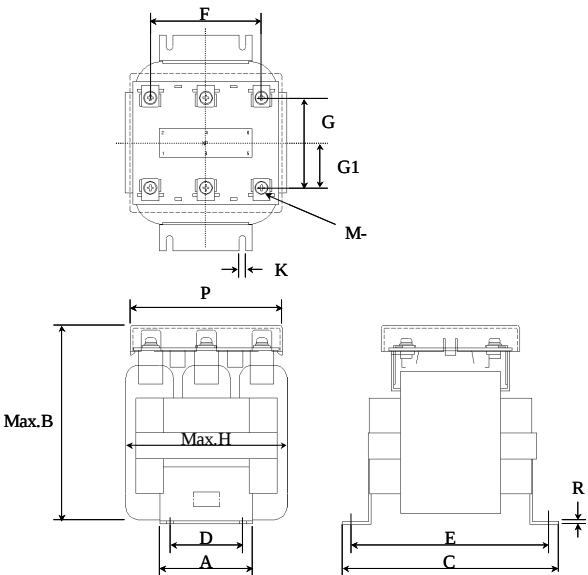
(d) A81L-0001-0158

There are two types of shapes under the same specification drawing number. Both types use the same mounting pitches and other dimensions for mounting.
Specifying shape (1) or (2) is not possible.

Shape (1)



Shape (2)

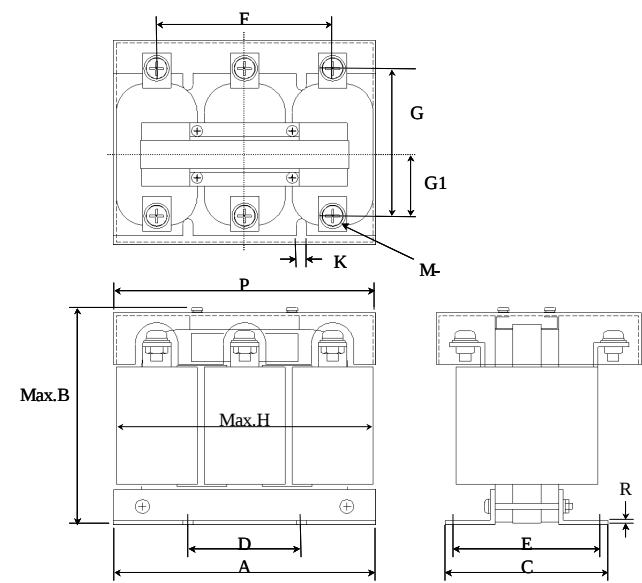


	A	B	C	D	E	F	G	G1	H	K	P	R	M
Shape (1)	128	155	165	55	145	84	66	33	135	7.2	135	2	M5
Shape (2)	70	155	165	55	145	84	66	33	135	7.2	115	2	M5

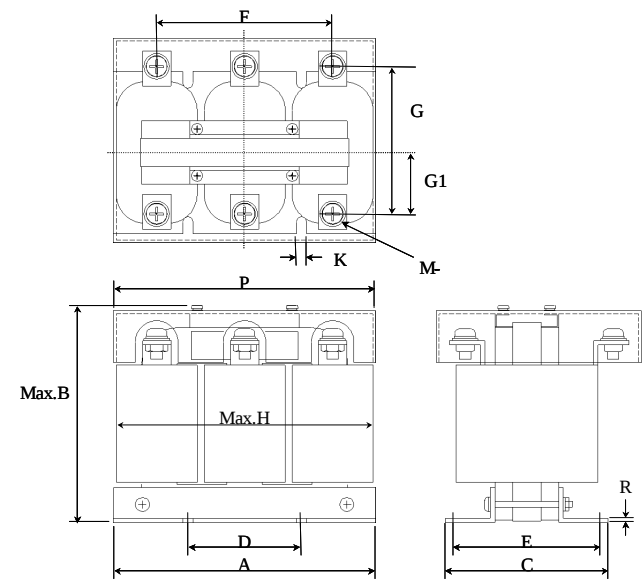
(e) A81L-0001-0159

There are two types of shapes under the same specification drawing number. Both types use the same mounting pitches and other dimensions for mounting.
Specifying shape (1) or (2) is not possible.

Shape (1)



Shape (2)

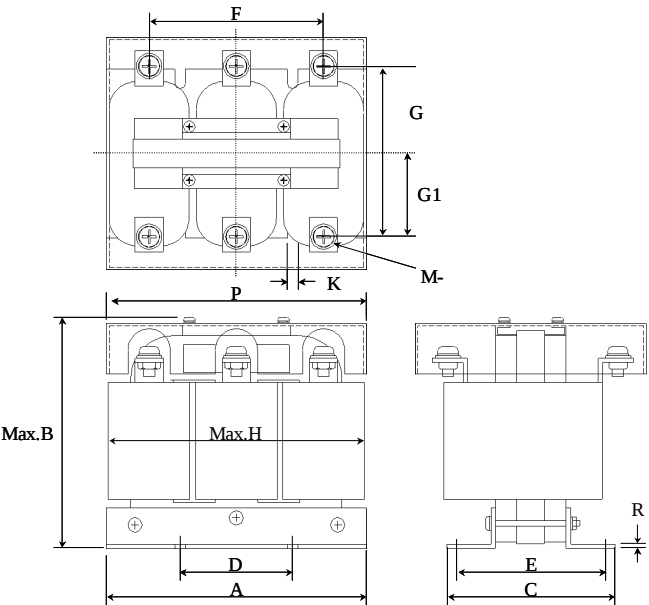


	A	B	C	D	E	F	G	G1	H	K	P	R	M
Shape (1)	185	160	115	80	100	124	105	44	185	7.2	185	2.6	M8
Shape (2)	184	160	115	80	100	124	95	38.5	185	7.2	185	2.6	M8

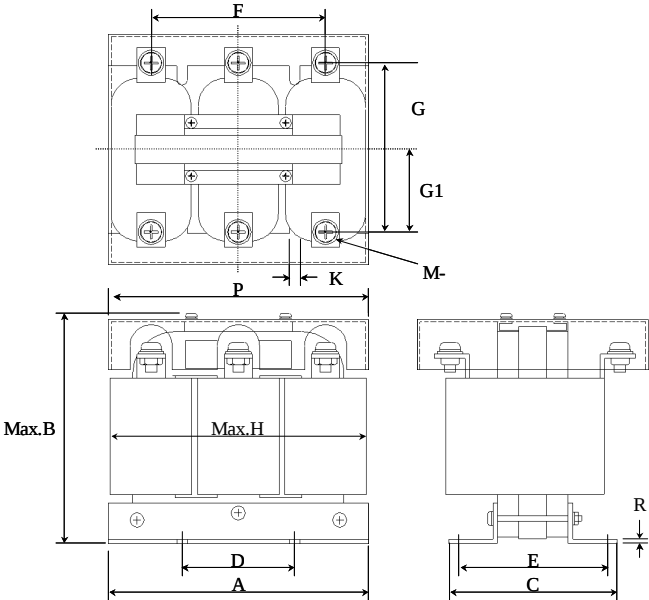
(f) A81L-0001-0160

There are two types of shapes under the same specification drawing number. Both types use the same mounting pitches and other dimensions for mounting.
Specifying shape (1) or (2) is not possible.

Shape (1)

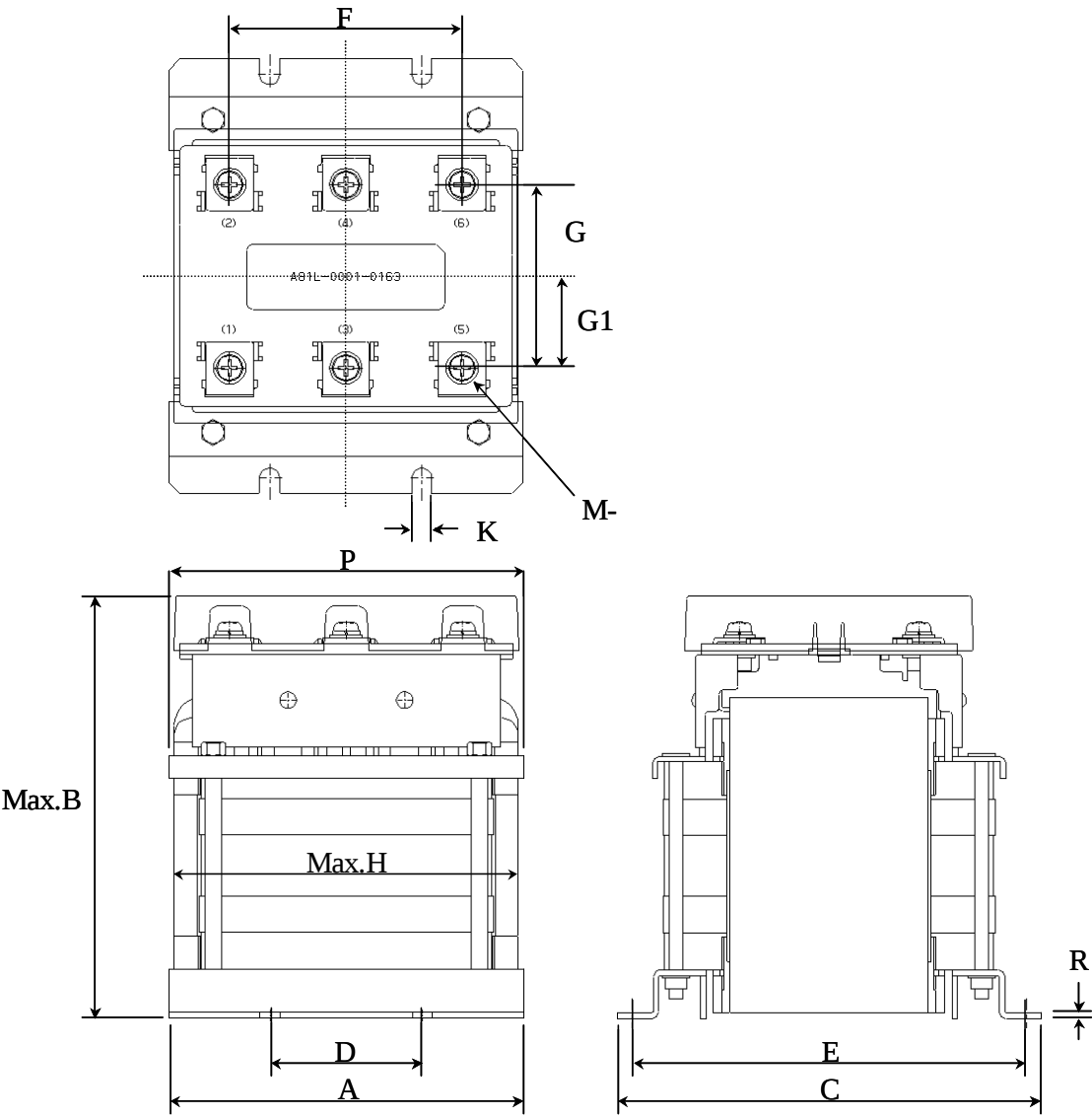


Shape (2)



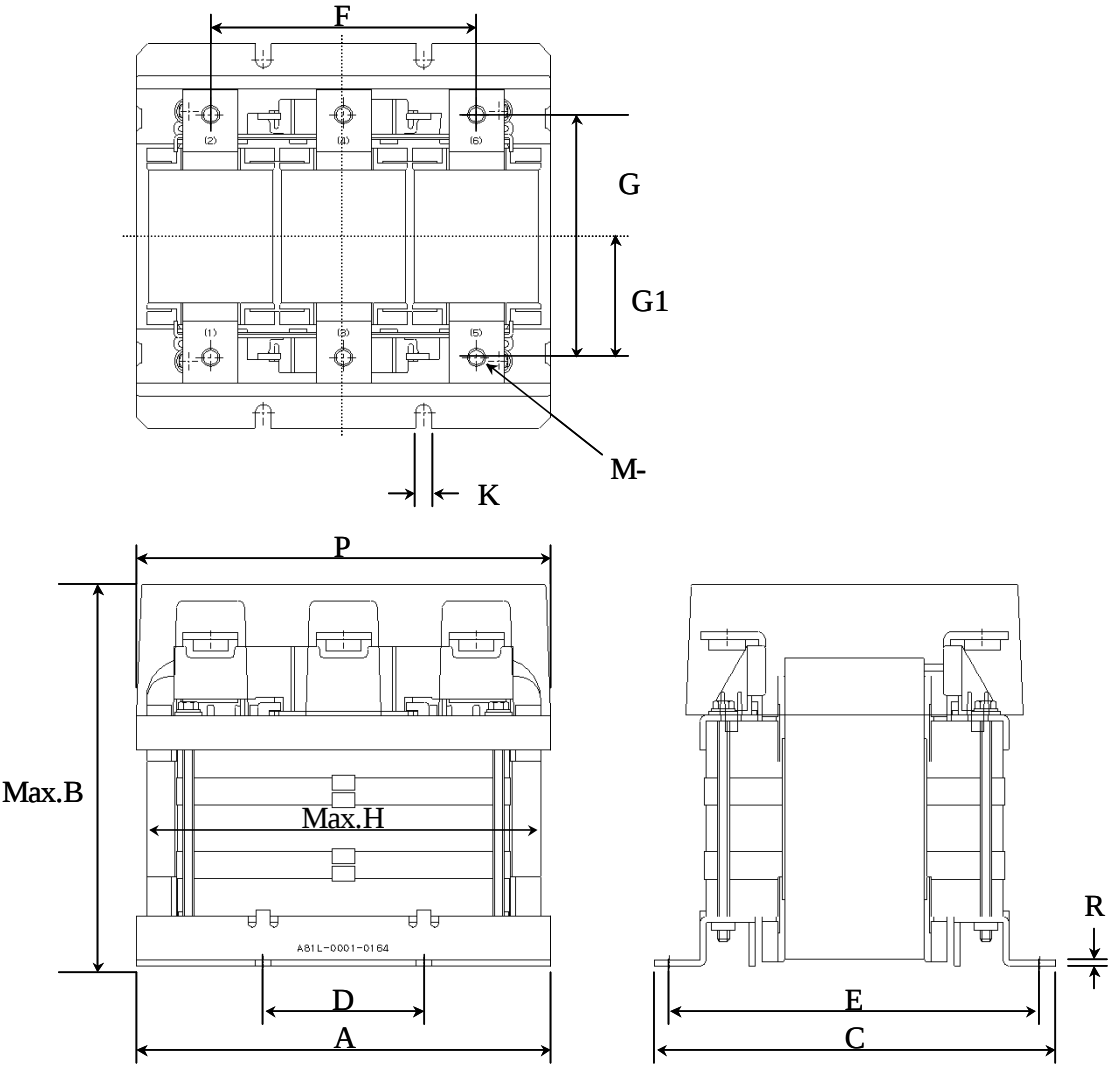
	A	B	C	D	E	F	G	G1	H	K	P	R	M
Shape (1)	185	170	120	80	100	124	125	58	190	7.2	185	2.6	M8
Shape (2)	184	170	120	80	100	124	115	57.5	185	7.2	185	2.6	M8

(g) A81L-0001-0163



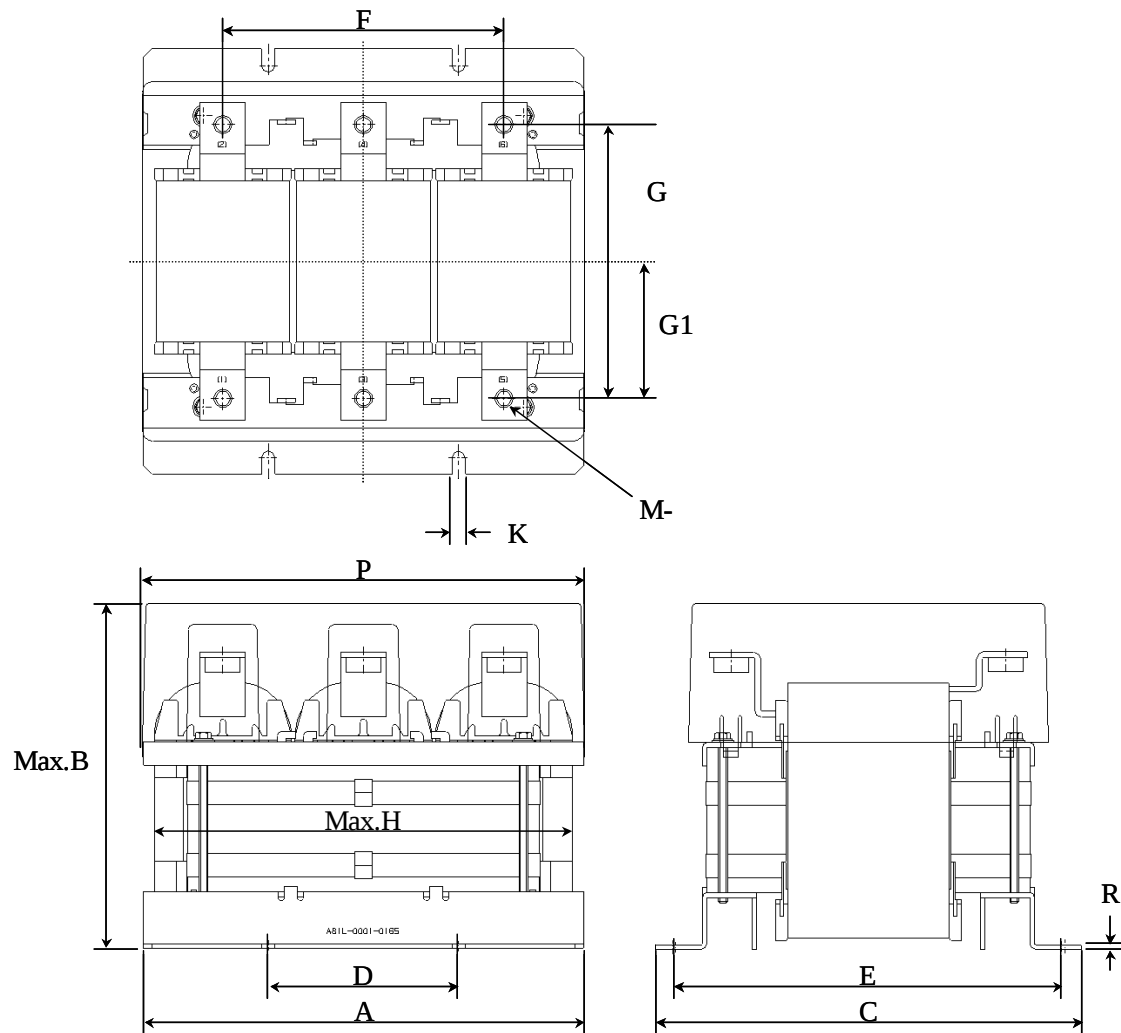
	A	B	C	D	E	F	G	G1	H	K	P	R	M
A81L-0001-0163	135	155	165	55	145	84	66	33	135	7.2	135	2	M5

(h) A81L-0001-0164



	A	B	C	D	E	F	G	G1	H	K	P	R	M
A81L-0001-0164	185	172	175	70	154	116	106	53	185	7	185	2.6	M8

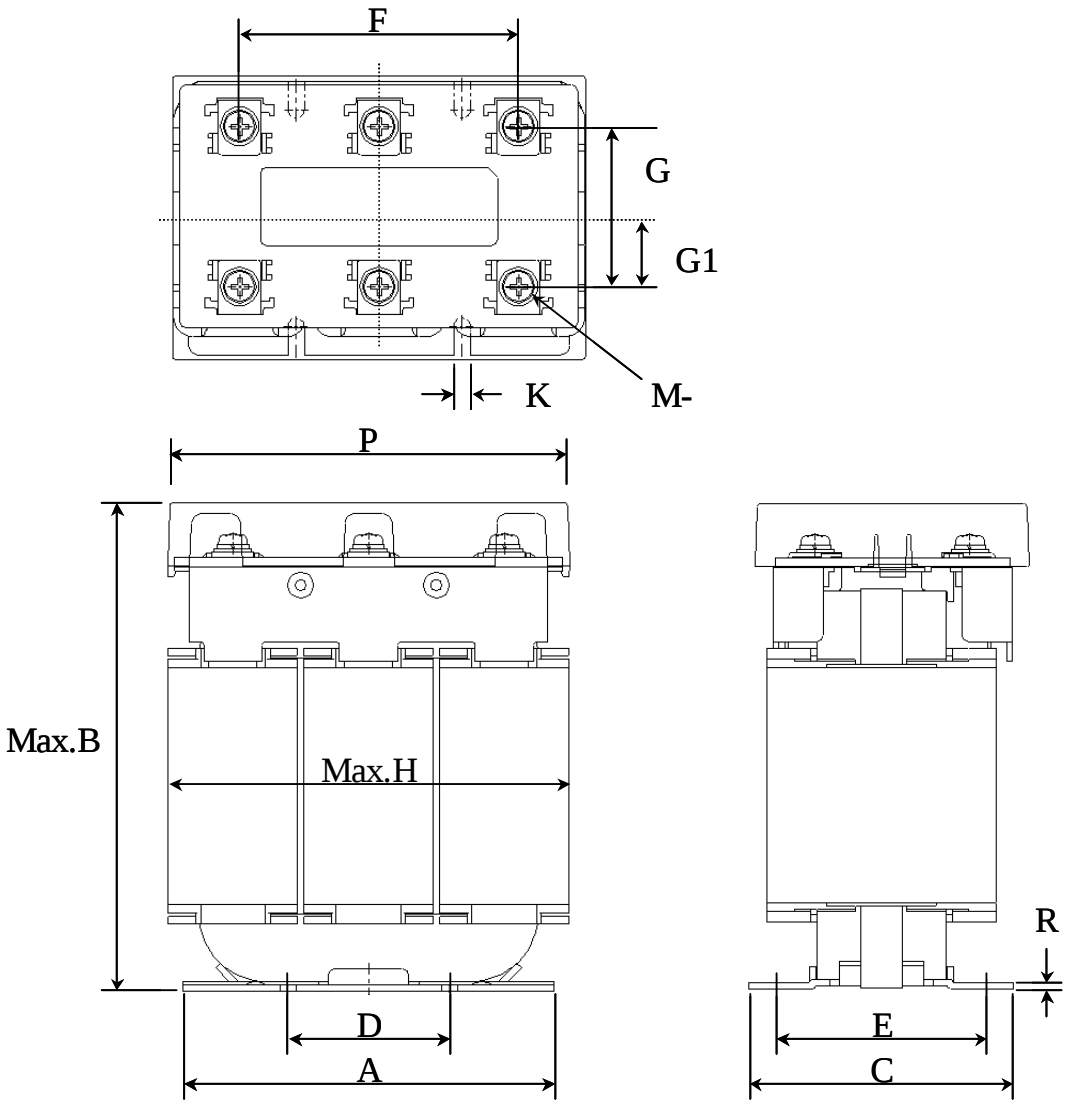
(i) A81L-0001-0165



	A	B	C	D	E	F	G	G1	H	K	P	R	M
A81L-0001-0165	248	200	238	105	216	155	151	75.5	248	7	248	2.6	M10

(j) A81L-0001-0167

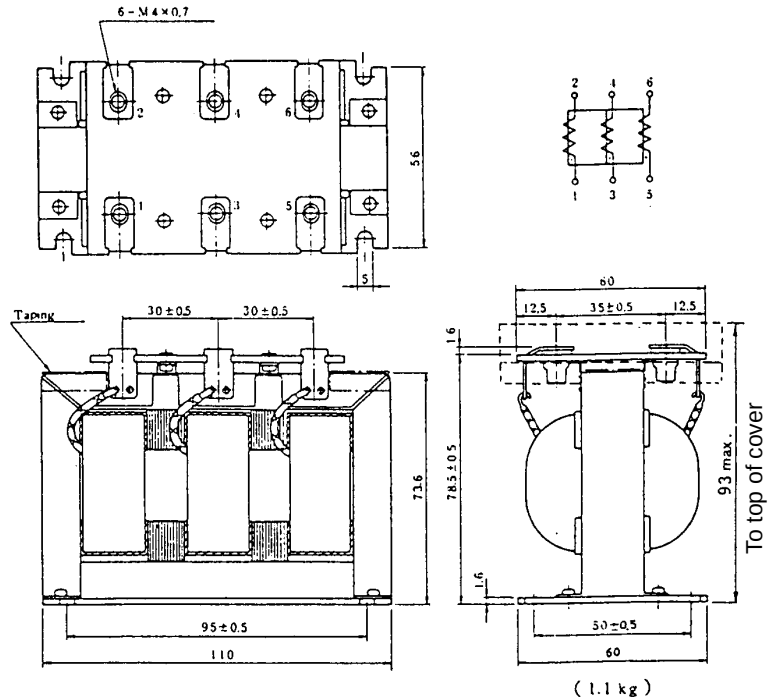
(j) A81L-0001-0170



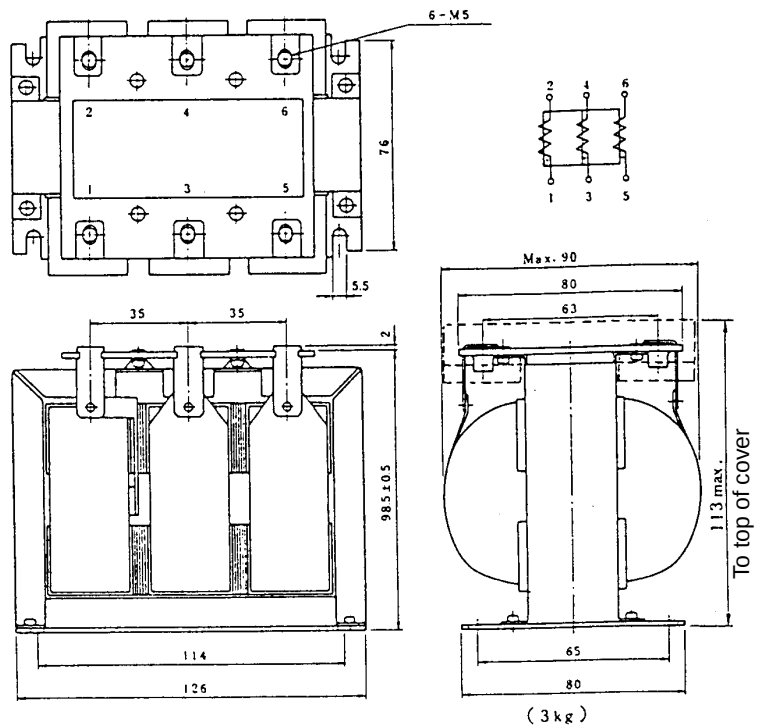
	A	B	C	D	E	F	G	G1	H	K	P	R	M
Shape (1)	115	155	82	50	65	84	48	20.5	135	5	135	2	M5

8.1.3 AC Line Filter

(a) A81L-0001-0083#3C, A81L-0001-0171

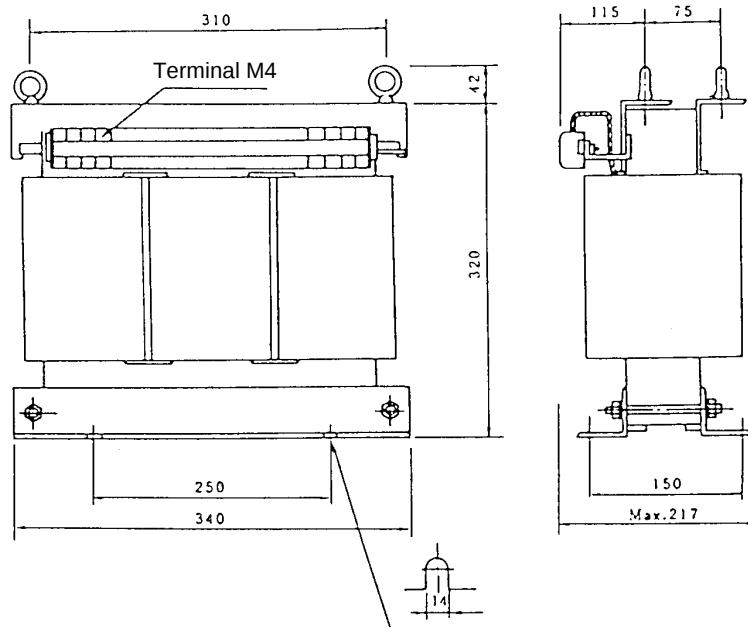


(b) A81L-0001-0101#C

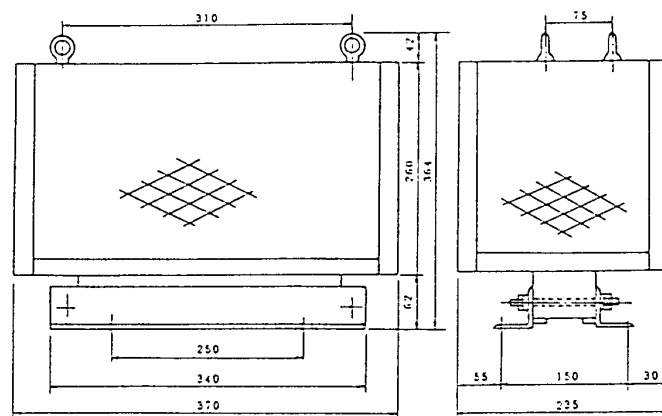


8.1.4 Power Transformer

(a) For αi PS 5.5, αi PS_R 5.5 (at 5.5 kW output) (A06B-6052-J001)



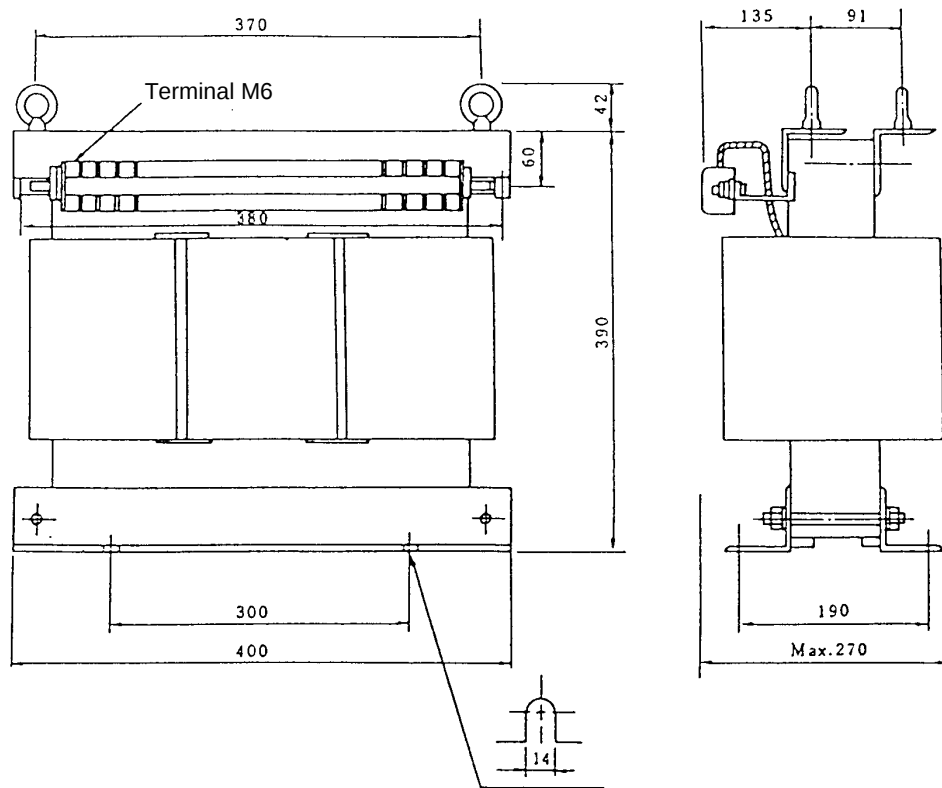
Outline Drawing of Power Transformer with no Cover



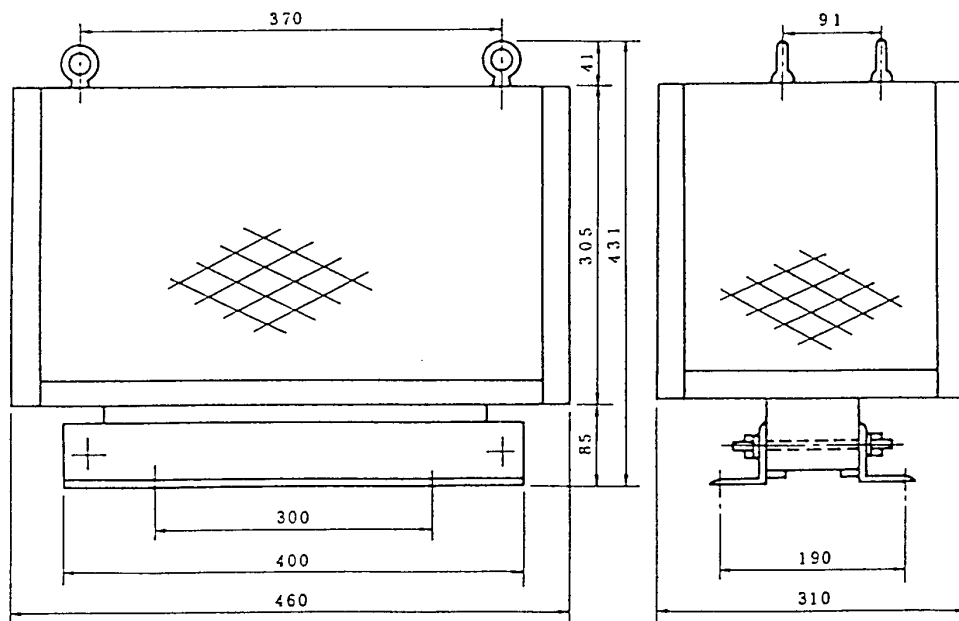
Outline Drawing of Power Transformer with Cover

NOTE

The four side panels are all meshed, while the top is a solid plate.

(b) For αi PS 11 , αi PS_R 5.5 (at 7.5KW output) (A06B-6044-J006)

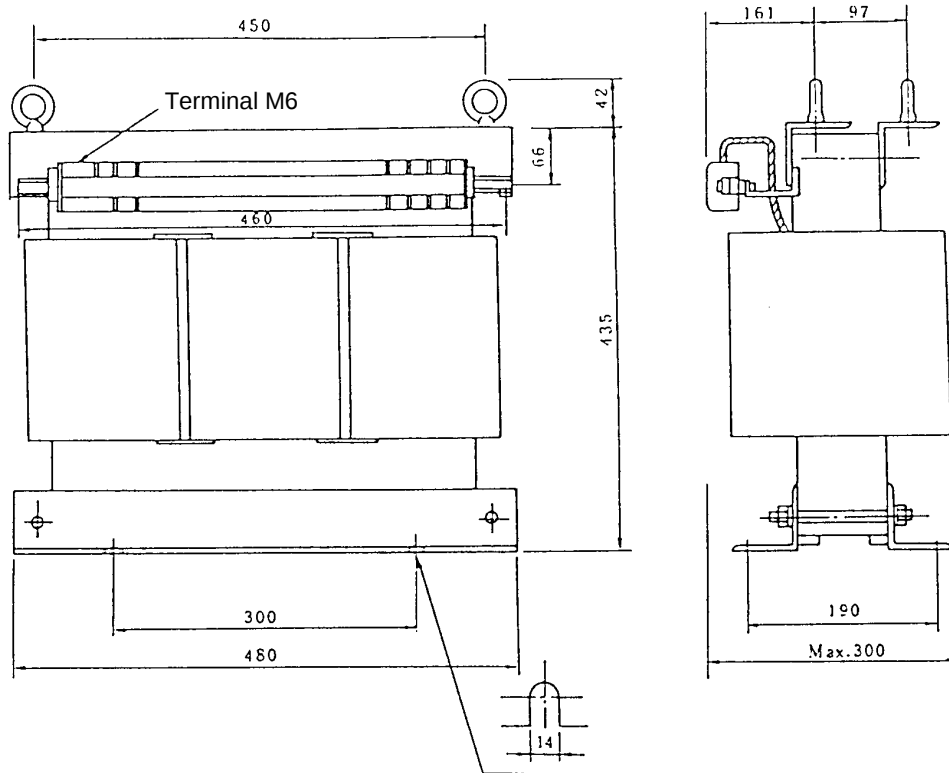
Outline Drawing of Power Transformer with no Cover



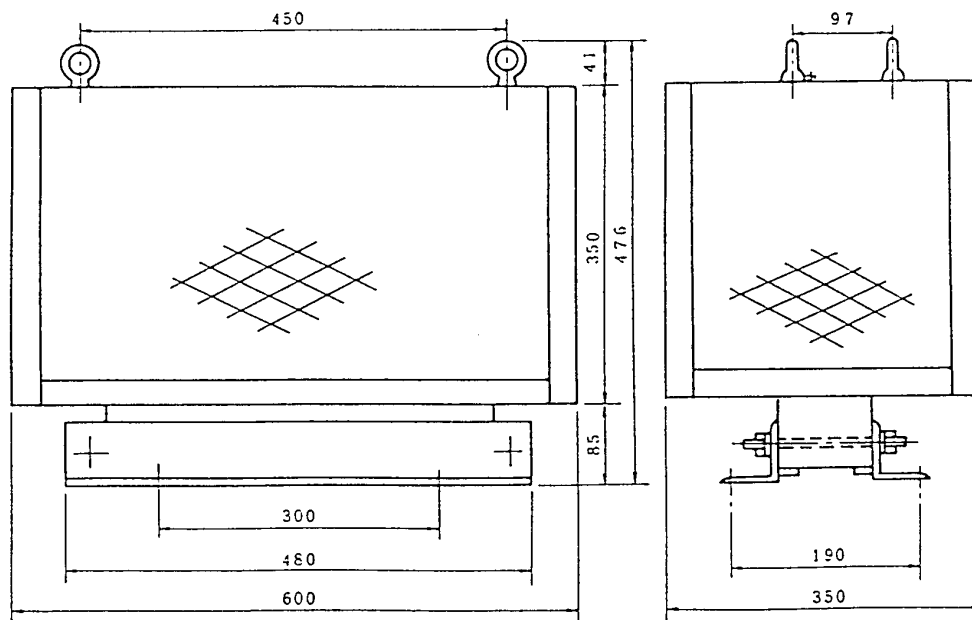
Outline Drawing of Power Transformer with Cover

NOTE

The four side panels are all meshed, while the top is a solid plate.

(c) For αi PS 15 (A06B-6044-J007)

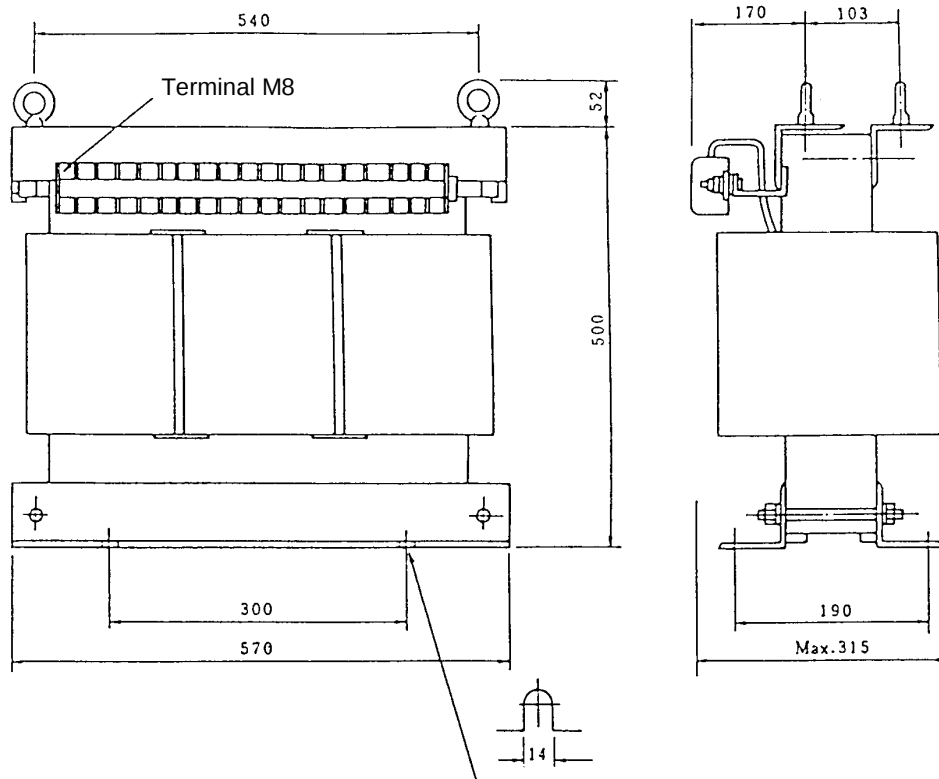
Outline Drawing of Power Transformer with no Cover



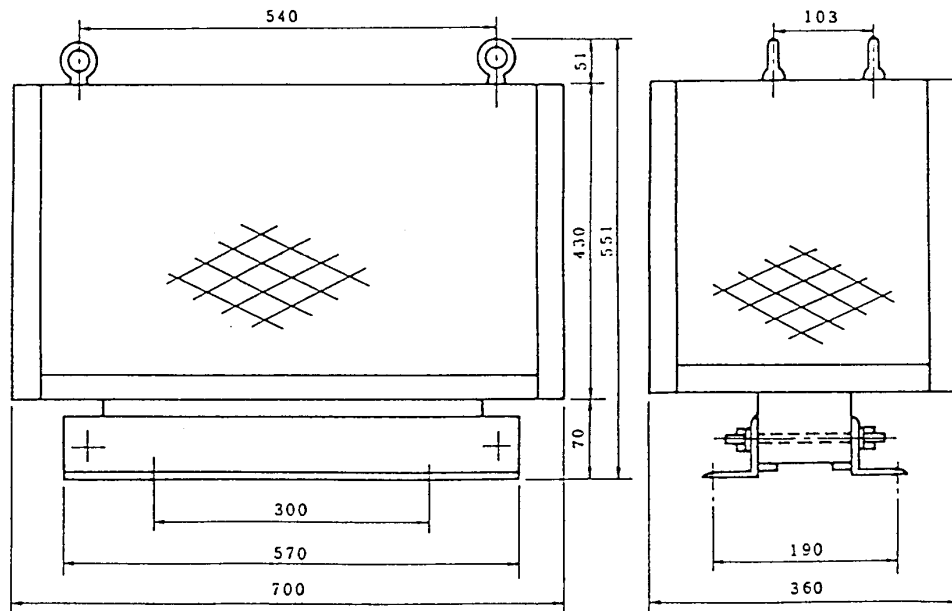
Outline Drawing of Power Transformer with Cover

NOTE

The four side panels are all meshed, while the top is a solid plate.

(d) For αi PS 26, 30(A06B-6044-J010)

Outline Drawing of Power Transformer with no Cover

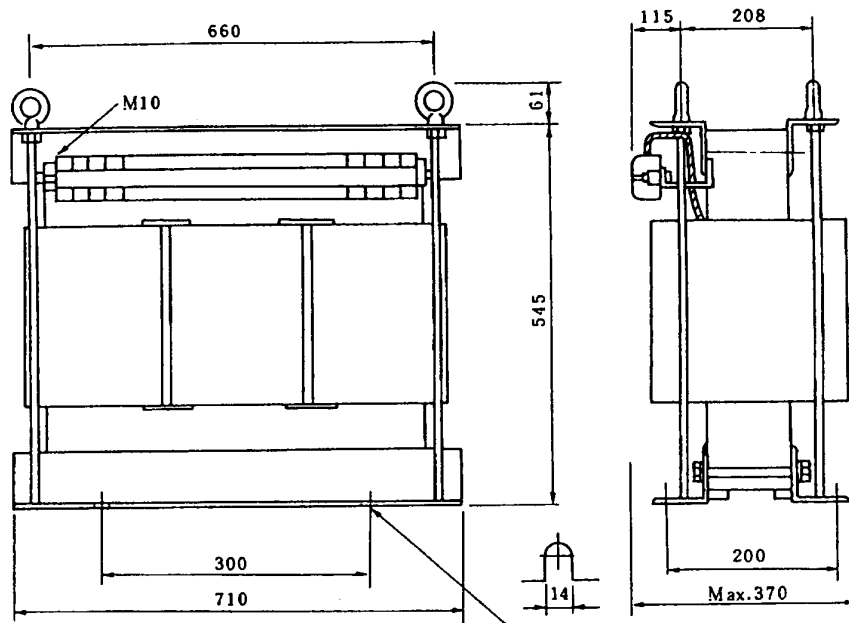


Outline Drawing of Power Transformer with Cover

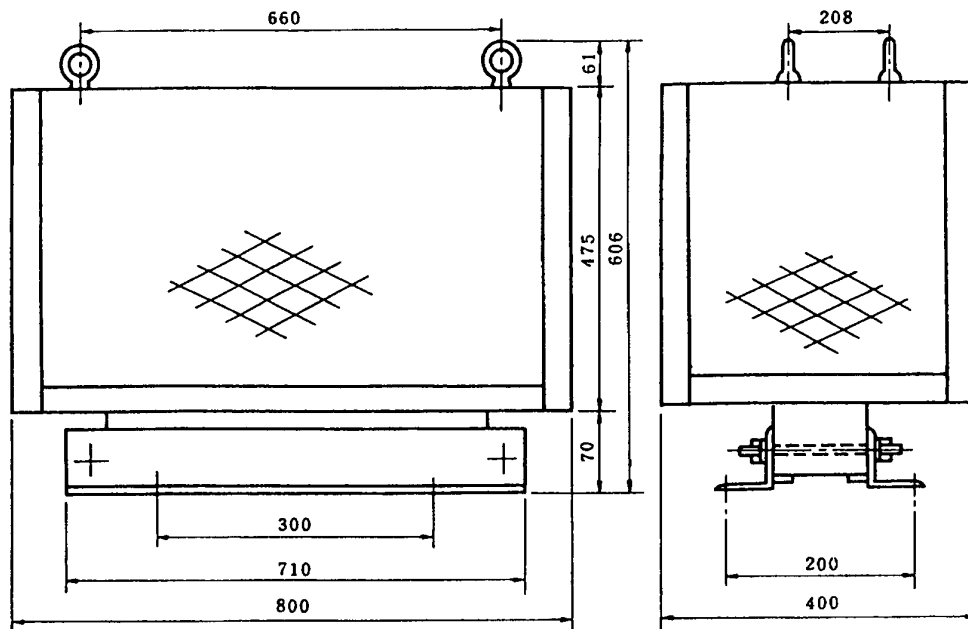
NOTE

The four side panels are all meshed, while the top is a solid plate.

(e) For αi PS 37, αi PS 55 (at 45kW output) (A06B-6044-J015)



Outline Drawing of Power Transformer with no Cover

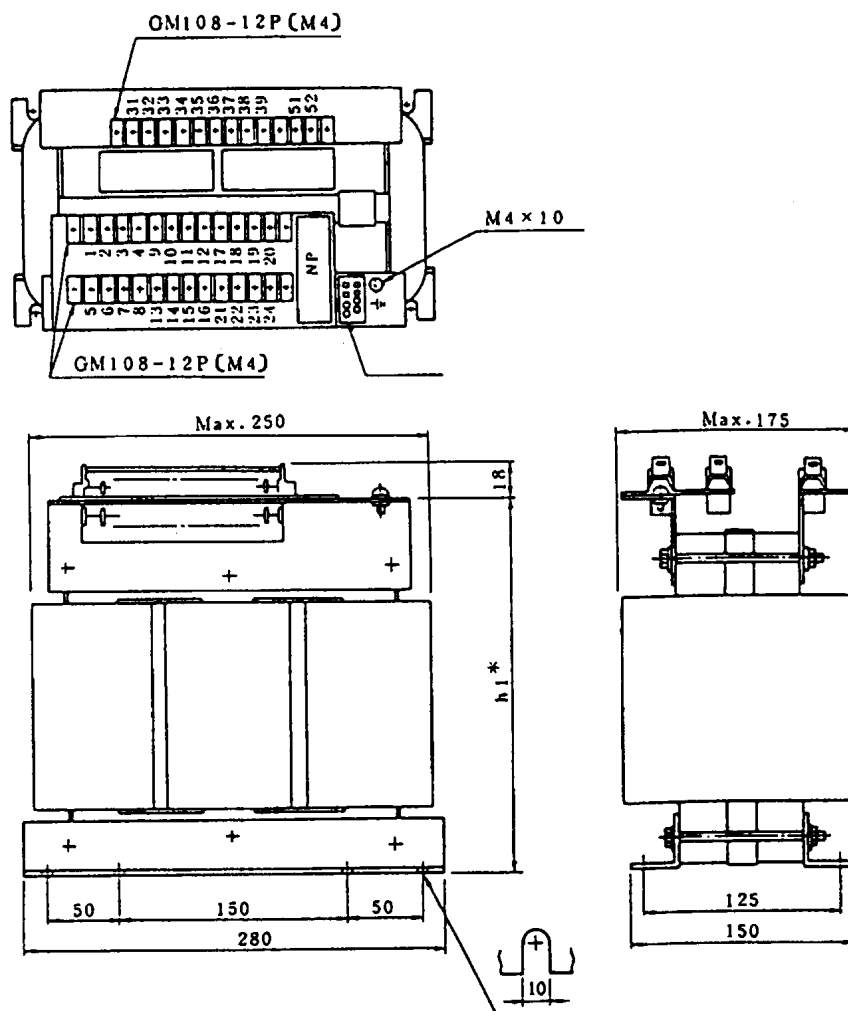


Outline Drawing of Power Transformer with Cover

NOTE

The four side panels are all meshed, while the top is a solid plate.

(f) For αi PS_R 3 (2KW output) (A80L-0024-0006), αi PS_R 3 (3KW output) (A80L-0026-0003)

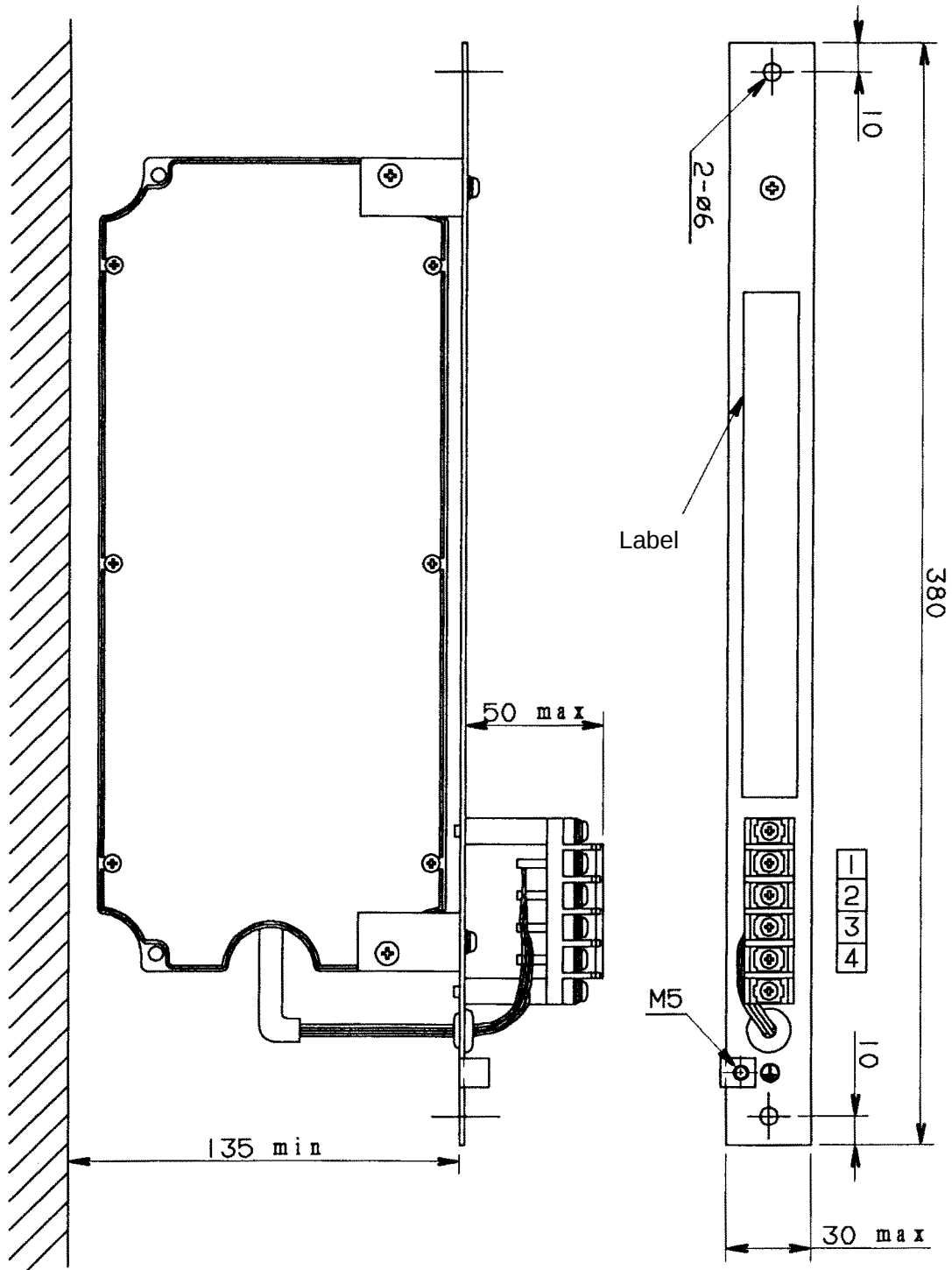


Drawing number	A80L-0024-0006	A80L-0026-0003
Type (name)	SBE	SCE
Weight	27 kg	36 kg
h1* (height of transformer)	217mm max	247mm max

8.1.5 Regenerative Discharge Unit

(a) A06B-6089-H510

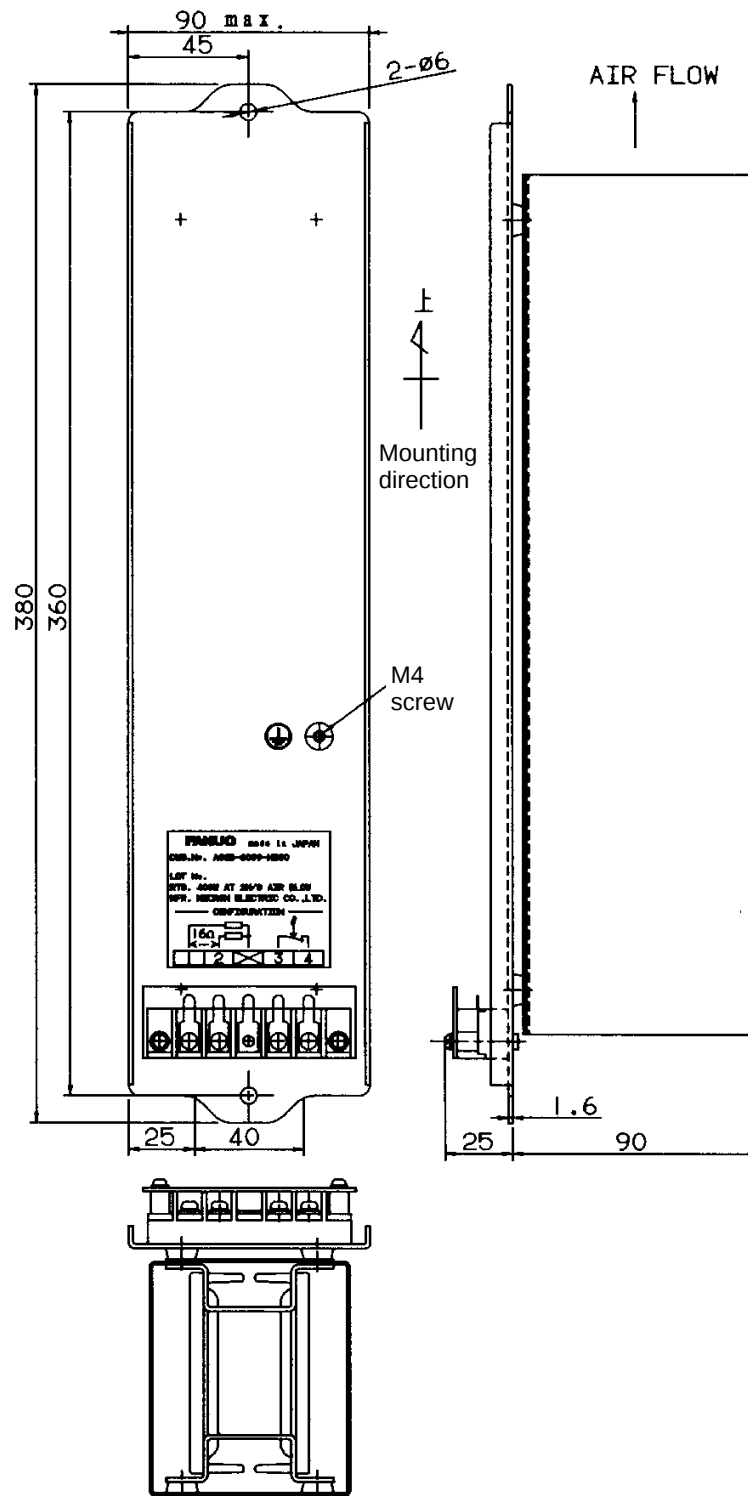
For the panel cut-out drawing, see Section 8.2 (e).



Terminal block: M4 × 4

(b) A06B-6089-H500

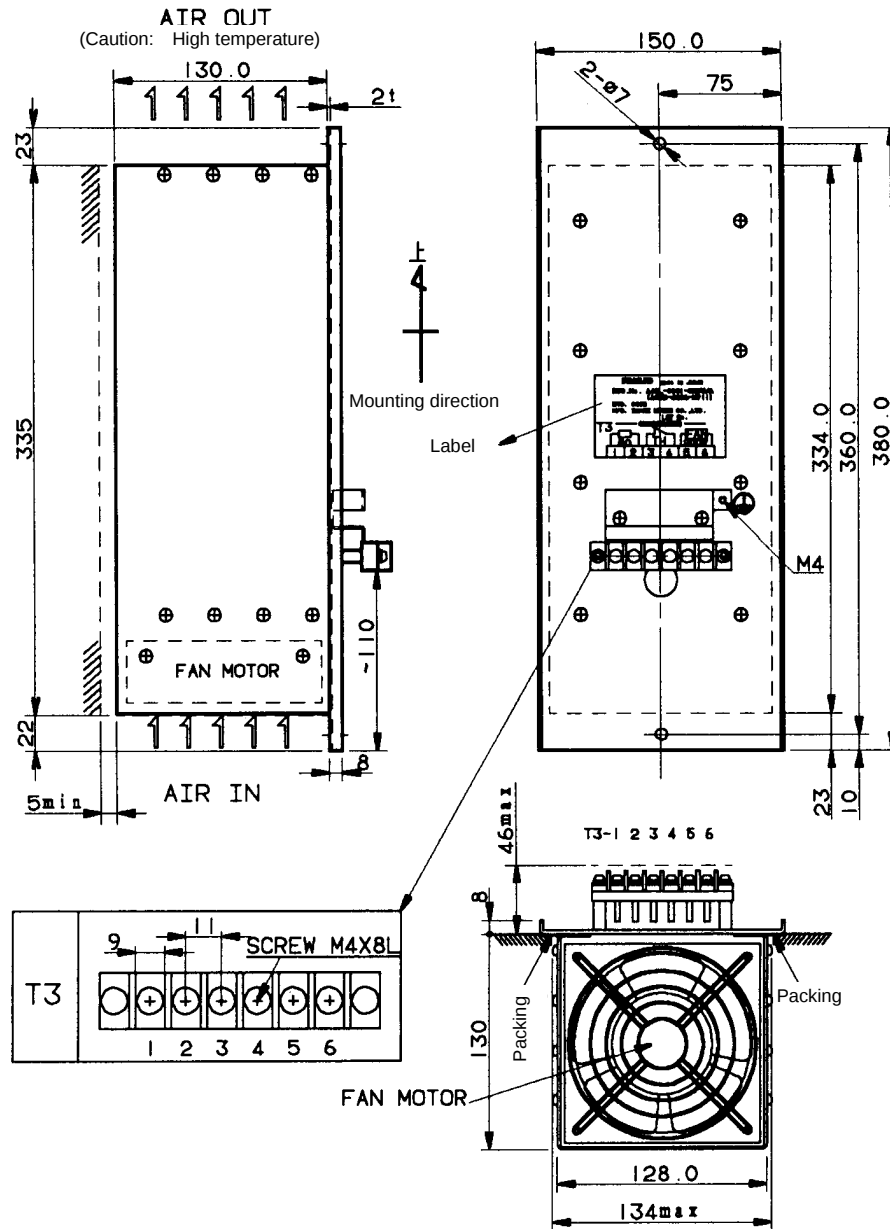
For the panel cut-out drawing, see Section 8.2 (f).



Terminal block: M4 $\times$ 4

(c) A06B-6089-H711 to H713

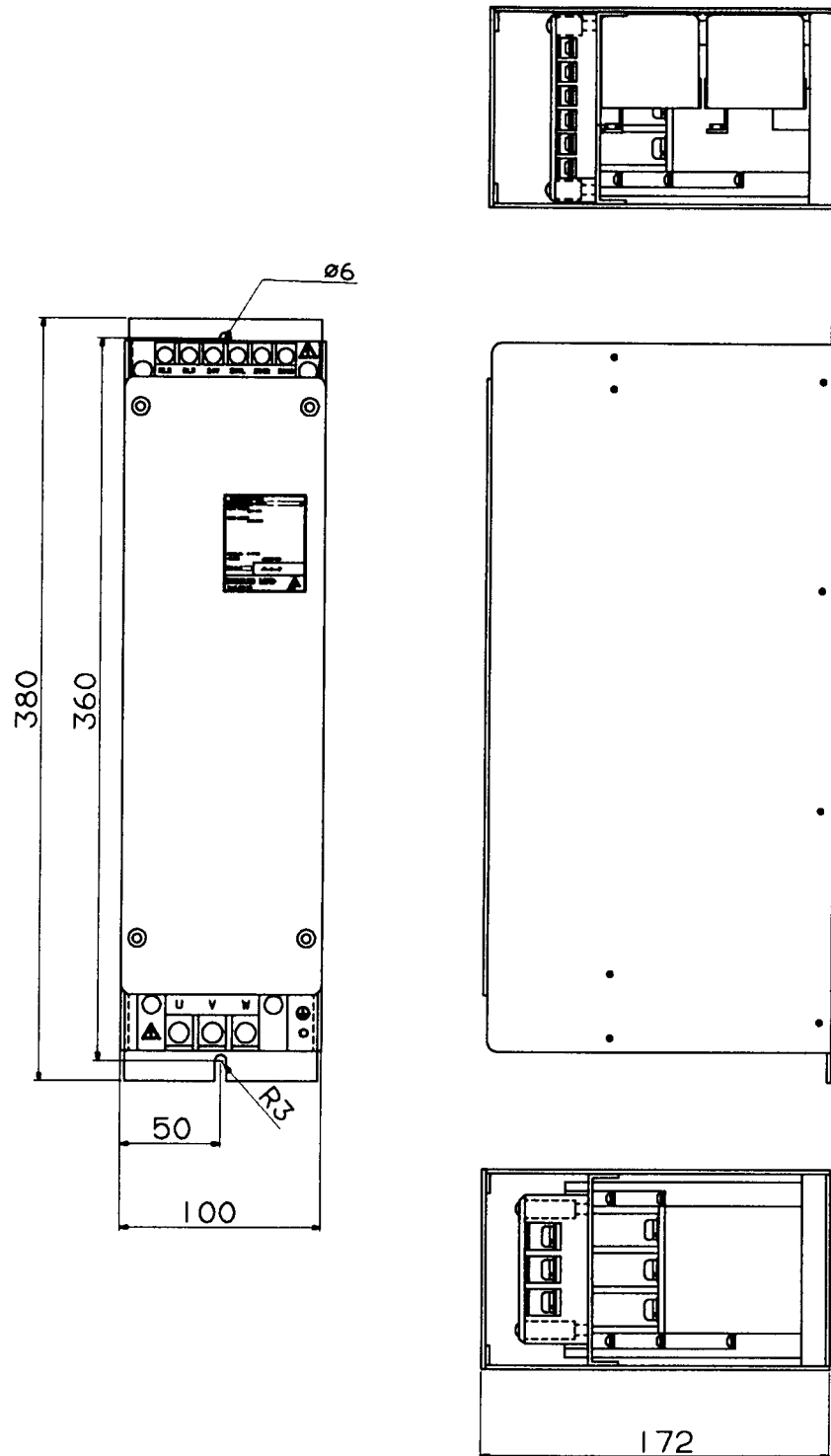
For the panel cut-out drawing, see Section 8.2 (g).



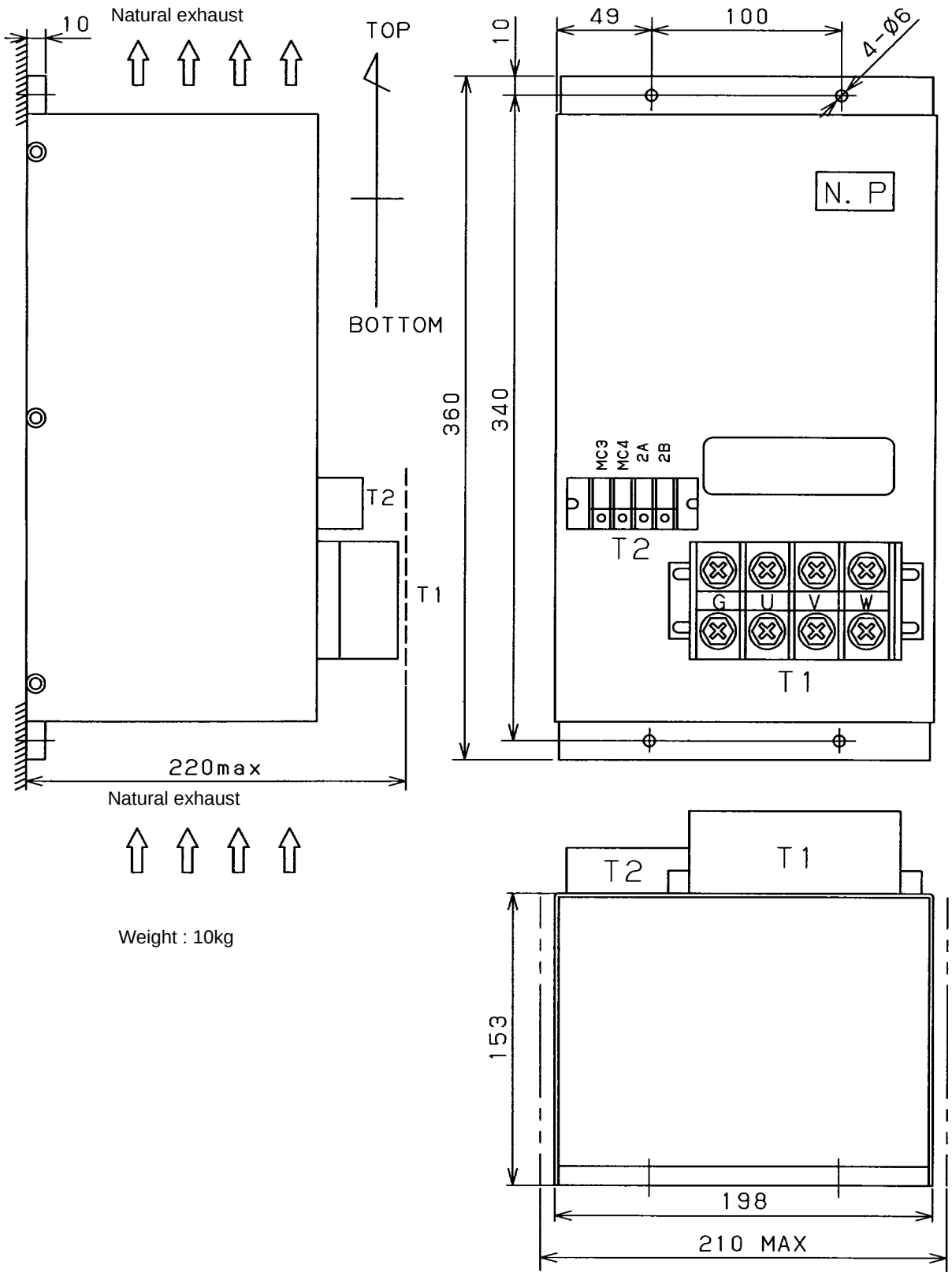
8.1.6 Dynamic Brake Module (DBM)

For the panel cut-out drawing, see Section 8.2 (j).

(a) A06B-6079-H401

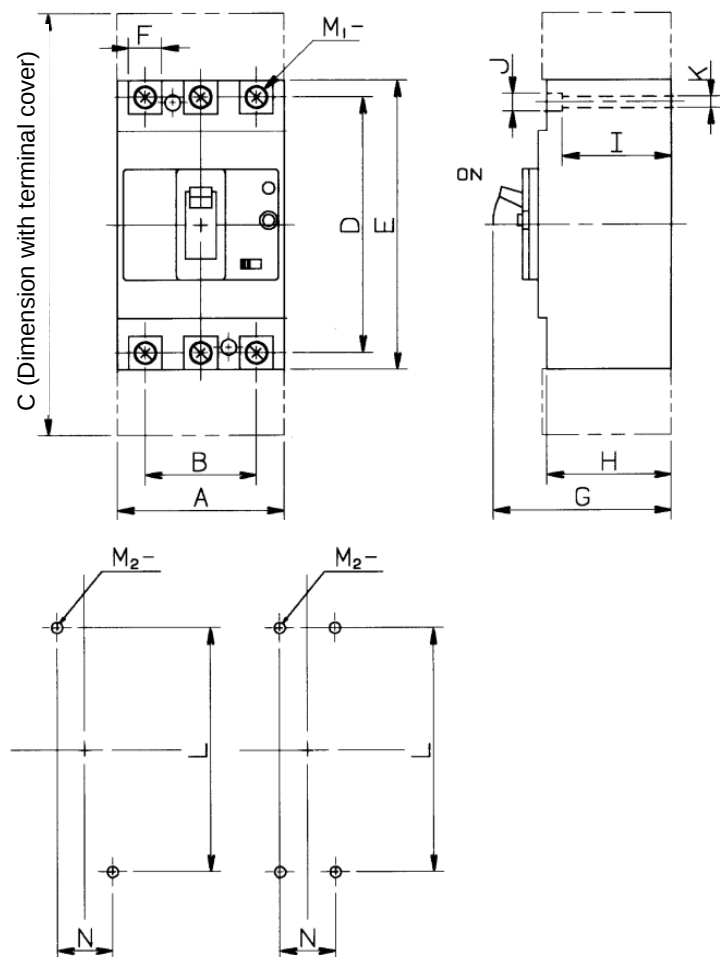


(b) A06B-6069-H300



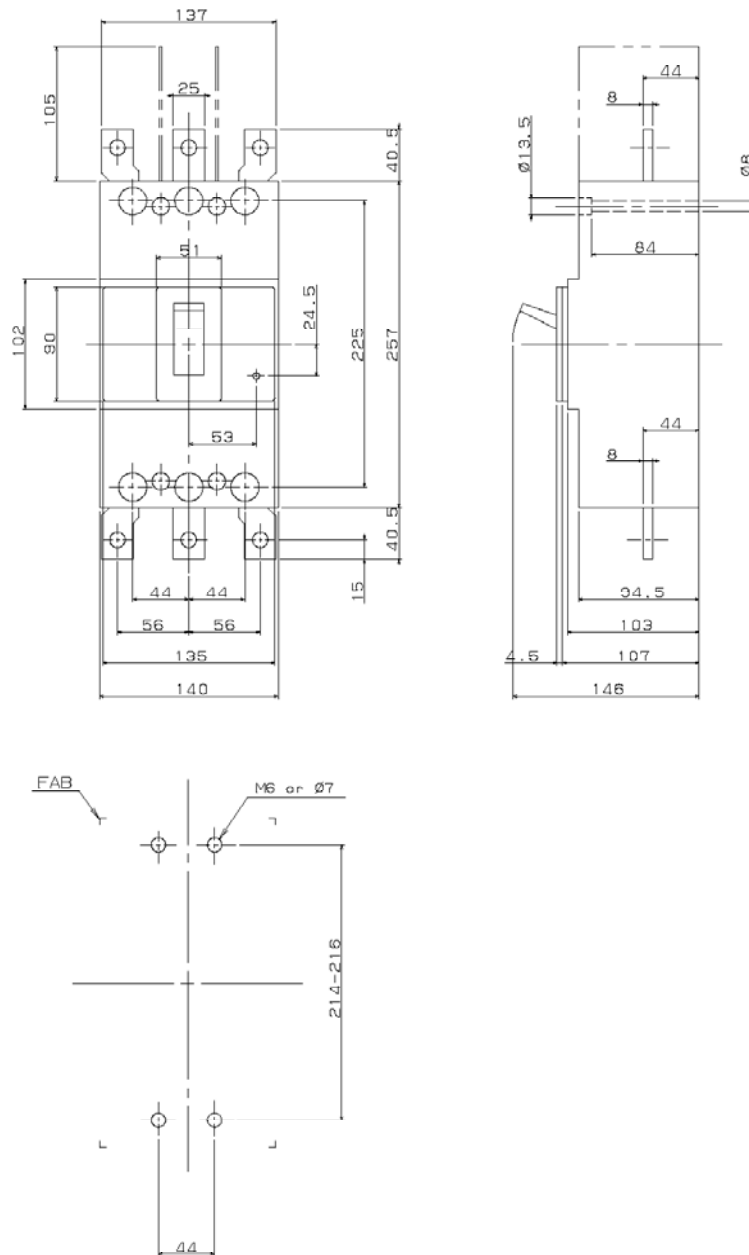
8.1.7 Circuit Breaker

	Ordering drawing number	A	B	C	D	E	M ₁ -	F	G	H	I	J	K	L	M ₂ -	N	Mounting
(a)	A06B-6077-K101	75	50	180	84	100	M5	17	84	60	43	φ7.8	φ4.9	84	M4	25	2 positions
(b)	A06B-6077-K102	75	50	180	84	100	M8	17	84	60	43	φ7.8	φ4.9	84	M4	25	2 positions
(c)	A06B-6077-K103																
(d)	A06B-6077-K104																
(e)	A06B-6077-K108	105	70	265	144	165	M8	25.5	84	56	47	φ8.5	φ4.5	126	M4	35	4 positions
(f)	A06B-6077-K105																
(g)	A06B-6077-K110																
(h)	A06B-6077-K109																
(i)	A06B-6077-K107	75	50	180	84	100	M5	17	84	60	43	φ7.8	φ4.9	84	M4	25	2 positions
(j)	A06B-6077-K106																



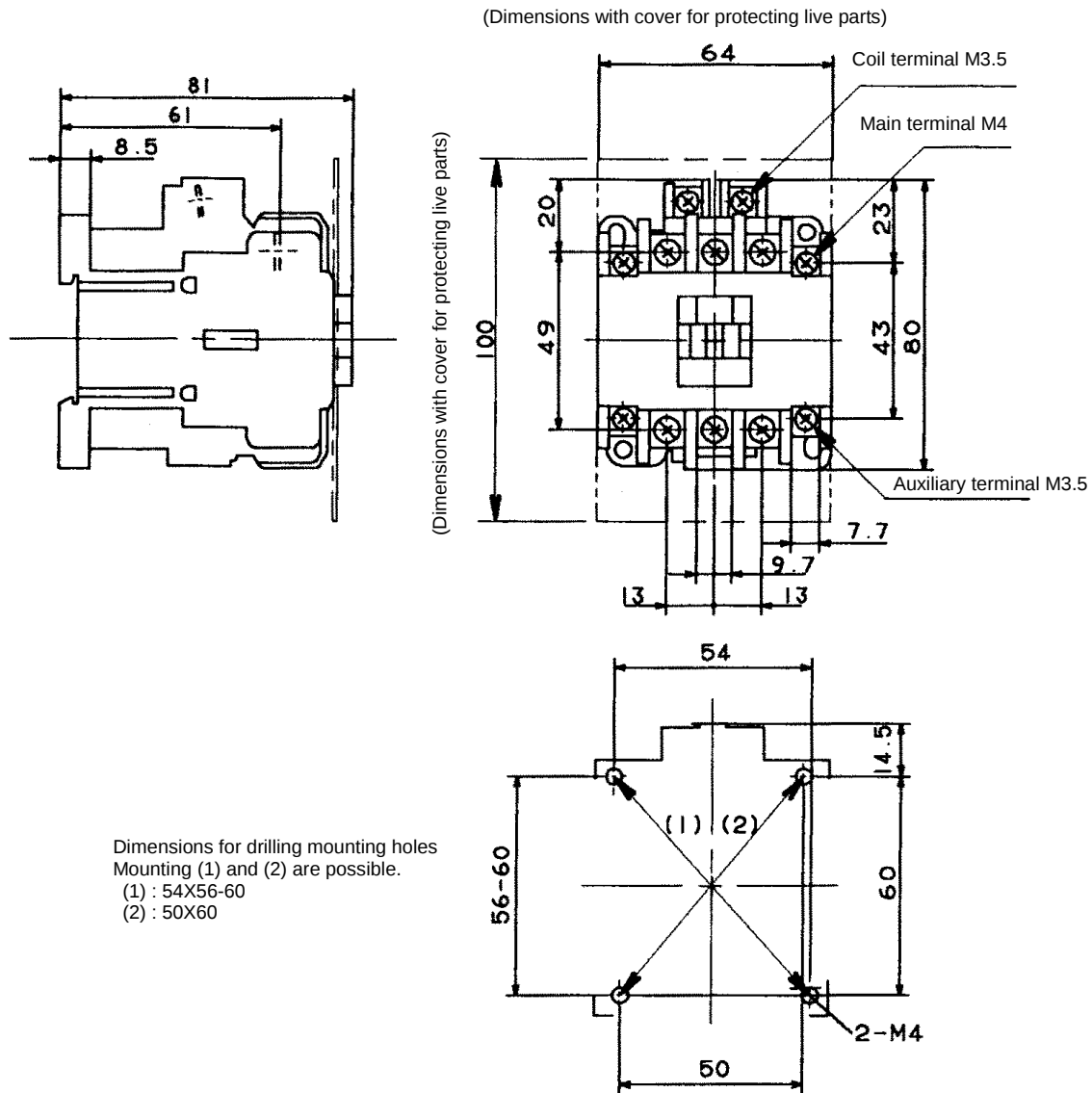
Two mounting holes(1) Two mounting holes(2) Four mounting holes

The circuit breakers have two or four mounting holes.

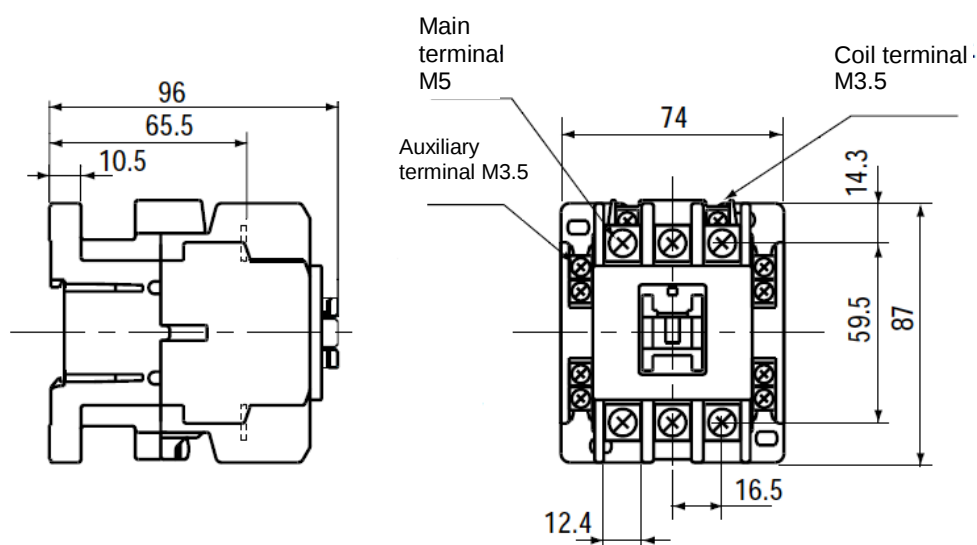
(k) A06B-6077-K111

8.1.8 Magnetic Contactors

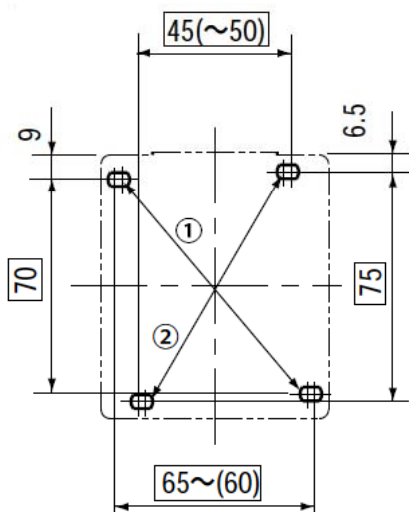
(a) A06B-6077-K121



Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Cover			
A06B-6077-K121	SC-5-1	SZ-JC4	200V/50Hz 200-220V/60Hz	1a1b	0.38Kg

(b) A06B-6077-K122, A06B-6077-K123

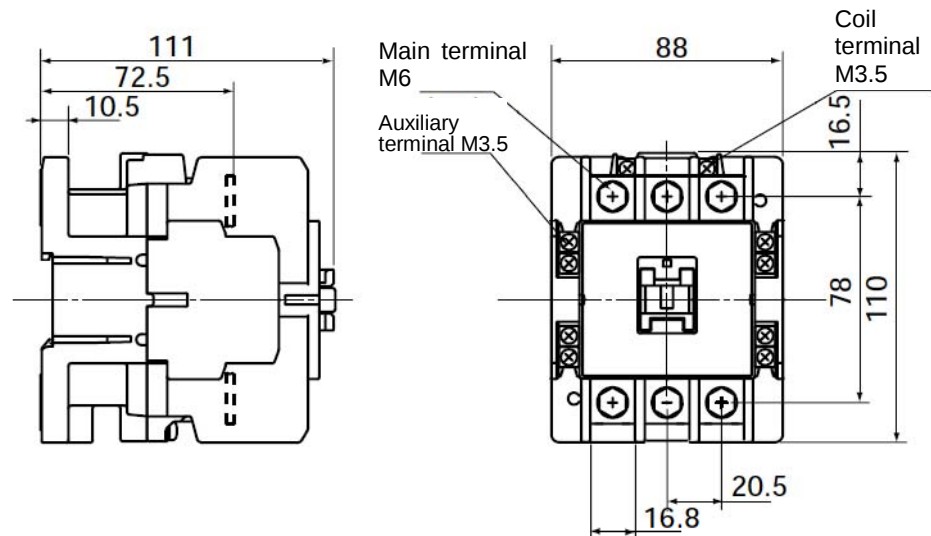
Dimensions for drilling mounting holes



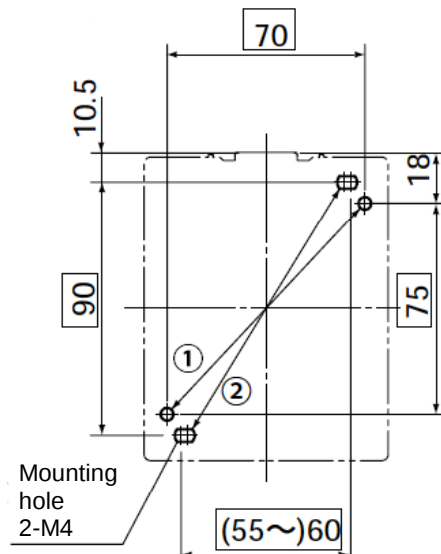
- Mounting dimensions: Holes <1> or <2> can be used for mounting.
 <1>: (60 to) 65 × 70 (compatible with SC-1N and SC-2N)
 <2>: 45 (to 50) × 75
- Mounting screw: 2-M4
 Install a screw at two mounting holes located diagonally.

Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Body			
A06B-6077-K122	SC-N1	SZ-N1J	200V/50Hz	2a2b	0.59Kg
A06B-6077-K123	SC-N2	SZ-N1J	200-220V/60Hz		0.59Kg

(c) A06B-6077-K124



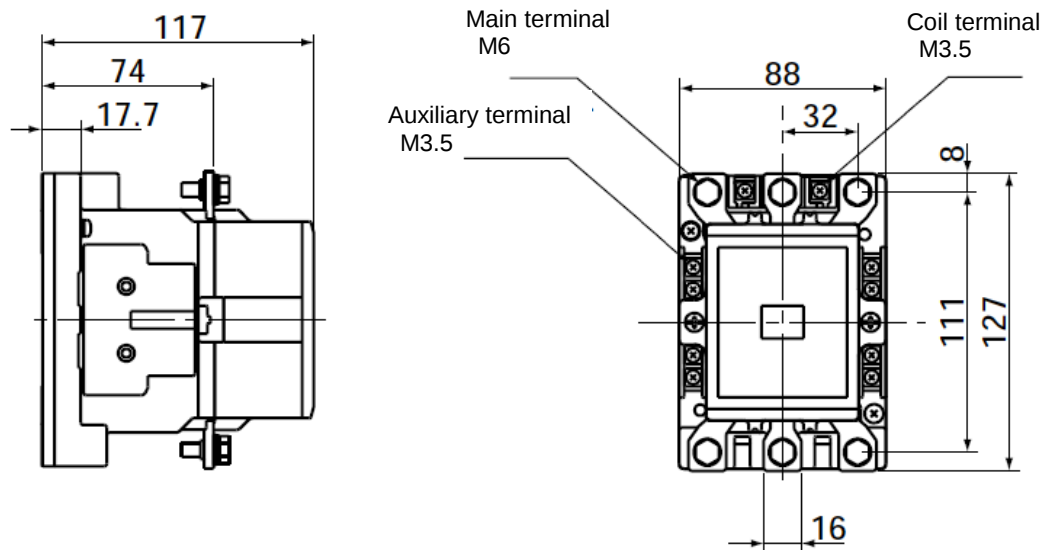
Dimensions for drilling mounting holes



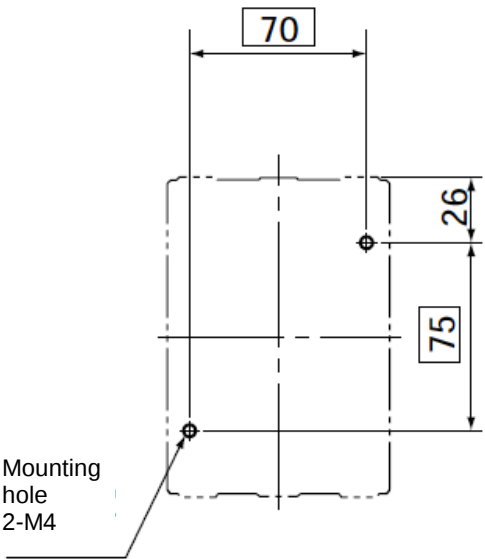
- Mounting dimensions: Holes <1> or <2> can be used for mounting.
 <1>: 70 × 75 (compatible with SC-1N and SC-2N)
 <2>: (55 to) 60 × 90
- Mounting screw: 2-M4
 Install a screw at two mounting holes located diagonally.

Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Body			
A06B-6077-K124	SC-N2S	SZ-N2SJ	200V/50Hz 200-220V/60Hz	2a2b	1.1Kg

(d) A06B-6077-K125

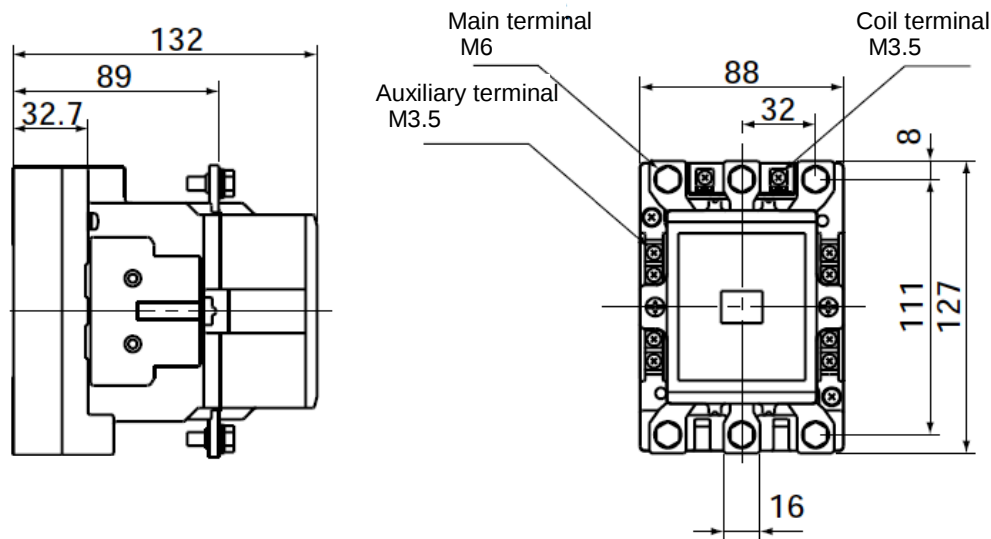


Dimensions for drilling mounting holes

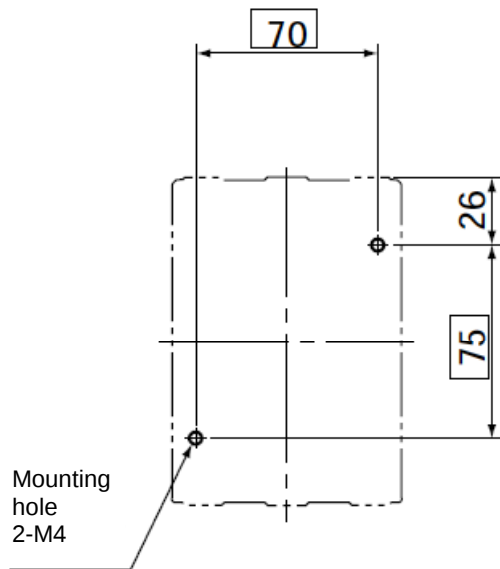


Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Cover			
A06B-6077-K125	SC-N4	SZ-N4J	200V/50Hz 200-220V/60Hz	2a2b	1.5Kg

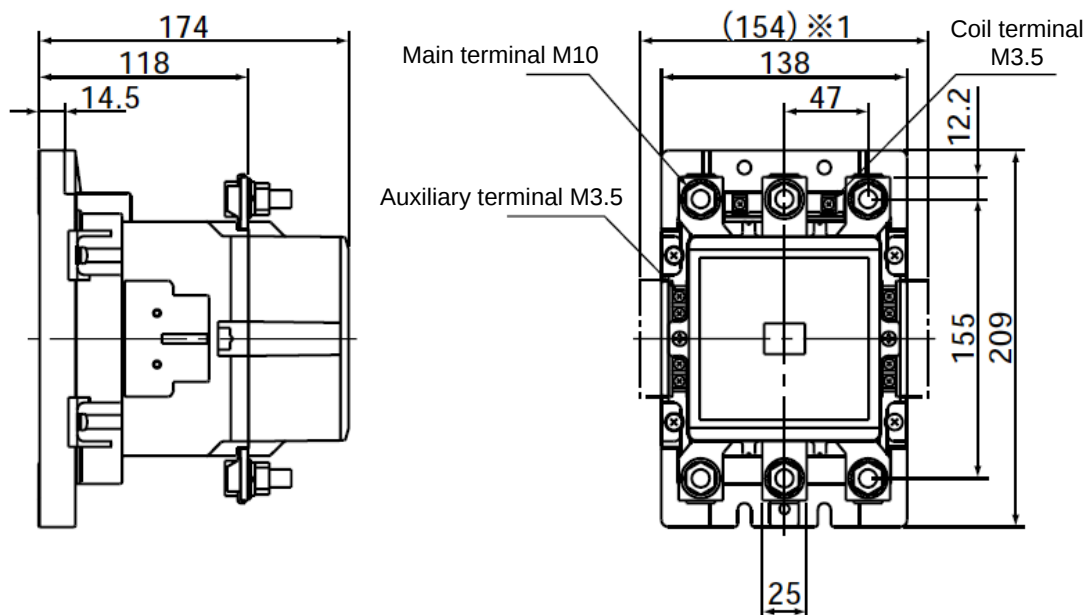
(e) A06B-6077-K126



Dimensions for drilling mounting holes

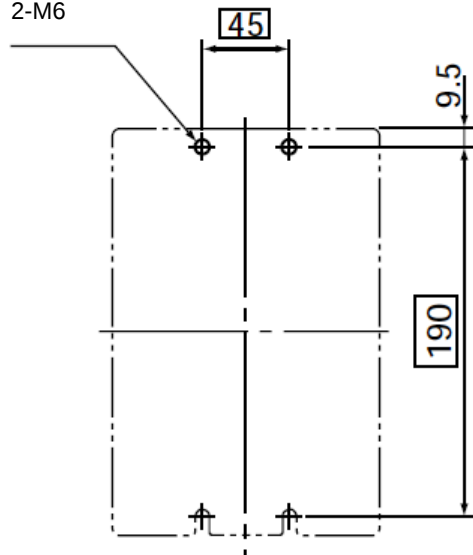


Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Body			
A06B-6077-K126	SC-N5	SZ-N4J	200V/50Hz 200-220V/60Hz	2a2b	1.8Kg

(f) A06B-6077-K127

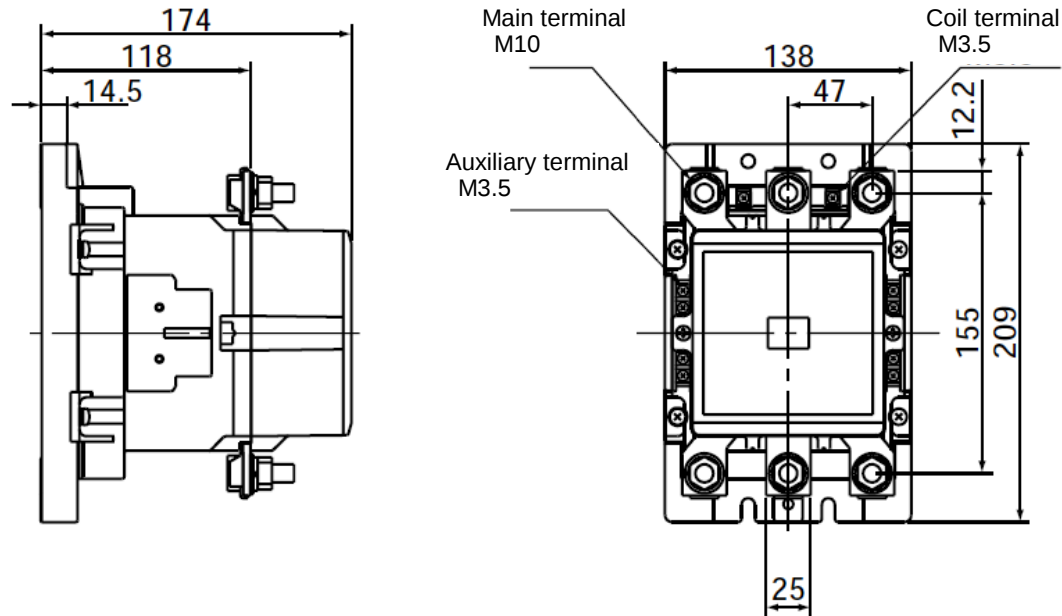
*1 When two side-on auxiliary contact units are installed

Mounting hole 2-M6 Dimensions for drilling mounting holes

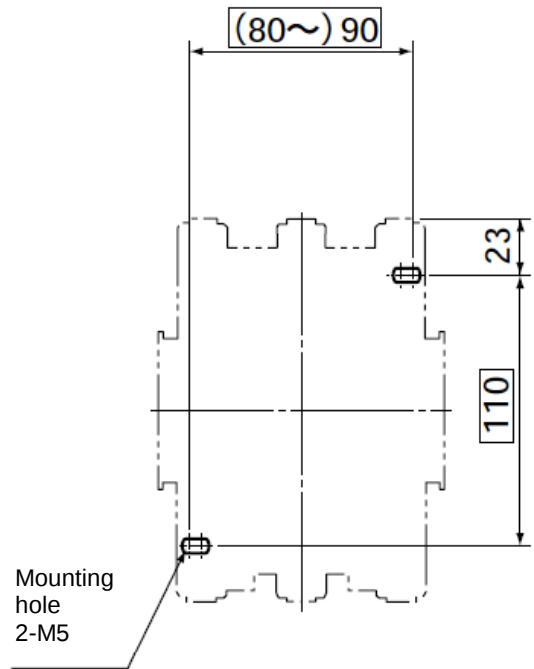


Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Body			
A06B-6077-K127	SC-N8	SZ-N8J	200V/50Hz 200-220V/60Hz	2a2b	4.9Kg

(g) A06B-6077-K128



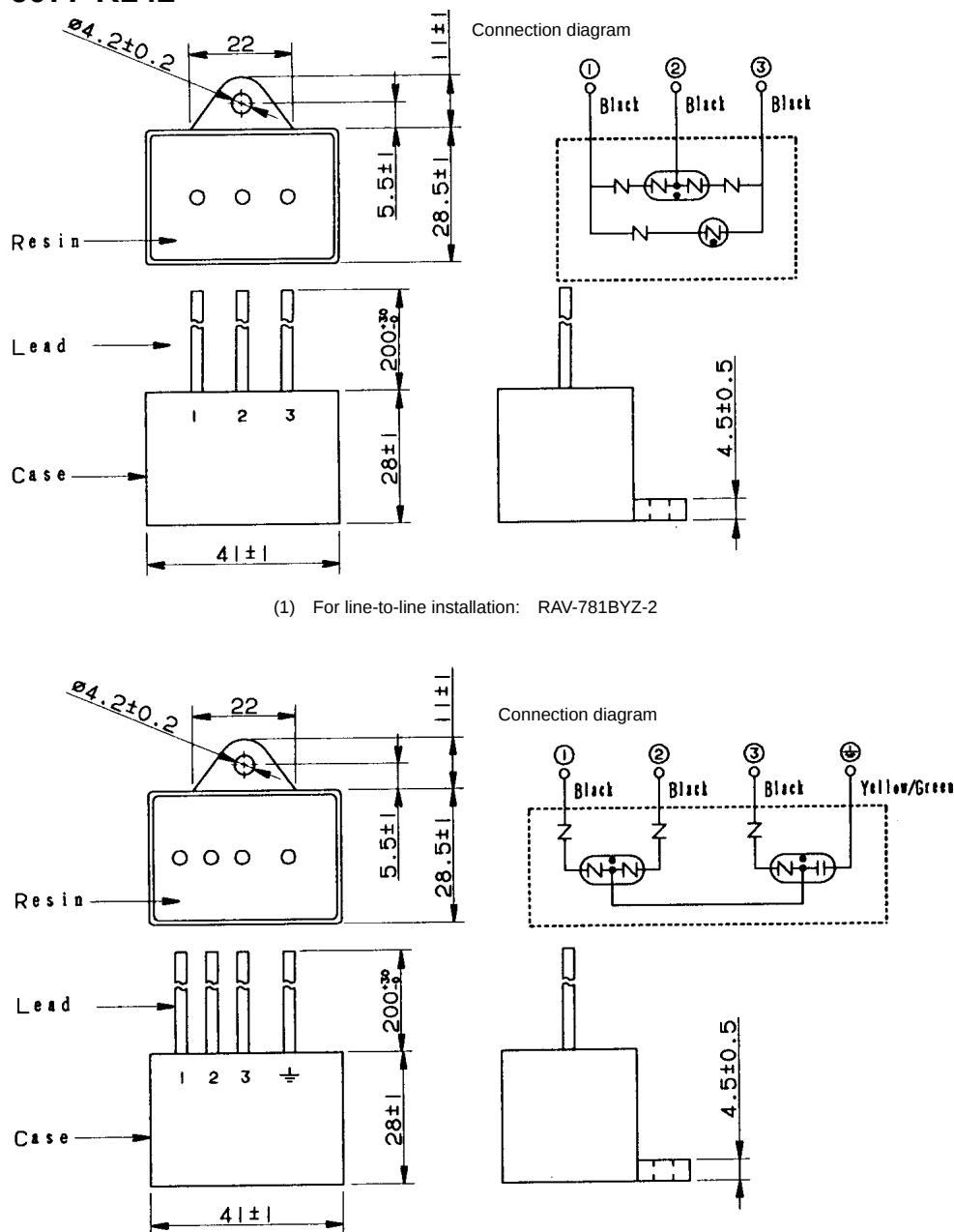
Dimensions for drilling mounting holes



Ordering drawing number	Fuji Electric part number		Operation coil voltage	Auxiliary contact structure	Weight
	Body	Body			
A06B-6077-K128	SC-N7	SZ-N7J	200V/50Hz 200-220V/60Hz	2a2b	2.7Kg

8.1.9 Lightning Surge Protector

(a) A06B-6077-K142



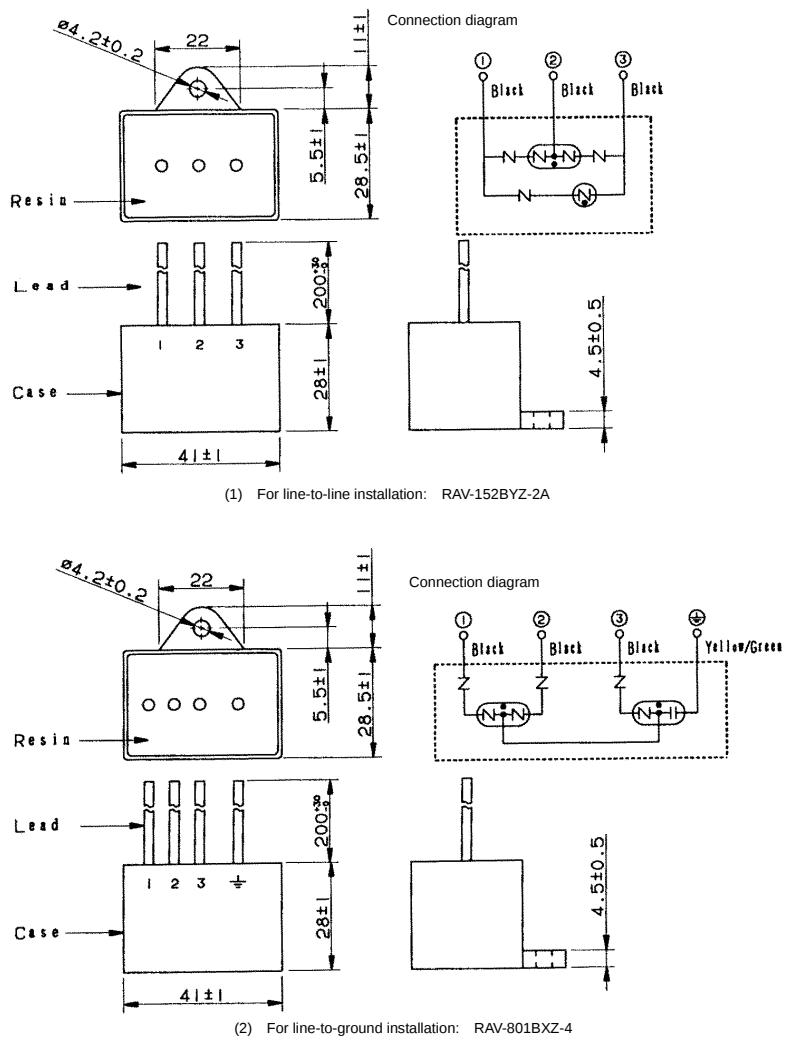
(1) For line-to-line installation: RAV-781BYZ-2

(2) For line-to-ground installation: RAV-781BXZ-4

Specification	Rated voltage	Clamp voltage	Surge withstand current	Surge withstand voltage
R-A-V-781BYZ-2	250VAC	783VDC $\pm 10\%$ (V1.0)	2500A(8/20 μ S)	20kV(1.2/50 μ S)

Specification	Rated voltage	AC discharge start voltage	Surge withstand current	Maximum surge discharge start voltage
R-A-V-781BXZ-4	line-to-line: 430VAC, line-to-ground: 250VAC	700VAC $\pm 20\%$ (Ua)	2500A(8/20 μ S)	2.0kV(1.2/50 μ S)

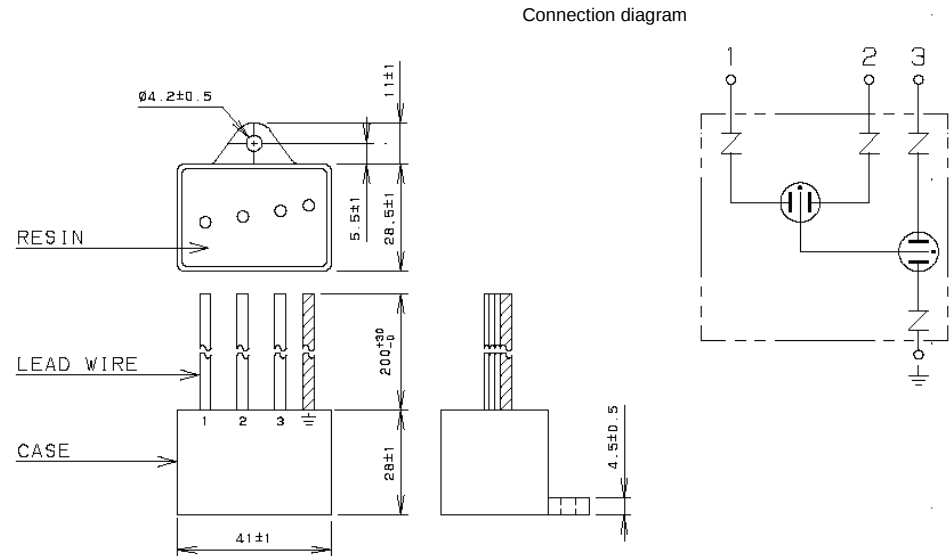
(b) A06B-6077-K143



Specification	Rated voltage	Clamp voltage	Surge withstand current	Surge withstand voltage
R·A·V-152BYZ-2A	460VAC+15%	1470V±10%(V1.0)	2500A(8/20μS)	20kV(1.2/50μS)

Specification	Rated voltage	AC discharge start voltage	Surge withstand current	Maximum surge discharge start voltage
R·A·V-801BXZ-4	line-to-line: 500VAC, line-to-ground: 290VAC	AC800V±20%(Ua)	2500A(8/20μS)	2.32kV(1.2/50μS)

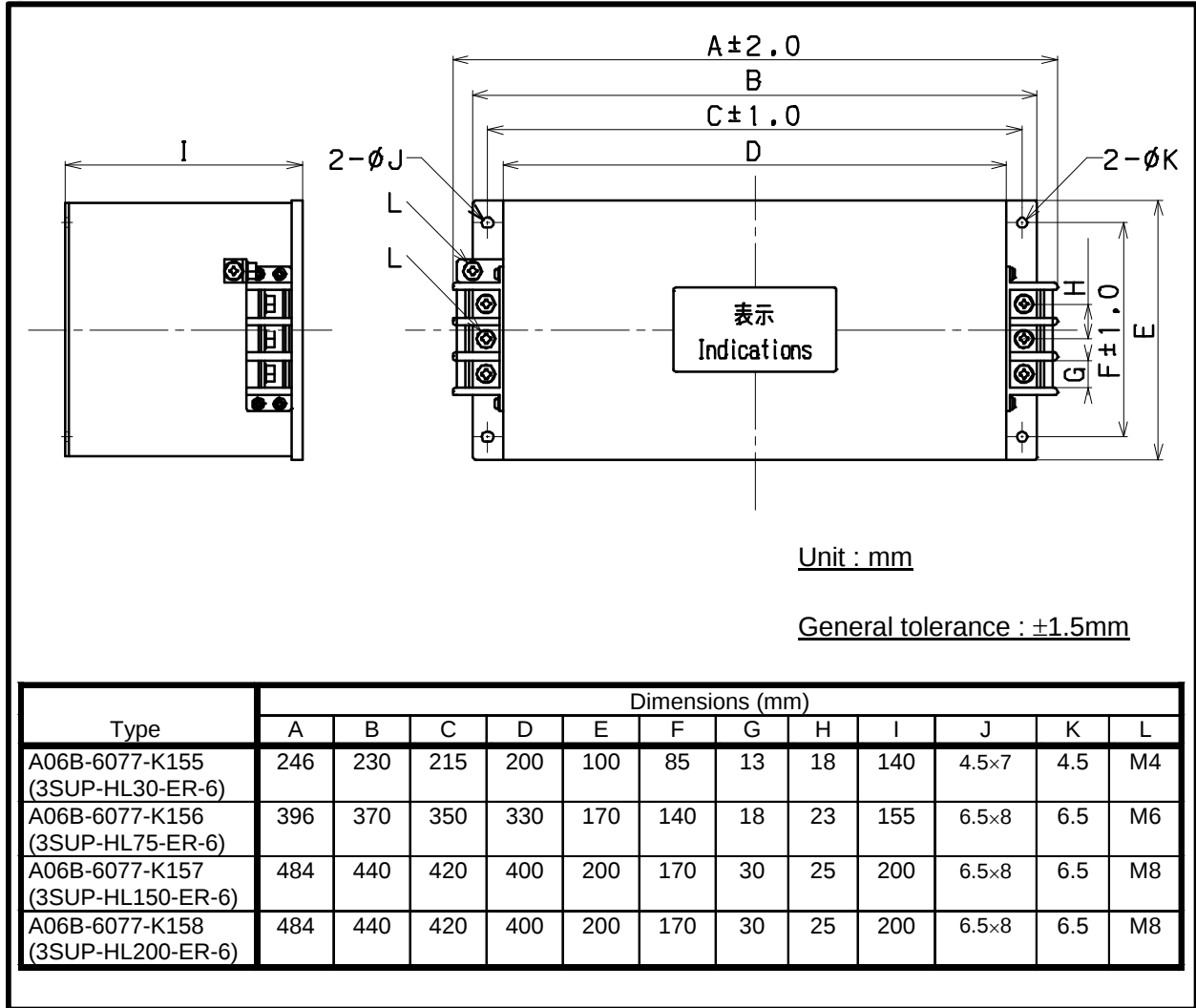
(c) A06B-6077-K144



Specification	Rated voltage	AC discharge start voltage	Clamp voltage	Surge withstand current	Surge withstand voltage	Maximum surge discharge start voltage
R-C-M-601BUZ-4	250VAC	560VAC $\pm 20\%(U_a)$	2000V $\pm 10\%(V_{1.0})$	2500A (8/20 μ S)	20kV (1.2/50 μ S)	2kV (1.2/50 μ S)

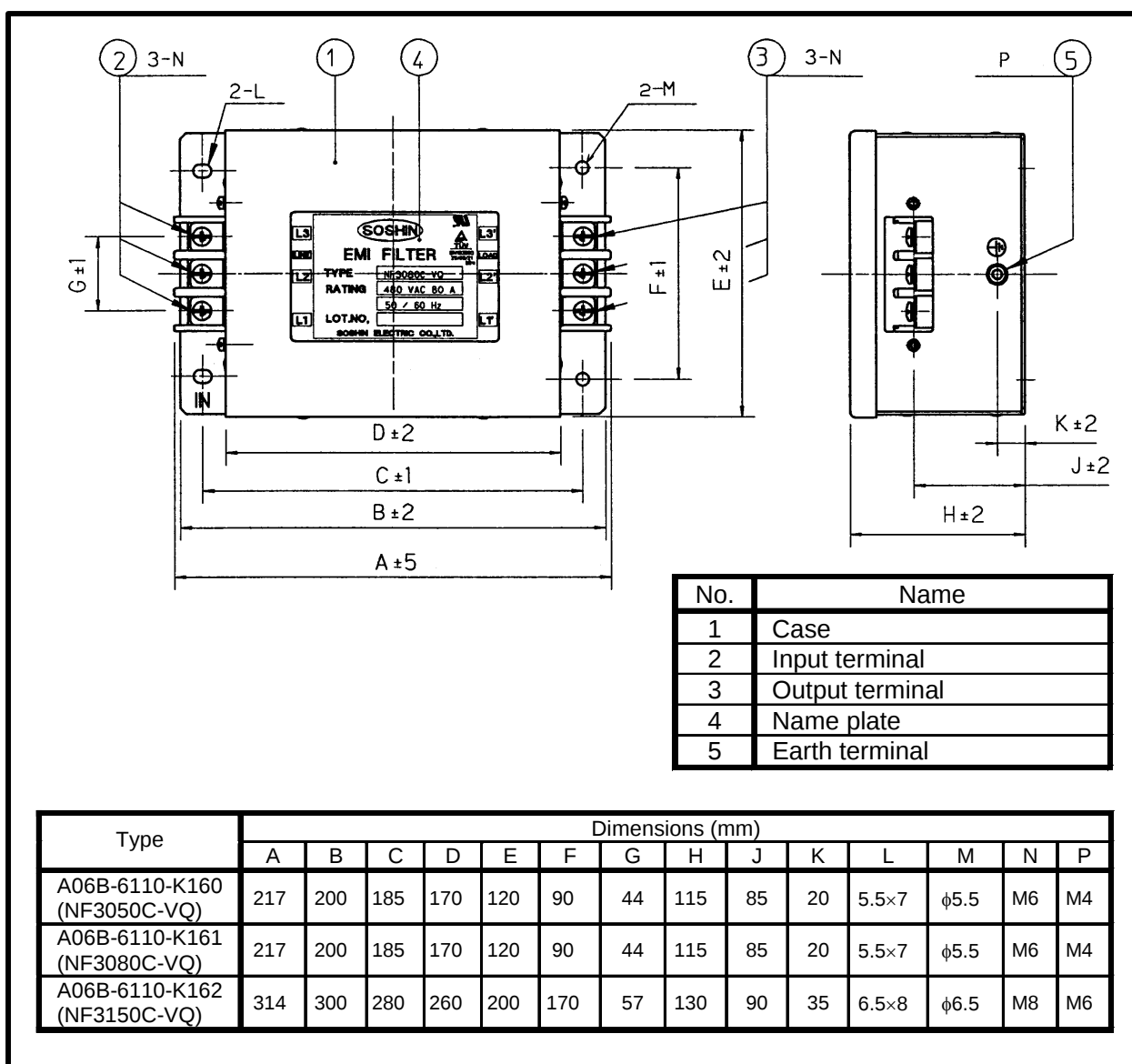
8.1.10 Noise Filter

(a) A06B-6077-K155 to -K158



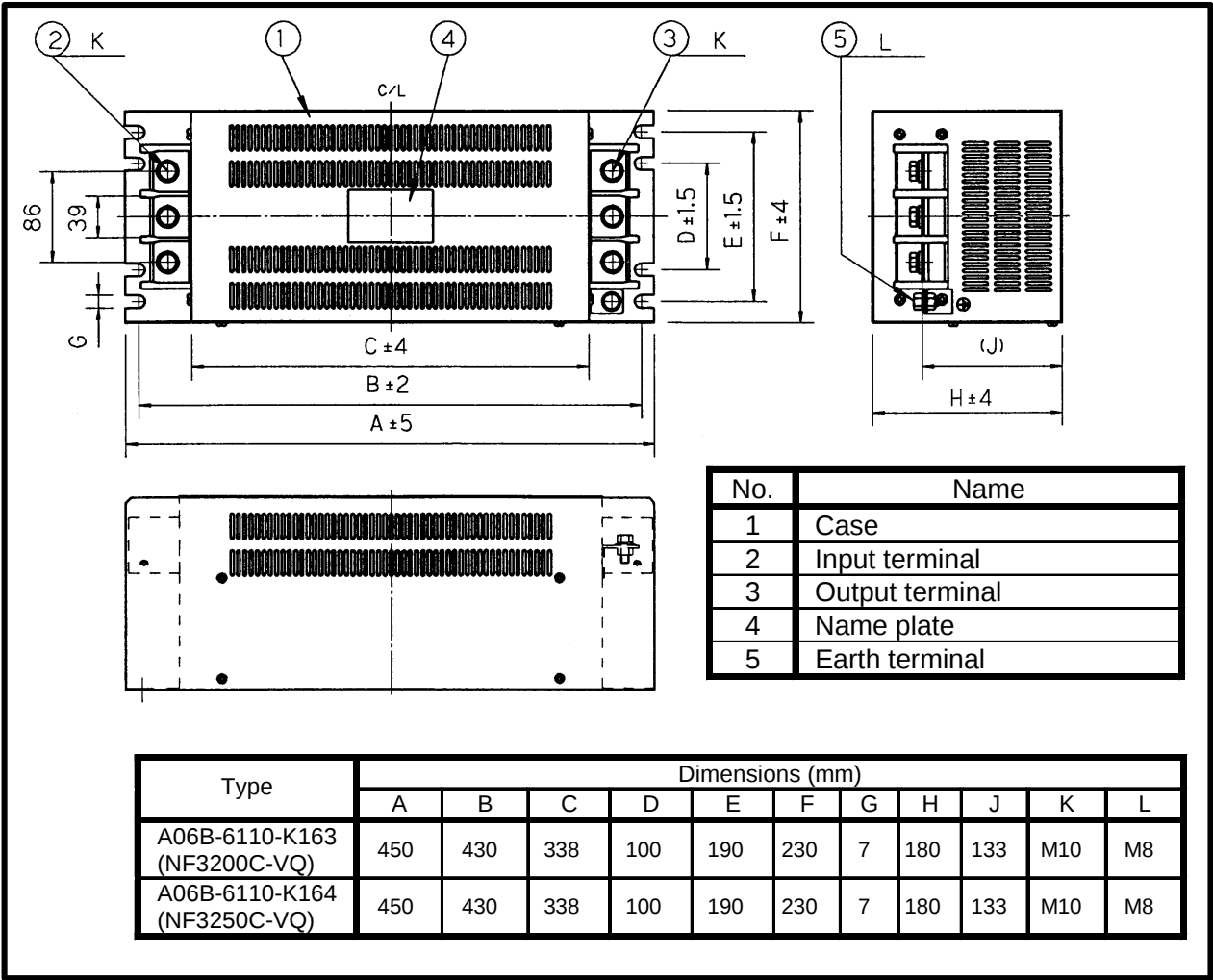
3SUP-HLx-ER-6: External dimensions of noise filter

(b) A06B-6110-K160 to -K162



NF3050C/3080C/3150C-VQ: External dimensions of noise filter

(c) A06B-6110-K163,K164

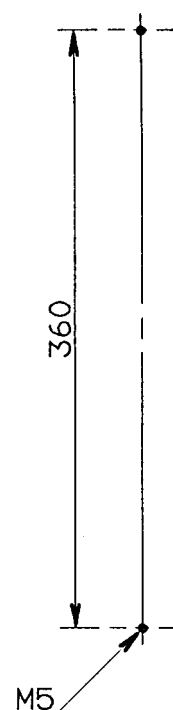


NF3200C/3250C-VQ: External dimensions of noise filter

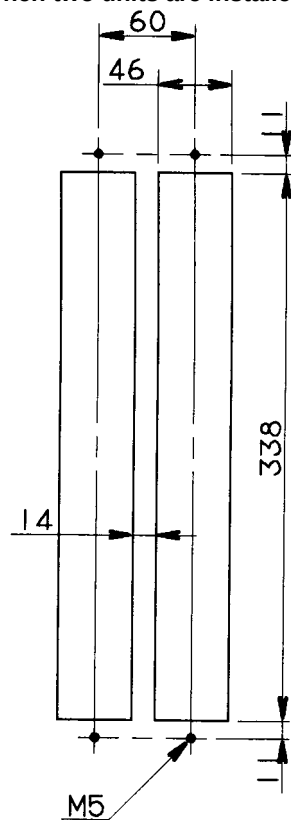
8.2 PANEL CUT-OUT DIAGRAMS

(a) 60-mm-wide amplifier

With no external fin



With external fin (when two units are installed side by side)

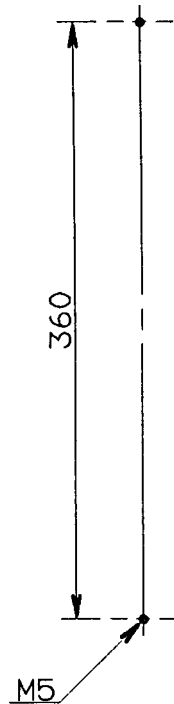


NOTE

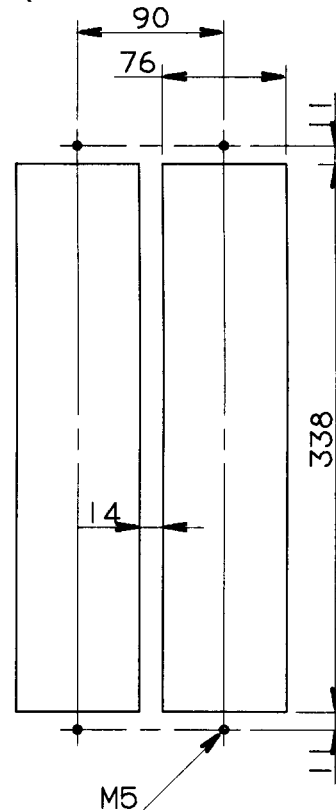
- 1 When an external fin is provided, attach a packing (acrylonitrile-butadiene rubber, NBR [soft type]) to the fin to protect it against oil and dust.
- 2 Reinforce the right and left sides of the panel cut-out in the power magnetics cabinet by using fittings such as angles to maintain satisfactory contact between the sheet metal of the power magnetics cabinet and the flange of the amplifier.

(b) 90-mm-wide amplifier

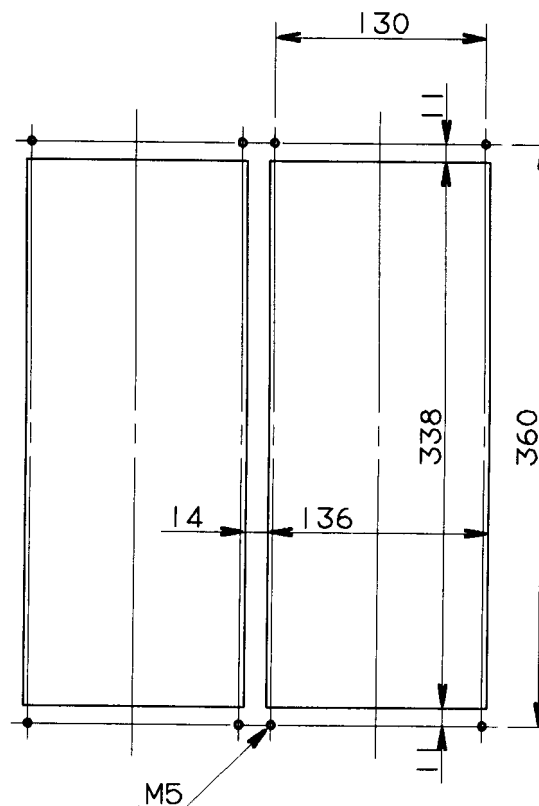
With no external fin



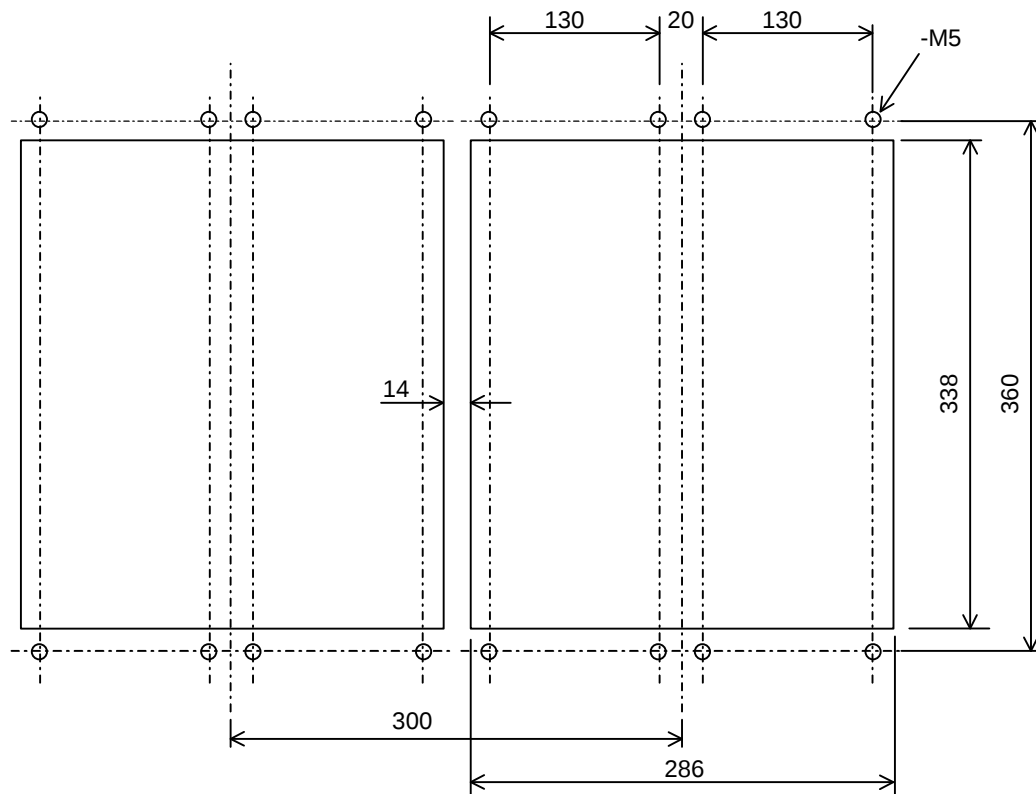
With external fin (when two units are installed side by side)

**NOTE**

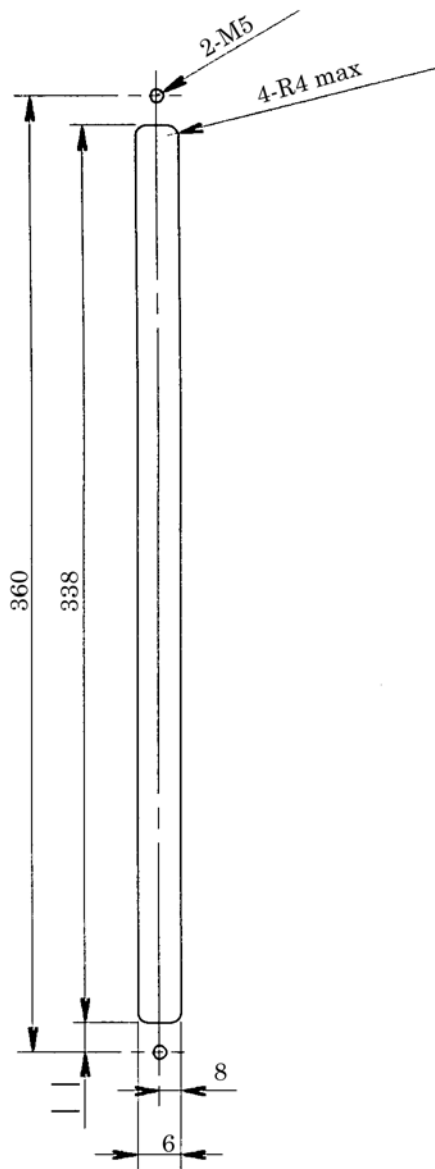
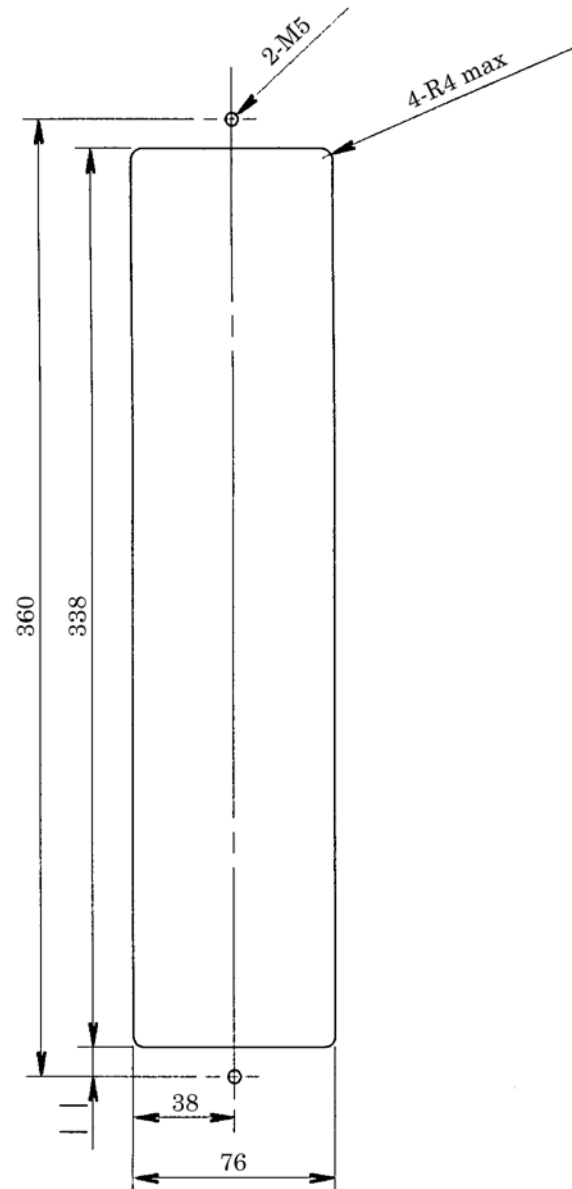
- 1 When an external fin is provided, attach a packing (acrylonitrile-butadiene rubber, NBR [soft type]) to the fin to protect it against oil and dust.
- 2 Reinforce the right and left sides of the panel cut-out in the power magnetics cabinet by using fittings such as angles to maintain satisfactory contact between the sheet metal of the power magnetics cabinet and the flange of the amplifier.

(c) 150-mm-wide amplifier (when two units are installed side-by-side)**NOTE**

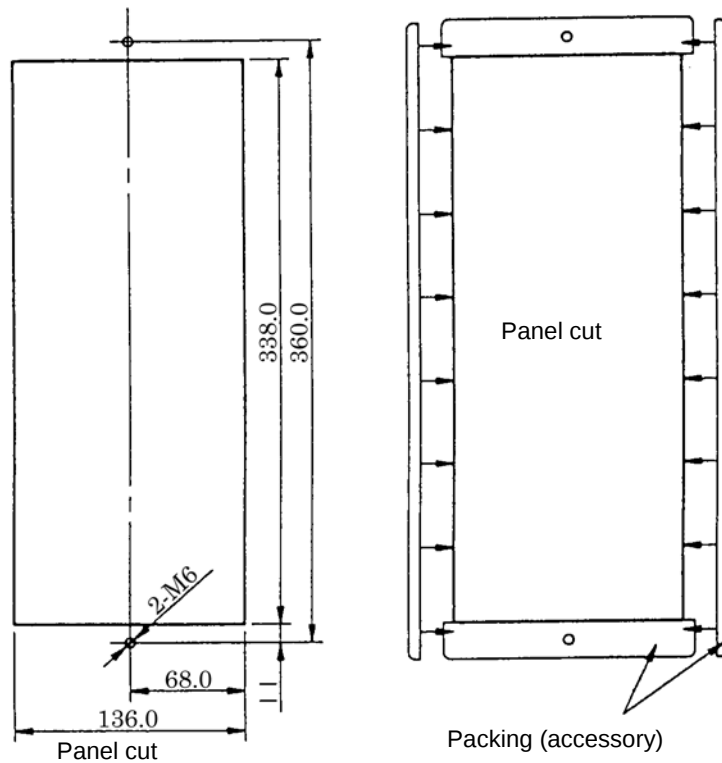
- 1 Attach a packing (acrylonitrile-butadiene rubber, NBR [soft type]) for protection against oil and dust.
- 2 Reinforce the right and left sides of the panel cut-out in the power magnetics cabinet by using fittings such as angles to maintain satisfactory contact between the sheet metal of the power magnetics cabinet and the flange of the amplifier.

(d) 300-mm-wide amplifier (when two units are installed side-by-side)**NOTE**

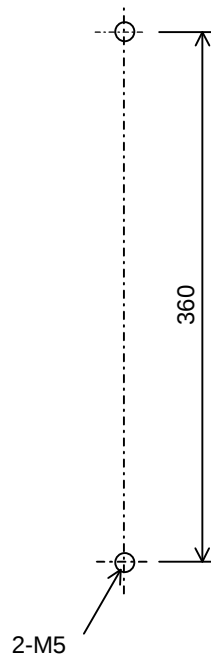
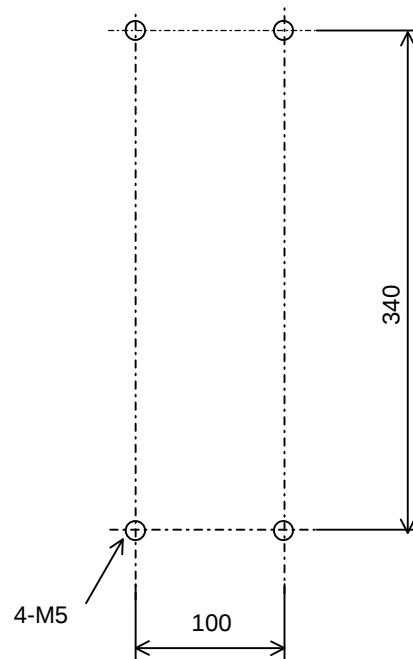
- 1 Attach a packing (acrylonitrile-butadiene rubber, NBR [soft type]) for protection against oil and dust.
- 2 Reinforce the right and left sides of the panel cut-out in the power magnetics cabinet by using fittings such as angles to maintain satisfactory contact between the sheet metal of the power magnetics cabinet and the flange of the amplifier.

**(e) Regenerative discharge unit
(A06B-6089-H510)****(f) Regenerative discharge unit
(A06B-6089-H500)****NOTE**

Attach a packing (acrylonitrile-butadiene rubber, NBR [soft type]) for protection against oil and dust.

(g) Regenerative discharge unit (A06B-6089-H711 to -H713)**NOTE**

Attach a packing (acrylonitrile-butadiene rubber, NBR [soft type]) for protection against oil and dust.

(h) Dynamic brake module**A06B-6079-H401****A06B-6069-H300**

9

CONNECTION

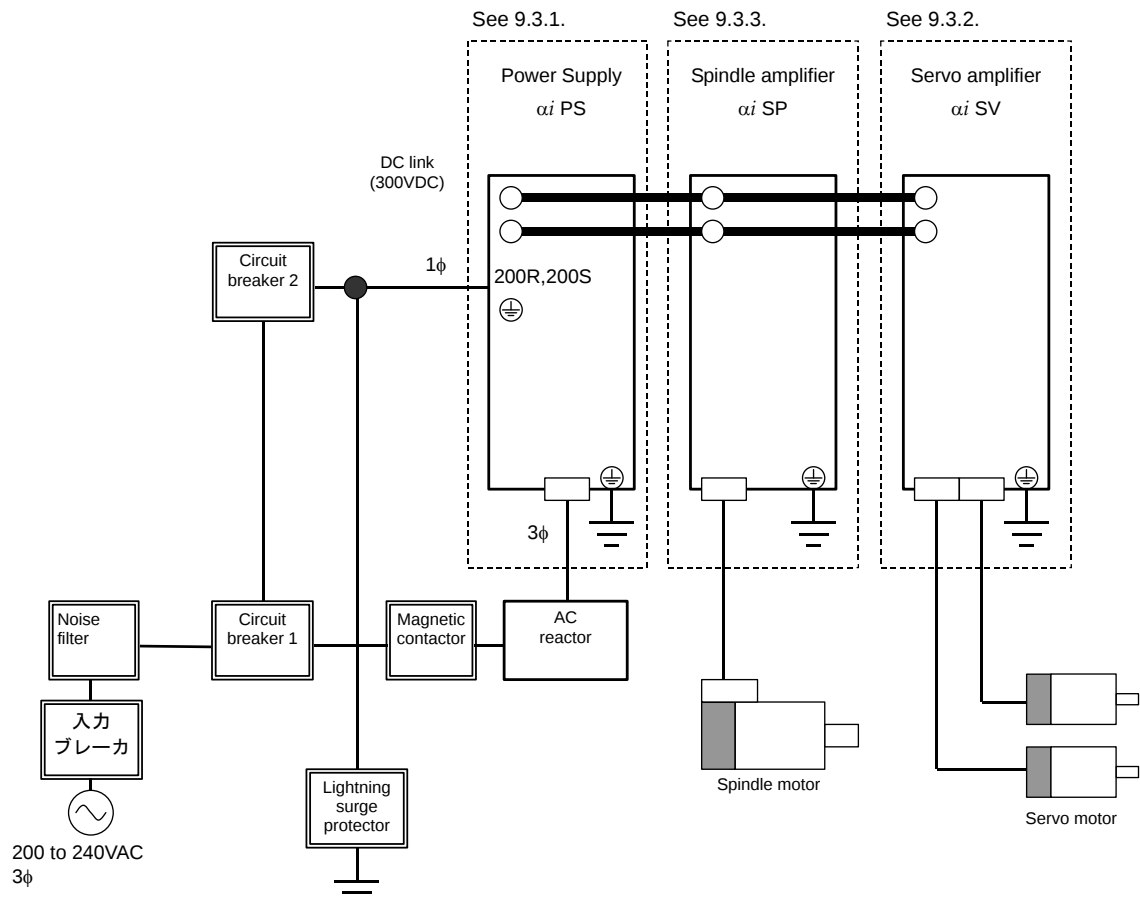
Chapter 9, "CONNECTION", consists of the following sections:

9.1	TOTAL CONNECTION DIAGRAM.....	193
9.2	CONNECTOR LOCATION	195
9.3	CABLE CONNECTION DETAILS	207
9.4	DETAILS OF CONNECTORS	301

9.1 TOTAL CONNECTION DIAGRAM

The following connection diagram is an example of combining a αi PS + a αi SP + a 2-axis αi SV. For detailed descriptions about how to connect these amplifiers, see their respective connection diagrams.

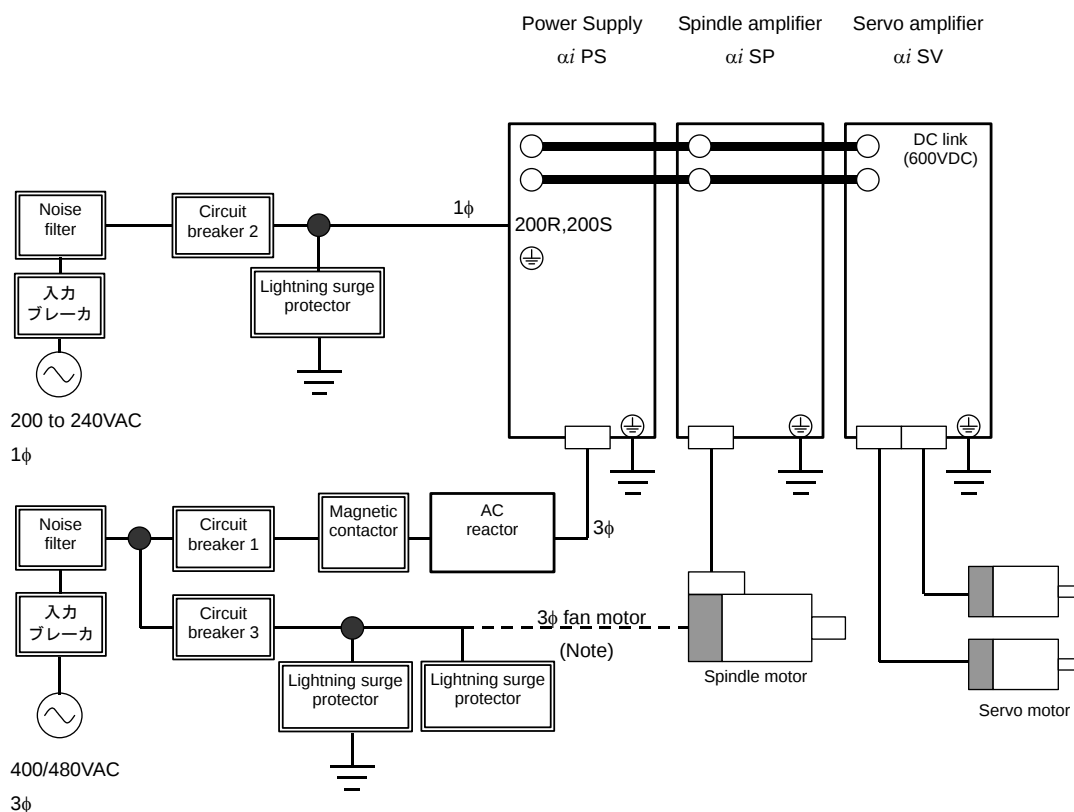
200-V input series



⚠ CAUTION

- 1 To meet the EMC Directive operating in EU countries, a noise filter must be installed.
- 2 Install the noise filter more nearer to the power supply than the magnetic contactor.
- 3 When the circuit breaker trips, the contact of the magnetic contactor may be melted. Before turning on the circuit breaker, make sure that the contact is not melted.

400-V input series

**CAUTION**

- 1 When the spindle motor model αi I 1HV, αi I 1.5HV, αi I 2HVi, αi I 3HV, αi I_T 1HV, αi I_T 2HV, and αi I_T 3HV is used, the specification of the fan motor is below: Single phase, 200/230 VAC
- 2 To meet the EMC Directive operating in EU countries, a noise filter must be installed.
- 3 Install the noise filter more nearer to the power supply than the magnetic contactor.
- 4 When the circuit breaker trips, the contact of the magnetic contactor may be melted. Before turning on the circuit breaker, make sure that the contact is not melted.
- 5 Breaker 3 is used to interrupt the lightning surge protector. Since the lightning surge protector is disabled if breaker 3 trips, it is necessary to issue a warning during the trip.

NOTE

When the power specification of the fan motor of the spindle motor is 400 V, breaker 3 can also be used for the fan motor.

9.2 CONNECTOR LOCATION

9.2.1 αi PS series

(a) αi PS 5.5

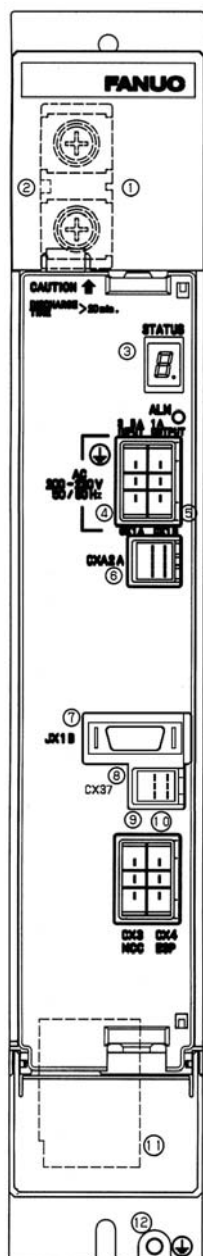


Table.9.2.1(a) Names of connectors and terminal blocks

	Names	Display	Remarks
1	DC link terminal block		Display the terminal block TB1
2	DC link charge LED		(Warning)
3	Status LED	STATUS	
4	200VAC input connector	CX1A	
5	200VAC output connector	CX1B	
6	Output connector for αi PS interface	CXA2A	24VDC power supply
7	Connector for connecting power failure backup module	JX1B	
8	Connector for power failure detection output	CX37	
9	Connector for connecting main power supply magnetic contactor control signal	CX3	
10	Connector for ESP signal	CX4	
11	Connector for motor power line	CZ1	
12	Tapped hole for grounding the flange		

WARNING

When the DC link charge LED is lit, touching parts in the amplifier or cables connected is hazardous; never touch them.

CAUTION

A06B-6110-H**** and A06B-6120-H**** do not have CX37.

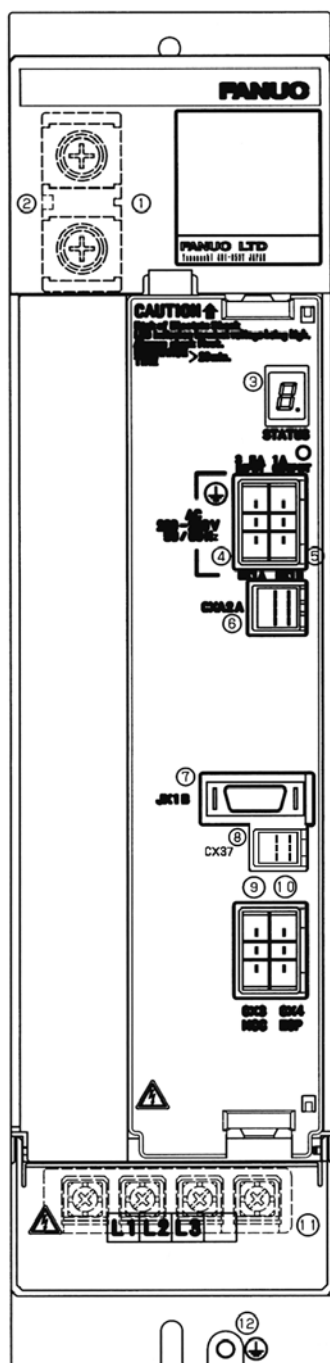
(b) αi PS 11, αi PS 15 , αi PS 11HV, αi PS 18HV

Table.9.2.1(b) Names of connectors and terminal blocks

	Names	Display	Remarks
1	DC link terminal block		Display the terminal block TB1
2	DC link charge LED		(Warning)
3	Status LED	STATUS	
4	200VAC input connector	CX1A	
5	200VAC output connector	CX1B	
6	Output connector for αi PS interface	CXA2A	24VDC power supply
7	Connector for connecting power failure backup module	JX1B	
8	Connector for power failure detection output	CX37	
9	Connector for connecting main power supply magnetic contactor control signal	CX3	
10	Connector for ESP signal	CX4	
11	Terminal block for motor power line	TB2	
12	Tapped hole for grounding the flange		

**WARNING**

When the DC link charge LED is lit, touching parts in the amplifier or cables connected is hazardous; never touch them.

**CAUTION**

A06B-6110-H**** and A06B-6120-H**** do not have CX37.

(c) αi PS 26, αi PS 30, αi PS 37, αi PS 30HV, αi PS 45HV

Table.9.2.1(c) Names of connectors and terminal blocks

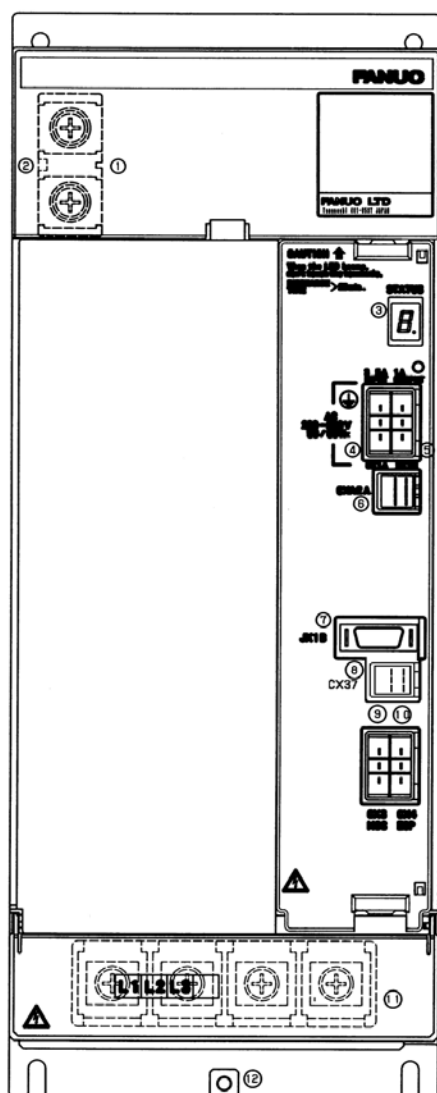
	Names	Display	Remarks
1	DC link terminal block		Display the terminal block TB1
2	DC link charge LED		(Warning)
3	Status LED	STATUS	
4	200VAC input connector	CX1A	
5	200VAC output connector	CX1B	
6	Output connector for αi PS interface	CXA2A	24VDC power supply
7	Connector for connecting power failure backup module	JX1B	
8	Connector for power failure detection output	CX37	
9	Connector for main power MCC control signal	CX3	
10	Connector for ESP signal	CX4	
11	Terminal block for motor power line	TB2	
12	Tapped hole for grounding the flange		

**WARNING**

When the DC link charge LED is lit, touching parts in the amplifier or cables connected is hazardous; never touch them.

**CAUTION**

A06B-6110-H**** and A06B-6120-H**** do not have CX37.



(d) αi PS 55, αi PS 75HV, αi PS 100HV**Table.9.2.1(d) Names of connectors and terminal blocks**

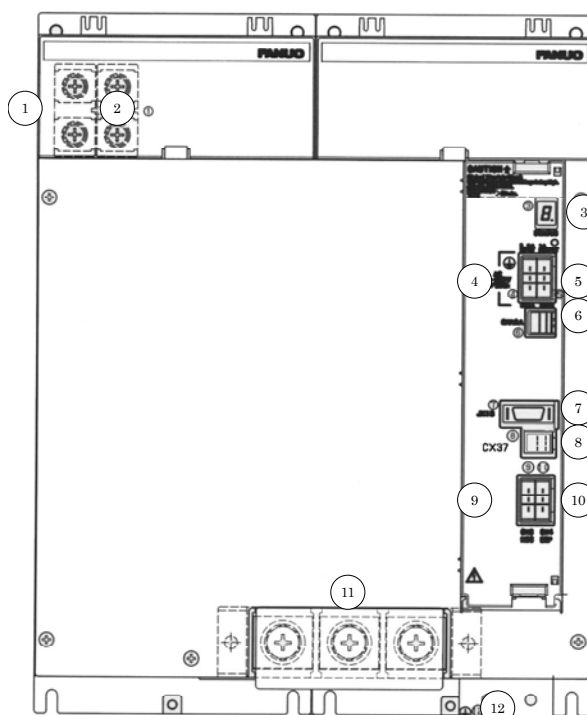
	Names	Display	Remarks
1	DC link terminal block		Display the terminal block TB1
2	DC link charge LED		(Warning)
3	Status LED	STATUS	
4	200VAC input connector	CX1A	
5	200VAC output connector	CX1B	
6	Output connector for αi PS interface	CXA2A	24VDC power supply
7	Connector for connecting power failure backup module	JX1B	
8	Connector for power failure detection output	CX37	
9	Connector for main power MCC control signal	CX3	
10	Connector for ESP signal	CX4	
11	Terminal block for motor power line	TB2	
12	Tapped hole for grounding the flange		

**WARNING**

When the DC link charge LED is lit, touching parts in the amplifier or cables connected is hazardous; never touch them.

**CAUTION**

A06B-6110-H**** and A06B-6120-H**** do not have CX37.



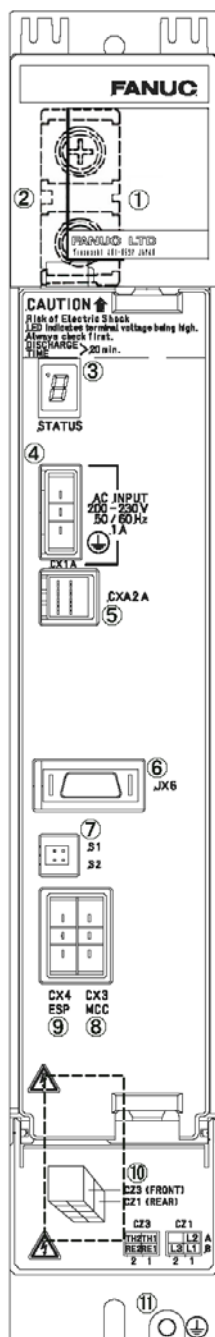
(e) αi PS_R 3 , αi PS_R 5.5

Table.9.2.1(e) Names of connectors and terminal blocks

	Names	Display	Remarks
1	DC link terminal block		Display the terminal block TB1
2	DC link charge LED		(Warning)
3	Status LED	STATUS	
4	200VAC input connector	CX1A	
5	Output connector for αi PS interface	CXA2A	24VDC power supply
6	Not used	JX6	
7	Not used	S1 S2	S1 : Connected S2 : Open
8	Connector for main power MCC control signal	CX3	
9	Connector for ESP signal	CX4	
10-1	Terminal block for motor power line	CZ1	XX key
10-2	Terminal block for regenerative discharge resistor	CZ3	YY key
11	Tapped hole for grounding the flange		

⚠ WARNING

When the DC link charge LED is lit, touching parts in the amplifier or cables connected is hazardous; never touch them.

9.2.2 αi SV series

(a) 60/90mm-wide αi SV series

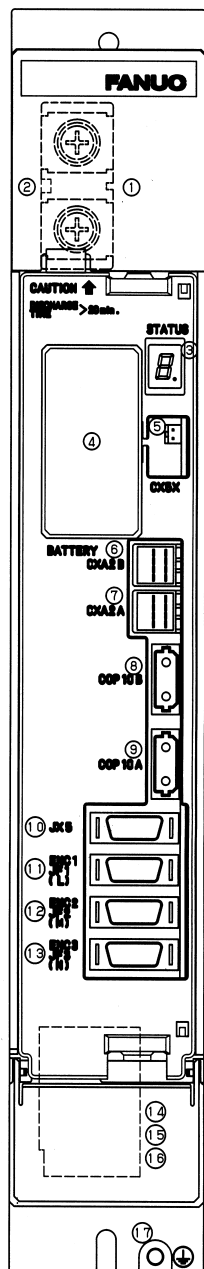


Table.9.2.2(a) Names of connectors and terminal blocks

No.	Names	Display	Remarks
1	DC link terminal block		Display the terminal block TB1
2	DC link charge LED		(Warning)
3	Status LED	STATUS	
4	Location of the batteries for the αi SV built-in-type absolute Pulsecoder	BATTERY	
5	Battery connector for the αi SV built-in-type absolute Pulsecoder	CX5X	
6	Input connector for αi PS interface	CXA2B	24VDC power supply The interface for the absolute Pulsecoder batteries is included.
7	Output connector for αi PS interface	CXA2A	
8	FSSB optical input connector	COP10B	
9	FSSB optical output connector	COP10A	
10	Signal check connector	JX5	Unused
11	Pulsecoder connector : L axis	ENC1/JF1	
12	Pulsecoder connector : M axis	ENC2/JF2	
13	Pulsecoder connector : N axis	ENC3/JF3	
14	Connector for motor power line: L axis	CZ2L	For αi SV 1-axis, CZ2
15	Connector for motor power line: M axis	CZ2M	
16	Connector for motor power line: N axis	CZ2N	
17	Tapped hole for grounding the flange		



WARNING

When the DC link charge LED is lit, touching parts in the amplifier or cables connected is hazardous; never touch them.