

Periodic Inspection & Maintenance

This chapter describes the periodic inspection and maintenance of the drive to ensure that it receives the proper care to maintain overall performance.

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7.1 Section Safety

DANGER

Electrical Shock Hazard

Do not connect or disconnect wiring while the power is on.

Failure to comply will result in death or serious injury.

Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc. To prevent electric shock, wait for at least the time specified on the warning label once all indicators are OFF, and then measure the DC bus voltage level to confirm it has reached a safe level.

Never connect or disconnect wiring, remove connectors or option cards, or replace the cooling fan while the power is on.

Failure to comply will result in death or serious injury.

Before servicing, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off.

WARNING

Electrical Shock Hazard

Do not operate equipment with covers removed.

Failure to comply could result in death or serious injury.

The diagrams in this section may show drives without covers or safety shields to show details. Be sure to reinstall covers or shields before operating the drives and run the drives according to the instructions described in this manual.

Always ground the motor-side grounding terminal.

Improper equipment grounding could result in death or serious injury by contacting the motor case.

Do not remove covers or touch circuit boards while the power is on.

Failure to comply could result in death or serious injury.

Do not allow unqualified personnel to perform work on the drive.

Failure to comply could result in death or serious injury.

Installation, maintenance, inspection, and servicing must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of AC drives.

Do not perform work on the drive while wearing loose clothing, jewelry or without eye protection.

Failure to comply could result in death or serious injury.

Remove all metal objects such as watches and rings, secure loose clothing, and wear eye protection before beginning work on the drive.

Do not touch any terminals before the capacitors have fully discharged.

Failure to comply could result in death or serious injury.

Before wiring terminals, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

⚠ WARNING**Fire Hazard**

Tighten all terminal screws to the specified tightening torque.

Loose electrical connections could result in death or serious injury by fire due to overheating of electrical connections.

Do not use an improper voltage source.

Failure to comply could result in death or serious injury by fire.

Verify that the rated voltage of the drive matches the voltage of the incoming power supply before applying power.

Do not use improper combustible materials.

Failure to comply could result in death or serious injury by fire.

Attach the drive to metal or other noncombustible material.

NOTICE

Observe proper electrostatic discharge procedures (ESD) when handling the drive and circuit boards.

Failure to comply may result in ESD damage to the drive circuitry.

Follow cooling fan replacement instructions. The cooling fan cannot operate properly when it is installed incorrectly and could seriously damage the drive.

Follow the instructions in this manual to replace the cooling fan, making sure that the label is on top before inserting the cooling fan into the drive. To ensure maximum useful product life, replace both cooling fans when performing maintenance.

Never connect or disconnect the motor from the drive while the drive is outputting voltage.

Improper equipment sequencing could result in damage to the drive.

Do not use unshielded cable for control wiring.

Failure to comply may cause electrical interference resulting in poor system performance. Use shielded, twisted-pair wires and ground the shield to the ground terminal of the drive.

Do not allow unqualified personnel to use the product.

Failure to comply could result in damage to the drive or braking circuit.

Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment and maintenance of AC drives.

Do not modify the drive circuitry.

Failure to comply could result in damage to the drive and will void warranty.

Yaskawa is not responsible for any modification of the product made by the user. This product must not be modified.

Check all the wiring to ensure that all connections are correct after installing the drive and connecting any other devices.

Failure to comply could result in damage to the drive.

Comply with proper wiring practices.

The motor may run in reverse if the phase order is backward.

Connect motor input terminals U, V and W to drive output terminals U/T1, V/T2, and W/T3. The phase order for the drive and motor should match.

NOTICE

Frequently switching the drive power supply to stop and start the motor can damage the drive.

To get the full performance life out of the electrolytic capacitors and circuit relays, refrain from switching the drive power supply off and on more than once every 30 minutes. Frequent use can damage the drive. Use the drive to stop and start the motor.

Do not operate damaged equipment.

Failure to comply could result in further damage to the equipment.

Do not connect or operate any equipment with visible damage or missing parts.

7.2 Inspection

Power electronics have limited life and may exhibit changes in characteristics or performance deterioration after years of use under normal conditions. To help avoid such problems, it is important to perform preventive maintenance and periodic inspection on the drive.

Drives contain a variety of power electronics such as power transistors, semiconductors, capacitors, resistors, fans, and relays. The electronics in the drive serve a critical role in maintaining proper motor control.

Follow the inspection lists provided in this chapter as a part of a regular maintenance program.

Note: The drive will require more frequent inspection if it is placed in harsh environments, such as:

- High ambient temperatures
- Frequent starting and stopping
- Fluctuations in the AC supply or load
- Excessive vibrations or shock loading
- Dust, metal dust, salt, sulfuric acid, chlorine atmospheres
- Poor storage conditions.

Perform the first equipment inspection one to two years after installation.

◆ Recommended Daily Inspection

Table 7.1 outlines the recommended daily inspection for Yaskawa drives. Check the following items on a daily basis to avoid premature deterioration in performance or product failure. Copy this checklist and mark the “Checked” column after each inspection.

Table 7.1 General Recommended Daily Inspection Checklist

Inspection Category	Inspection Points	Corrective Action	Checked
Motor	Inspect for abnormal oscillation or noise coming from the motor.	<ul style="list-style-type: none"> • Check the load coupling. • Measure motor vibration. • Tighten all loose components. 	
Cooling	Inspect for abnormal heat generated from the drive or motor and visible discoloration.	<ul style="list-style-type: none"> • Check for excessive load. • Loose connections • Check for dirty heatsink or motor. • Ambient temperature 	
	Inspect drive cooling fan and circulation fan operation.	<ul style="list-style-type: none"> • Check for clogged or dirty fan. • Check fan operation drive parameter. 	
	Inspect drive airfilter.	Check for the dirty airfilter.	
Environment	Verify the drive environment complies with the specifications listed in <i>Installation Environment on page 44</i> .	Eliminate the source of contaminants or correct poor environment.	
Load	The drive output current should not be higher than the motor or drive rating for an extended period of time.	<ul style="list-style-type: none"> • Check for excessive load. • Check the motor parameter settings of the drive. 	
Power Supply Voltage	Check main power supply and control voltages.	<ul style="list-style-type: none"> • Correct the voltage or power supply to within nameplate specifications. • Verify all main circuit phases. 	

◆ Recommended Periodic Inspection

Table 7.2 outlines the recommended periodic inspections for Yaskawa drive installations. Although periodic inspections should generally be performed once a year; the drive may require more frequent inspection in harsh environments or with rigorous use. Operating and environmental conditions, along with experience in each application, will determine the actual inspection frequency for each installation. Periodic inspection will help to avoid premature deterioration in performance or product failure. Copy this checklist and mark the “Checked” column after each inspection.

■ Periodic Inspection

WARNING! Electrical Shock Hazard. Do not inspect, connect, or disconnect any wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

Table 7.2 Periodic Inspection Checklist

Inspection Area	Inspection Points	Corrective Action	Checked
Main Circuit Periodic Inspection			
General	<ul style="list-style-type: none"> Inspect equipment for discoloration from overheating or deterioration. Inspect for damaged or deformed parts. 	<ul style="list-style-type: none"> Replace damaged components as required. The drive has few serviceable parts and may require complete drive replacement. 	
	Inspect for dirt, foreign particles, or dust collection on components.	<ul style="list-style-type: none"> Inspect enclosure door or seal if used. Use dry air to clear away foreign matter. Use a pressure of 39.2×10^4 to 58.8×10^4 Pa (4 - 6 kg·cm²). Replace components if cleaning is not possible. 	
Conductors and Wiring	<ul style="list-style-type: none"> Inspect wiring and connections for discoloration, damage, or heat stress. Inspect wire insulation and shielding for wear. 	Repair or replace damaged wiring.	
Terminals	Inspect terminals for stripped, damaged, or loose connections.	Tighten loose screws and replace damaged screws or terminals.	
Relays and Contactors	<ul style="list-style-type: none"> Inspect contactors and relays for excessive noise during operation. Inspect coils for signs of overheating such as melted or cracked insulation. 	<ul style="list-style-type: none"> Check coil voltage for over or under voltage conditions. Replace damaged removable relays contactors or circuit board. 	
Braking Resistors	Inspect for discoloration of heat stress on or around resistors.	<ul style="list-style-type: none"> Minor discoloration may be acceptable. If discoloration exists check for loose connections. 	
Electrolytic Capacitor	<ul style="list-style-type: none"> Inspect for leaking, discoloration, or cracks. Check if the cap has come off, for any swelling, or if the sides have burst open. 	The drive has few serviceable parts and may require complete drive replacement.	
Diode, IGBT (Power Transistor)	Inspect for dust or other foreign material collected on the surface.	Use dry air to clear away foreign matter. Use a pressure of 39.2×10^4 to 58.8×10^4 Pa (4 - 6 kg·cm ²).	
Motor Periodic Inspection			
Operation Check	Check for increased vibration or abnormal noise.	Stop the motor and contact qualified maintenance personnel as required.	
Control Circuit Periodic Inspection			
General	<ul style="list-style-type: none"> Inspect terminals for stripped, damaged, or loose connections. Make sure all terminals have been properly tightened. 	<ul style="list-style-type: none"> Tighten loose screws and replace damaged screws or terminals. If terminals are integral to a circuit board, then board or drive replacement may be required. 	
Circuit Boards	Check for any odor, discoloration, and rust. Make sure connections are properly fastened and that no dust or oil mist has accumulated on the surface of the board.	<ul style="list-style-type: none"> Fix any loose connections. If an antistatic cloth or vacuum plunger can't be used, replace the board. Do not use any solvents to clean the board. Use dry air to clear away foreign matter. Use a pressure of 39.2×10^4 to 58.8×10^4 Pa (4 - 6 kg·cm²). The drive has few serviceable parts and may require complete drive replacement. 	
Cooling System Periodic Inspection			
Air filter	Check for dirty or clogged filter.	Replace the air filter. <i>Refer to Replacing the Air Filter on page 325 for detail.</i>	
Cooling Fan, Circulation Fan	<ul style="list-style-type: none"> Check for abnormal oscillation or unusual noise. Check for damaged or missing fan blades. 	<ul style="list-style-type: none"> Replace as required. <i>Refer to Cooling Fan and Circulation Fan on page 303 for information on cleaning or replacing the fan.</i> 	
Heatsink	Inspect for dust or other foreign material collected on the surface.	Use dry air to clear away foreign matter. Use a pressure of 39.2×10^4 to 58.8×10^4 Pa (4 - 6 kg·cm ²).	
Air Duct	Inspect air intake and exhaust openings. They must be free from obstruction and properly installed.	<ul style="list-style-type: none"> Visually inspect the area. Clear obstructions and clean air duct as required. 	
Display Periodic Inspection			
Digital Operator	<ul style="list-style-type: none"> Make sure data appears on the operator properly. Inspect for dust or other foreign material that may have collected on surrounding components. 	<ul style="list-style-type: none"> Contact your Yaskawa representative if there is any trouble with the display or keypad. Clean the digital operator. 	

7.3 Periodic Maintenance

The drive has Maintenance Monitors that keep track of component wear. This feature provides advance maintenance warning and eliminates the need to shut down the entire system for unexpected problems. The drive allows the user to check predicted maintenance periods for the components listed below.

- Cooling Fan, Circulation Fan
- Electrolytic Capacitors
- Inrush Prevention Circuit
- IGBTs

For replacement parts, contact the distributor where the drive was purchased or contact Yaskawa directly.

◆ Replacement Parts

Table 7.3 contains the estimated performance life of components that require replacement during the life of the drive. Only use Yaskawa replacement parts for the appropriate drive model and revision.

Table 7.3 Estimated Performance Life

Component	Estimated Performance Life
Cooling Fan, Circulation Fan	10 years
Electrolytic Capacitors	10 years <I>

<I> The drive has few serviceable parts and may require complete drive replacement.

NOTICE: Estimated performance life based on specific usage conditions. These conditions are provided for the purpose of replacing parts to maintain performance. Some parts may require more frequent replacement due to poor environments or rigorous use. Usage conditions for estimated performance life:

- Ambient temperature: Yearly average of 40°C (IP00 enclosure)
- Load factor: 80% maximum
- Operation time: 24 hours a day

■ Performance Life Monitors Maintenance Monitors

The drive calculates the maintenance period for components that may require replacement during the life of the drive. A percentage of the maintenance period is displayed on the digital operator by viewing the appropriate monitor parameter.

When the maintenance period reaches 100%, there is increased risk that the drive may malfunction. Yaskawa recommends checking the maintenance period regularly to ensure maximum performance life.

Refer to *Recommended Periodic Inspection on page 300* for more details.

Table 7.4 Performance Life Monitors Used for Component Replacement

Parameter	Component	Contents
U4-03	Cooling Fan, Circulation Fan	Displays the accumulated operation time of the fan, from 0 to 99999 hours. This value is automatically reset to 0 once it reaches 99999.
U4-04		Displays the accumulated fan operation time as a percentage of the specified maintenance period.
U4-05	DC Bus Capacitors	Displays the accumulated time the capacitors are used as a percentage of the specified maintenance period.
U4-06	Inrush (pre-charge) Relay	Displays the number of times the drive is powered up as a percentage of the performance life of the inrush circuit.
U4-07	IGBT	Displays the percentage of the maintenance period reached by the IGBTs.

■ Alarm Outputs for Maintenance Monitors

An output can be set up to inform the user when a specific components has neared its expected performance life.

When one of multi-function digital output terminals has been assigned the maintenance monitor function (H2-□□ = 2F), the terminal will close when the cooling fan, DC bus capacitors, or DC bus pre-charge relay reach 90% of the expected performance life, or the IGBTs have reached 50% of their expect performance life. Additionally the digital operator will display an alarm like shown in **Table 7.5** to indicate the specific components that may need maintenance.

Table 7.5 Maintenance Alarms

Alarm Display		Function	Corrective Action
LT-1<1>	LT-1	The cooling fans have reached 90% of their designated life time.	Replace the cooling fan.
LT-2<1>	LT-2	The DC bus capacitors have reached 90% of their designated life time.	Contact a Yaskawa representative or the nearest Yaskawa sales office on possible drive replacement.
LT-3<1>	LT-3	The DC bus charge circuit has reached 90% of its designated life time.	Contact a Yaskawa representative or the nearest Yaskawa sales office on possible drive replacement.
LT-4<1>	LT-4	The IGBT's have reached 50% of their designated life time.	Check the load, carrier frequency, and output frequency.
TrPC<2>	TrPC	The IGBT's have reached 90% of their designated life time.	Contact a Yaskawa representative or the nearest Yaskawa sales office on possible drive replacement.

<1> This alarm message will be output only if the Maintenance Monitor function is assigned to one of the digital outputs (H2-□□ = 2F). The alarm will also trigger a digital output that is programmed for alarm indication (H2-□□ = 10).

<2> This alarm message will always be output, even if the Maintenance Monitor function is not assigned to any of the digital outputs (H2-□□ = 2F). The alarm will also trigger a digital output that is programmed for alarm indication (H2-□□ = 10).

■ Related Drive Parameters

Parameters o4-03, o4-05, o4-07, and o4-09 can be used to reset a Maintenance Monitor back to zero after a specific component has been replaced. *Refer to Parameter Table on page 360* for details on parameter settings.

NOTICE: *If these parameters are not reset after the corresponding parts have been replaced, the Maintenance Monitor function will continue to count down the performance life from the value that was reached with the old part. If the Maintenance Monitor is not reset, the drive will not have the correct value of the performance life for the new component.*

7.4 Cooling Fan and Circulation Fan

NOTICE: Follow cooling fan replacement instructions. The cooling fan cannot operate properly when installed incorrectly and could seriously damage the drive. To ensure maximum useful product life, replace all cooling fans when performing maintenance.

Contact your Yaskawa representative or the nearest Yaskawa sales office to order replacement cooling fans as required.

For drives with multiple cooling fans, replace all the fans when performing maintenance to ensure maximum product performance life.

◆ Number of Fan

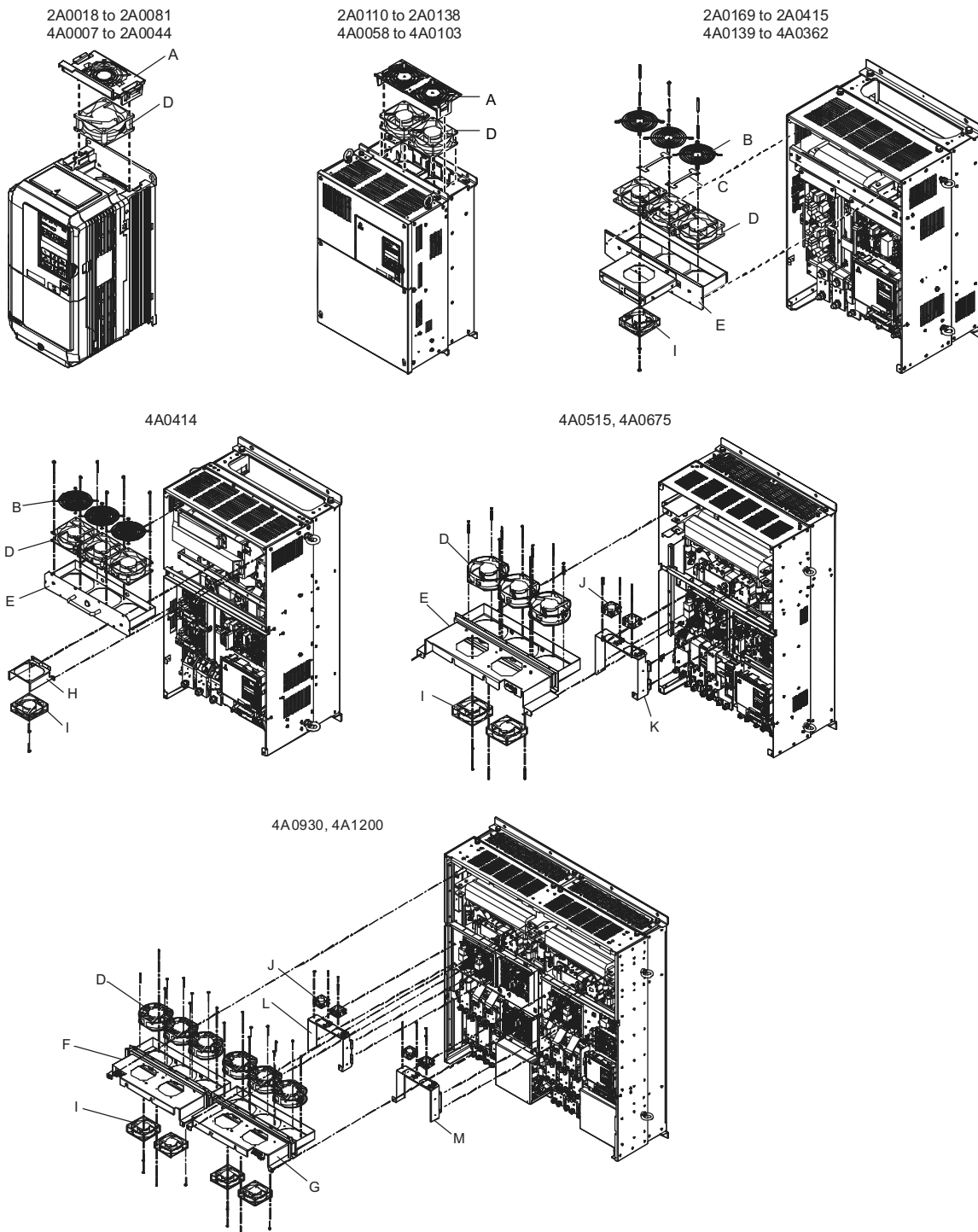
Three-Phase 200 V Class				Three-Phase 400 V Class				
Model CIMR-E□	Cooling Fan	Circulation Fan	Page	Model CIMR-E□	Cooling Fan	Circulation Fan	Control Board Cooling Fan	Page
2A0004	—	—	—	4A0002	—	—	—	—
2A0006	—	—	—	4A0004	—	—	—	—
2A0008	—	—	—	4A0005	—	—	—	—
2A0010	—	—	—	4A0007	1	—	—	305
2A0012	—	—	—	4A0009	1	—	—	
2A0018	1	—	305	4A0011	1	—	—	
2A0021	1	—		4A0018	2	—	—	
2A0030	2	—		4A0023	2	—	—	
2A0040	2	—		4A0031	2	—	—	
2A0056	2	—		4A0038	2	—	—	
2A0069	2	—		4A0044	2	—	—	307
2A0081	2	—	307	4A0058	2	—	—	
2A0110	2	—		4A0072	2	—	—	309
2A0138	2	—	311	4A0088	2	—	—	
2A0169	2	—		4A0103	2	—	—	311
2A0211	2	—		4A0139	2	—	—	
2A0250	2	—		4A0165	2	—	—	
2A0312	2	—		4A0208	2	—	—	
2A0360	3	1		4A0250	3	—	—	
2A0415	3	1		4A0296	3	—	—	
—	—	—	—	4A0362	3	1	—	315
—	—	—	—	4A0414	3	1	—	
—	—	—	—	4A0515	3	2	2	317
—	—	—	—	4A0675	3	2	2	
—	—	—	—	4A0930	6	4	4	320
—	—	—	—	4A1200	6	4	4	

◆ Cooling Fan Component Names

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink has cooled down.

7.4 Cooling Fan and Circulation Fan



- | | |
|----------------------|--|
| A – Fan Cover | H – Circulation Fan Base |
| B – Fan Guard | I – Circulation Fan |
| C – Cable Cover | J – Circuit Board Cooling Fan |
| D – Cooling Fan | K – Circuit Board Cooling Fan Unit Case |
| E – Fan Unit Case | L – Circuit Board Cooling Fan Unit Case(L) |
| F – Fan Unit Case(L) | M – Circuit Board Cooling Fan Unit Case(R) |
| G – Fan Unit Case(R) | |

Figure 7.1 Cooling Fan Component Names

◆ Cooling Fan Replacement: 2A0018 to 2A0081 and 4A0007 to 4A0044

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink has cooled down.

NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing the Cooling Fan

1. Depress the right and left sides of the fan cover hooks and pull upward. Remove the fan cover from the top of the drive.

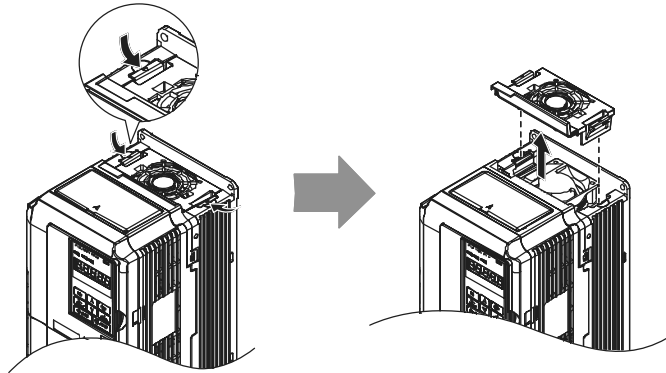


Figure 7.2 Removing the Fan Cover: 2A0018 to 2A0081, 4A0007 to 4A0044

2. Remove the cooling fan cartridge. Disconnect the pluggable connector and remove the fan.

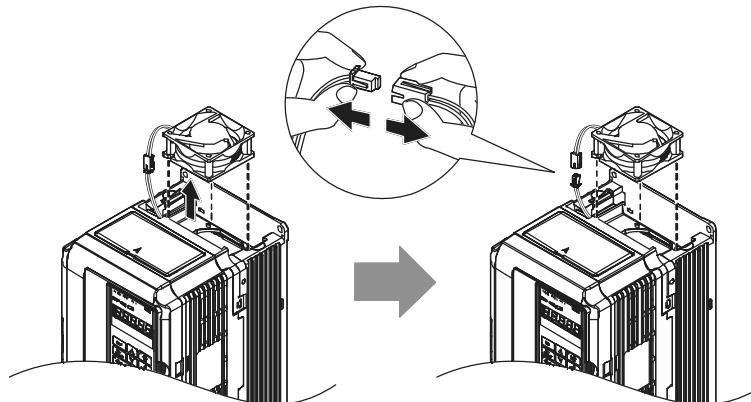
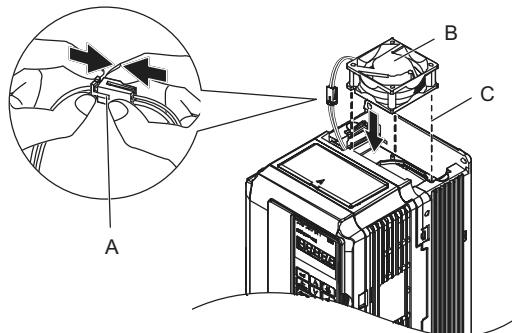


Figure 7.3 Removing the Cooling Fan: 2A0018 to 2A0081, 4A0007 to 4A0044

■ Installing the Cooling Fan

Reverse the procedure described above to reinstall the cooling fan.

1. Install the replacement fan into the drive, ensuring the alignment pins line up as shown in the figure below.



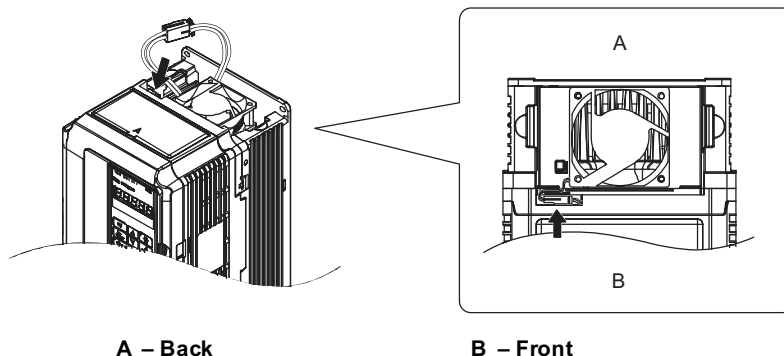
A – Push the connectors together so no space remains between them.

B – Label facing up

C – Make sure the alignment pins line up properly.

Figure 7.4 Installing the Cooling Fan: 2A0018 to 2A0081, 4A0007 to 4A0044

2. Make sure the power lines for the fan are properly connected, then place the cable back into the recess of the drive.



A – Back

B – Front

Figure 7.5 Cooling Fan Power Supply Connectors: 2A0018 to 2A0081, 4A0007 to 4A0044

3. While pressing in on the hooks on the left and right sides of the fan cover, guide the fan cover until it clicks back into place.

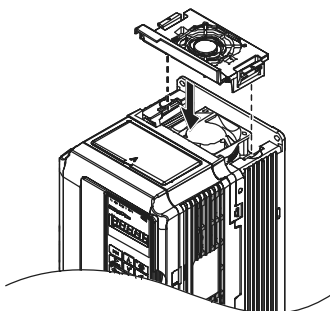


Figure 7.6 Reattach the Fan Cover: 2A0018 to 2A0081, 4A0007 to 4A0044

4. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

◆ Cooling Fan Replacement: 2A0110 and 2A0138, 4A0058 and 4A0072

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink has cooled down.

NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing the Cooling Fan

1. While pressing in on the hooks located on the left and right sides of the fan cover, free the fan cover leading by lifting the back end first.

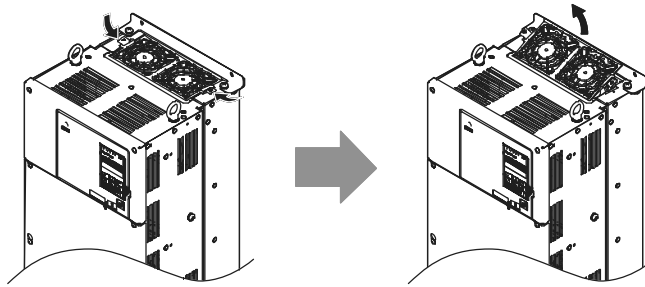


Figure 7.7 Removing the Cooling Fan Cover: 2A0110 and 2A0138, 4A0058 and 4A0072

2. Lift the fan cover out leading with the back end. Unplug the replay connector and free the fan cover from the drive.

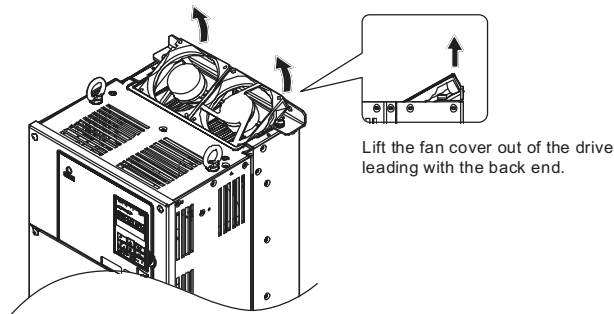


Figure 7.8 Removing the Cooling Fan: 2A0110 and 2A0138, 4A0058 and 4A0072

■ Installing the Cooling Fan

Reverse the procedure described above to reinstall the cooling fan.

1. Make sure the power lines for the fan are properly connected.
2. Place the power supply connectors and cable back into the recess of the drive.

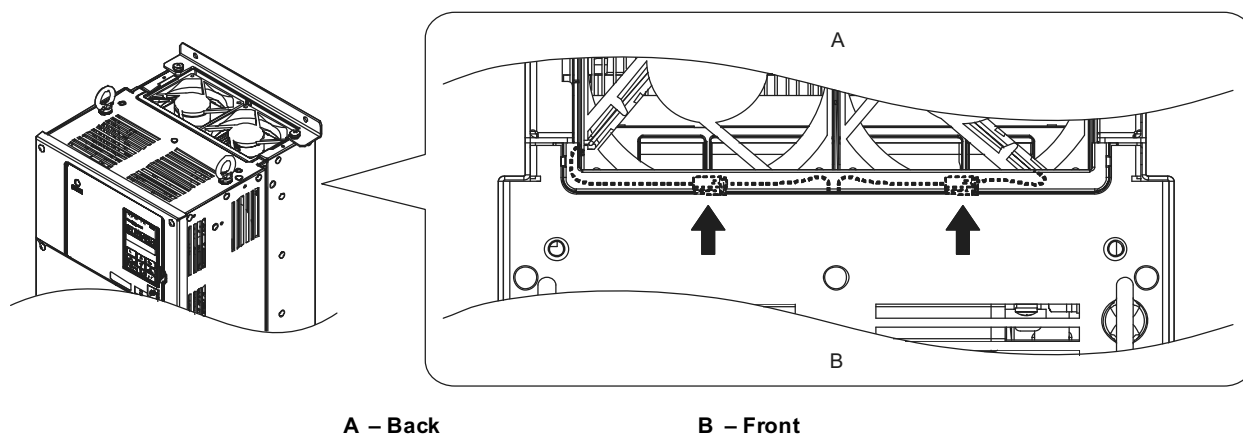


Figure 7.9 Cooling Fan Power Supply Connectors: 2A0110 and 2A0138, 4A0058 and 4A0072

3. Install the replacement fan into the drive.

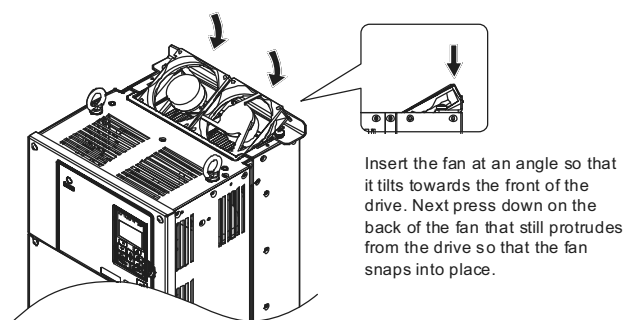


Figure 7.10 Installing the Cooling Fan: 2A0110 and 2A0138, 4A0058 and 4A0072

4. Angle the fan cover so the back end tilts up. Slide the cover into the small opening towards the front of the drive, and then guide the entire fan cover into place.

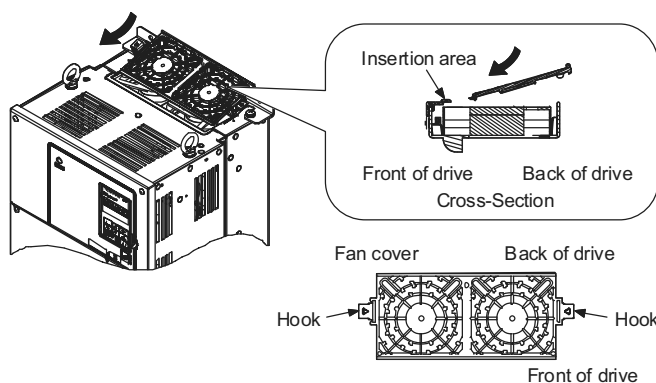


Figure 7.11 Reattach the Fan Cover: 2A0110 and 2A0138, 4A0058 and 4A0072

5. While pressing in on the hooks on the left and right sides of the fan cover, guide the fan cover until it clicks back into place.

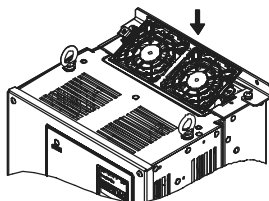


Figure 7.12 Reattach the Fan Cover: 2A0110 and 2A0138, 4A0058 and 4A0072

6. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

◆ Cooling Fan Replacement: 4A0088 and 4A0103

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NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing the Cooling Fan

1. While pressing in on the hooks located on the left and right sides of the fan cover, free the fan cover leading by lifting the back end first.

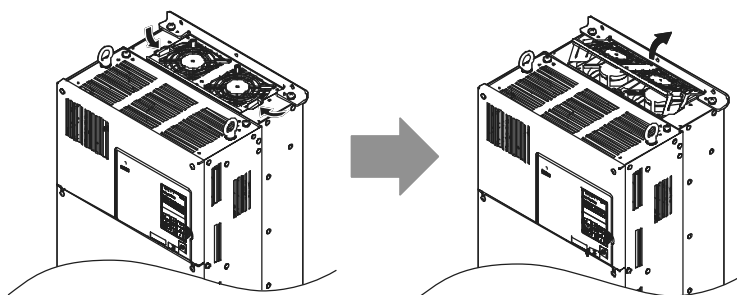


Figure 7.13 Removing the Cooling Fan Cover: 4A0088 and 4A0103

2. Lift the cooling fan directly up on the fan as shown below. Unplug the relay connector and free the fan from the drive.

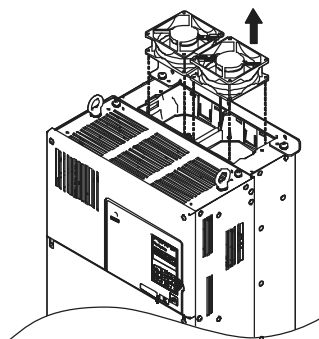


Figure 7.14 Removing the Cooling Fan: 4A0088 and 4A0103

■ Installing the Cooling Fan

Reverse the procedure described above to reinstall the cooling fan.

1. Install the replacement fan into the drive, ensuring the alignment pins line up as shown in the figure below.

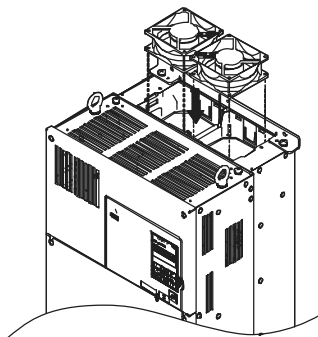
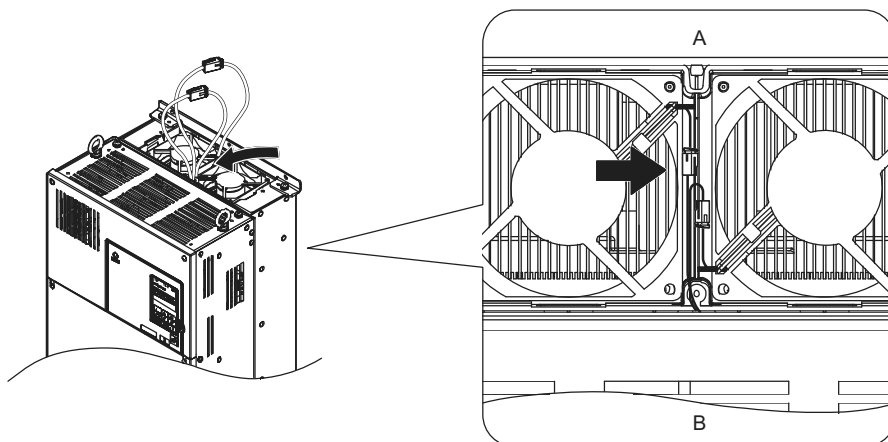


Figure 7.15 Installing the Cooling Fan: 4A0088 and 4A0103

2. Make sure the power lines for the fan are properly connected, then place the power supply connectors and cable back into the recess of the drive.



A – Back

B – Front

Figure 7.16 Cooling Fan Power Supply Connectors: 4A0088 and 4A0103

3. Angle the fan cover as shown and insert the connector tabs into the corresponding holes on the drive.

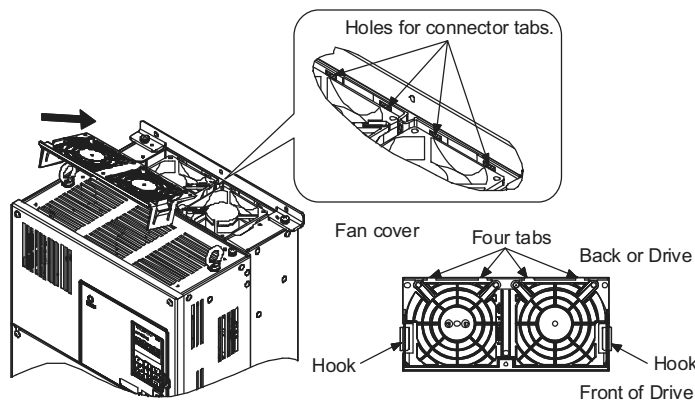


Figure 7.17 Reattach the Fan Cover: 4A0088 and 4A0103

4. While pressing in on the hooks on the left and right sides of the fan cover, guide the fan cover until it clicks back into place.

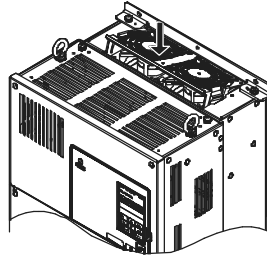


Figure 7.18 Reattach the Fan Cover: 4A0088 and 4A0103

5. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

◆ Cooling Fan Replacement: 2A0169 to 0415, 4A0139 to 4A0362

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink has cooled down.

NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing and Disassembling the Cooling Fan Unit

1. Remove the terminal cover and front cover. Refer to **Terminal Cover** on page 66 for detail.
2. Remove the fan connector (CN6). Remove the fan connector (CN6, CN7) in models 2A0360, 2A0415, and 4A0362.

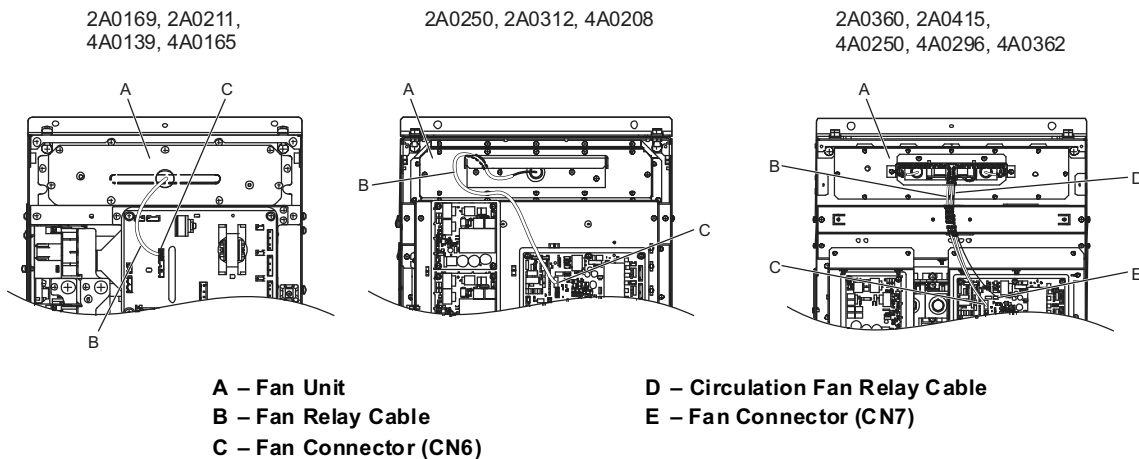


Figure 7.19 Cooling Fan Replacement: Fan Unit and Connectors

3. Remove the screws holding the fan unit in place and slide the fan unit out of the drive.

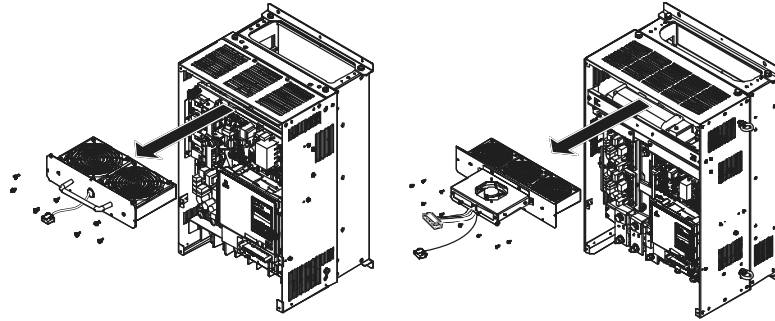


Figure 7.20 Removing the Fan Unit: 2A0169 to 2A0415, 4A0139 to 4A0362

4. Remove the fan guard and replace the cooling fans.

Note: Make sure the fan cable does not get pinched between parts when reassembling the fan unit.

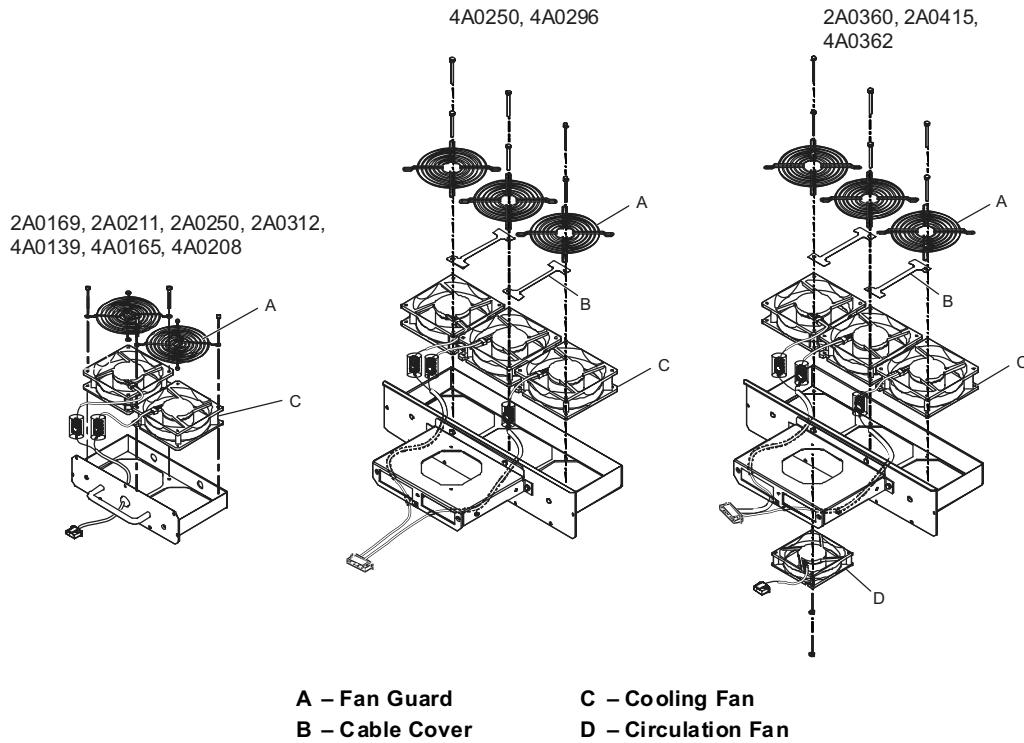
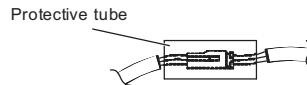


Figure 7.21 Fan Unit Disassembly: 2A0169 to 2A0415, 4A0139 to 4A0362

■ Cooling Fan Wiring: 2A0169, 2A0211, 4A0139 and 4A0165

1. Position the protective tube so that the fan connector sits in the center of the protective tube.



2. Place the fan connector covered by the tube as shown in the drawings below.

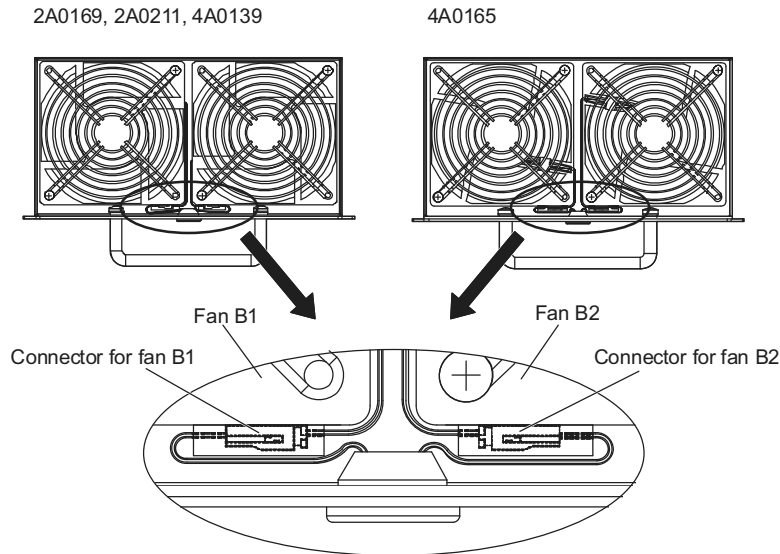
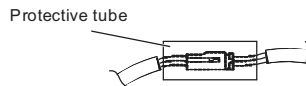


Figure 7.22 Cooling Fan Wiring: 2A0169, 2A0211, 4A0139 and 4A0165

3. Make sure that the protective tube does not stick out beyond the fan guard.

■ Cooling Fan Wiring: 2A0250, 2A0312 and 4A0208

1. Position the protective tube so that the fan connector sits in the center of the protective tube.



2. Place the connector for fan B2 before the B1 connector and guide the lead wire for fan B2 so that it is held in place by the cable hook.

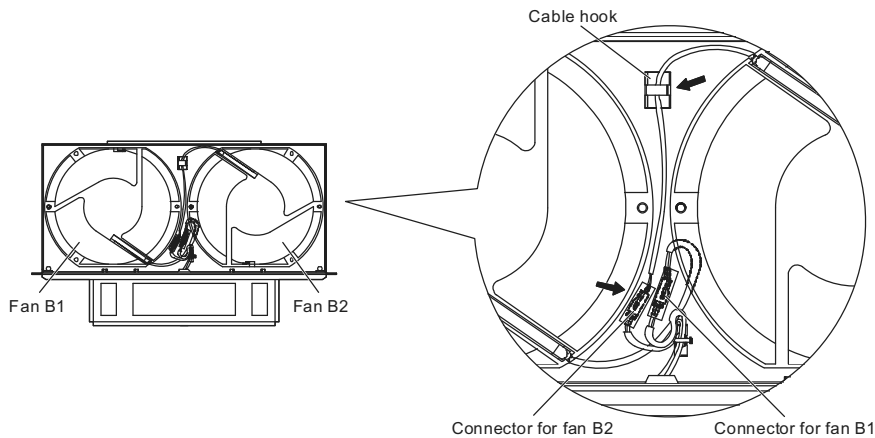
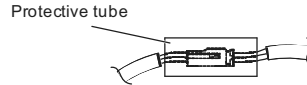


Figure 7.23 Cooling Fan Wiring: 2A0250, 2A0312 and 4A0208

3. Make sure that the protective tube does not stick out beyond the fan guard.

■ Cooling Fan Wiring: 2A0360, 2A0415, 4A0250 to 4A0362

1. Position the protective tube so that the fan connector sits in the center of the protective tube.



2. The fan connector for fan B2 should be placed in front of the fan B1 connector between fans B1 and B2.
3. The connector for fan B3 should be pressed in between fan B2 and B3.

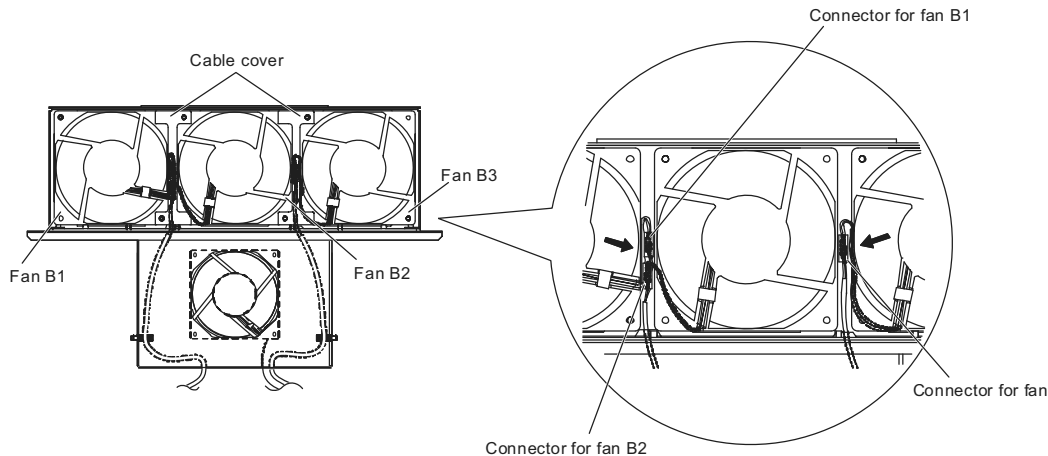


Figure 7.24 Cooling Fan Wiring: 2A0360, 2A0415, 4A0250 to 4A0362

4. Double check the relay connector to ensure that it is properly connected.
5. Reattach the cable cover to its original position and tighten the screws so that the fan guard holds the cable cover in place.

Note: Make sure the fan cable does not get pinched between parts when reassembling the fan unit.

■ Installing the Cooling Fan Unit

1. Reverse the procedure described above to reinstall the cooling fan unit.

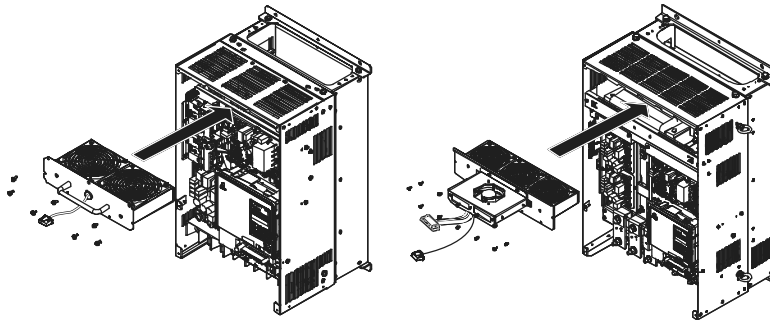


Figure 7.25 Installing the Cooling Fan Unit: 2A0165 to 2A0415, 4A0139 to 4A0362

2. Reattach the covers and digital operator.
3. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

◆ Cooling Fan Replacement: 4A0414

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink and a fan unit. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink and the fan unit have cooled down.

NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing and Disassembling the Cooling Fan Unit

1. Remove the terminal cover and front cover 1 and 2.

CAUTION! Crush Hazard. Do not completely remove the cover screws, just loosen them. If the cover screws are removed completely, the terminal cover may fall off causing an injury. Take special care when removing/reattaching the terminal covers for larger drives

2. Remove the fan connector (CN6).

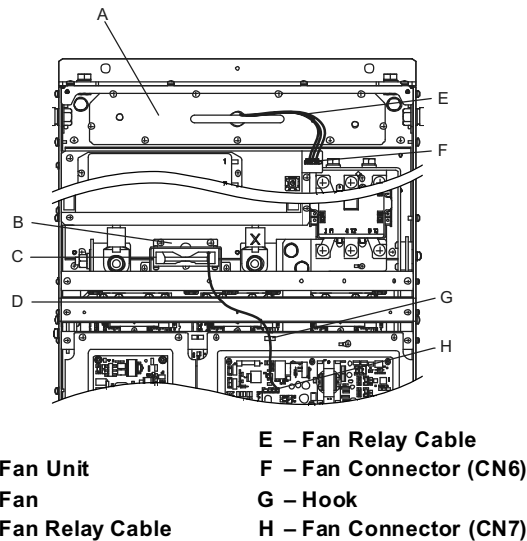


Figure 7.26 Component Names: 4A0414

3. Remove the circulation fan relay cable from the hook. Remove the fan connector (CN7).
4. Remove the screws holding the fan units in place and slide the fan units out of the drive.

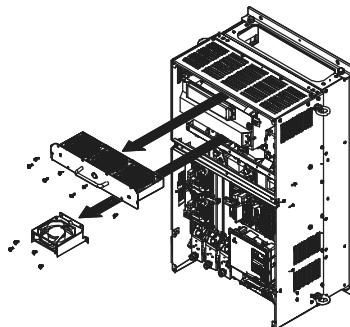


Figure 7.27 Removing the Fan Unit: 4A0414

- Remove the fan guard and circulation fan casing. Replace the cooling fans.

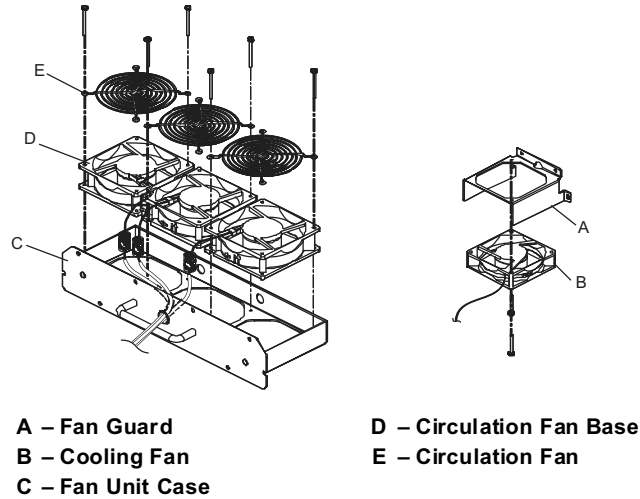
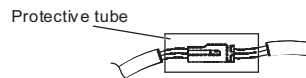


Figure 7.28 Fan Unit Disassembly: 4A0414

■ Cooling Fan Wiring

- Position the protective tube so that the fan connector sits in the center of the protective tube.



- Place the fan connector covered by the tube as shown in the drawings below.

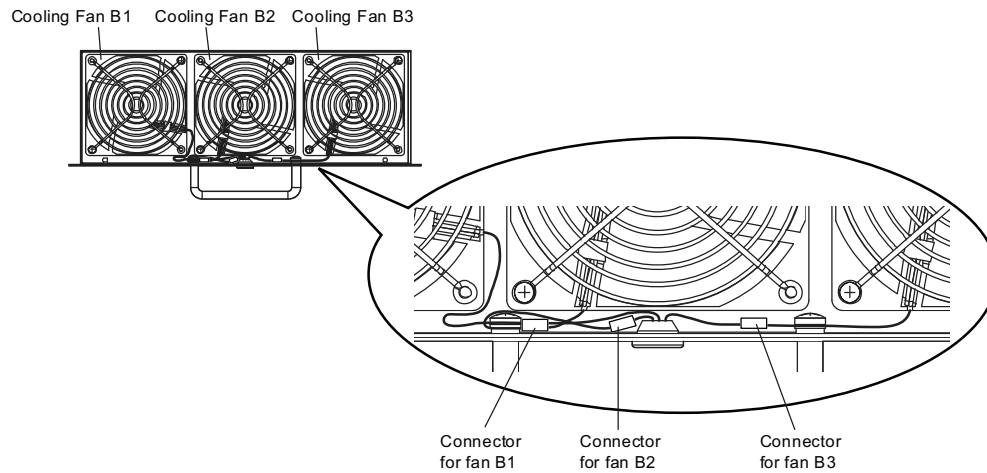


Figure 7.29 Cooling Fan Wiring: 4A0414

- Double check the relay connector to ensure that it is properly connected.

■ Installing the Cooling Fan Unit

1. Reverse the procedure described above to reinstall the cooling fan unit.

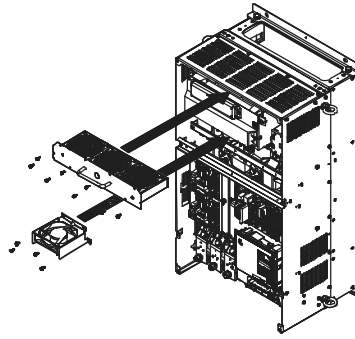


Figure 7.30 Installing the Cooling Fan Unit: 4A0414

2. Reattach the covers and digital operator.
3. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

◆ Cooling Fan Replacement: 4A0515 and 4A0675

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink and a fan unit. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink and the fan unit have cooled down.

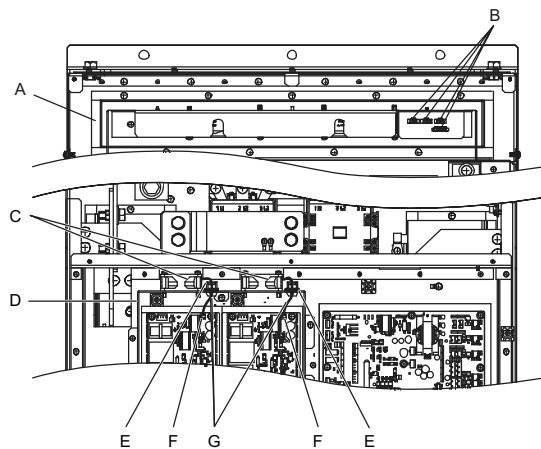
NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing and Disassembling the Cooling Fan Unit

1. Remove the terminal cover and front cover 1 and 2.

CAUTION! Crush Hazard. Do not completely remove the cover screws, just loosen them. If the cover screws are removed completely, the terminal cover may fall off causing an injury. Take special care when removing/reattaching the terminal covers for larger drives.

2. Remove the connectors for the cooling fan relay and the circuit board cooling fan.



- | | |
|------------------------------------|---|
| A – Fan Unit | E – Hook |
| B – Fan Relay Connector | F – Circuit Board Cooling Fan Connector |
| C – Circuit Board Cooling Fan | G – Circuit Board Cooling Fan Cable |
| D – Circuit Board Cooling Fan Case | |

Figure 7.31 Component Names: 4A0515 and 4A0675

7.4 Cooling Fan and Circulation Fan

3. Loosen the screw A (2) and the screw B (9), then slide the panel that the screws held into place to the right.

Note: The fan unit can be removed simply by loosening these screws.

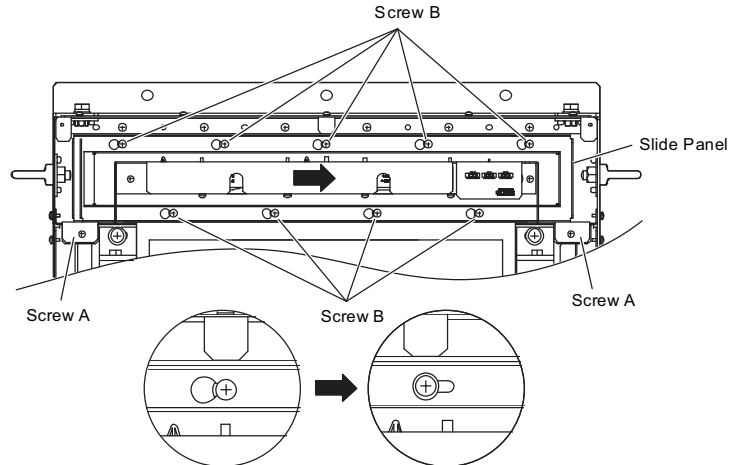


Figure 7.32 Removing the Fan Unit: 4A0515 and 4A0675

4. Remove the slide panel and fan unit along with the cooling fan unit for the circuit boards from the drive.

Note: The fan unit can be removed simply by loosening these screws.

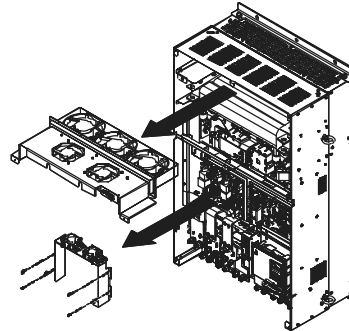
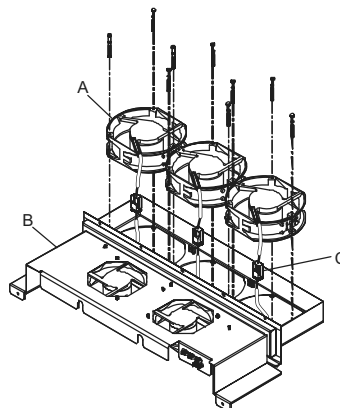


Figure 7.33 Removing the Fan Units: 4A0515 and 4A0675

■ Replacing the Cooling Fans

1. Replace the cooling fans.

Note: Make sure the fan cable does not get pinched between parts when reassembling the fan unit.



A – Cooling Fan
B – Fan Unit Case

C – Cooling Fan Connector

Figure 7.34 Fan Unit Disassembly: 4A0515 and 4A0675

- Place the cooling fan connectors and guide the lead wires so that they are held in place by the cable hooks.

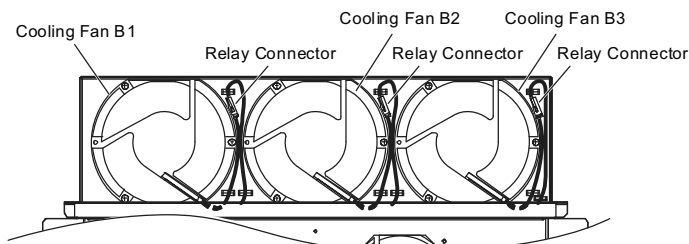
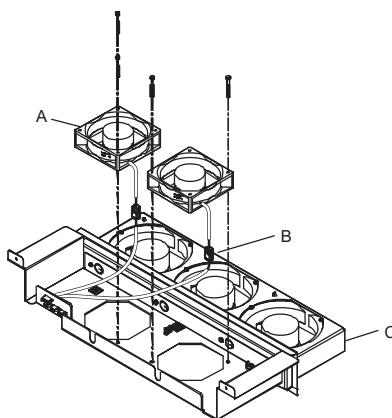


Figure 7.35 Cooling Fan Wiring: 4A0515 and 4A0675

- Turn the fan unit over and replace the circulation fans.



A – Circulation Fan
B – Cooling Fan Connector

C – Fan Unit Case

Figure 7.36 Fan Unit Disassembly: 4A0515 and 4A0675

- Turn over the cooling fan unit. Guide the lead wires so that they are held in place by the cable hooks and place the circulation fan connectors between the fan and fan unit.

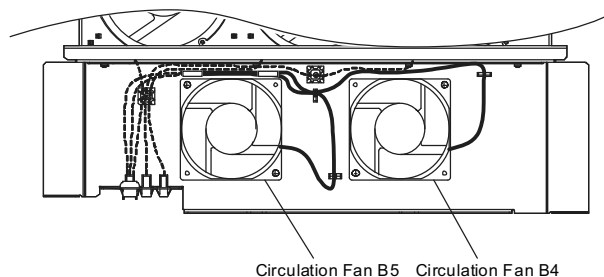
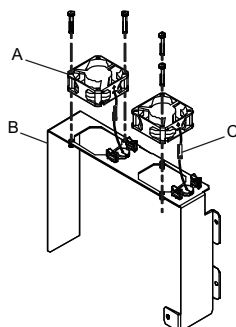


Figure 7.37 Cooling Fan Wiring: 4A0515 and 4A0675

- Replace the cooling fans



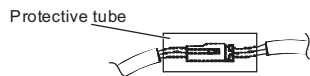
A – Circuit Board Cooling Fan
B – Circuit Board Cooling Fan Case

C – Relay Connector

Figure 7.38 Fan Unit Disassembly: 4A0515 and 4A0675

7.4 Cooling Fan and Circulation Fan

6. Position the protective tube so that the fan connector sits in the center of the protective tube. (Only for circuit board cooling fans)



7. Guide lead wires through the hooks provided so that the wires are held in place.

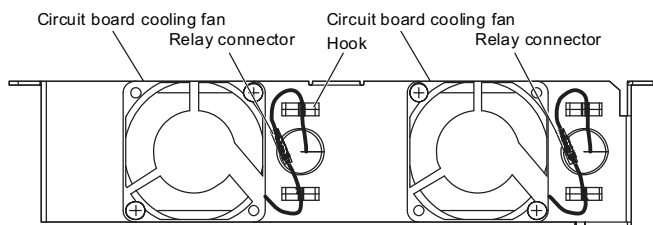


Figure 7.39 Cooling Fan Wiring: 4A0515 and 4A0675

8. Double check the relay connector to ensure that it is properly connected.

■ Installing the Cooling Fan Unit

1. Reverse the procedure described above to reinstall the cooling fan unit.

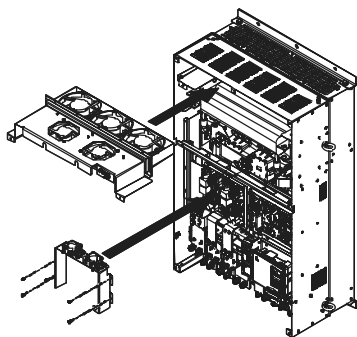


Figure 7.40 Installing the Cooling Fan Units: 4A0515 and 4A0675

2. Reattach the covers and digital operator.
3. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

◆ Cooling Fan Replacement: 4A0930 and 4A1200

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink and a fan unit. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink and the fan unit have cooled down.

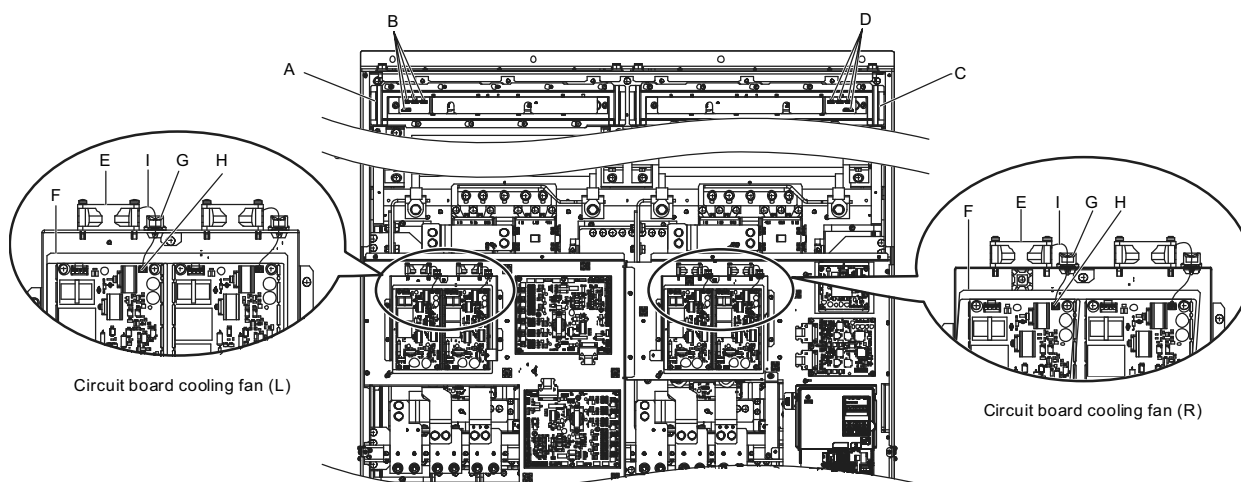
NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing and Disassembling the Cooling Fan Unit

1. Remove the terminal cover and front covers 1 and 2. Refet to **Removing the Terminal Cover on page 67** for details.

CAUTION! Crush Hazard. Do not completely remove the cover screws, just loosen them. If the cover screws are removed completely, the terminal cover may fall off causing an injury. Take special care when removing/reattaching the terminal covers for larger drives.

2. Remove the connectors for the cooling fan relay and the circuit board cooling fan.



- | | |
|-------------------------------|---|
| A – Fan Unit (L) | F – Circuit Cooling Fan Case |
| B – Fan Relay Connector (L) | G – Hook |
| C – Fan Unit (R) | H – Circuit Board Cooling Fan Connector |
| D – Fan Relay Connector (R) | I – Circuit Board Cooling Fan Cable |
| E – Circuit Board Cooling Fan | |

Figure 7.41 Component Names: 4A0930 and 4A1200

3. Loosen screw A (4 count) and screw B (18 count), and slide the panel to the right.

Note: The fan unit can be removed by loosening these screws; they do not need to be removed.

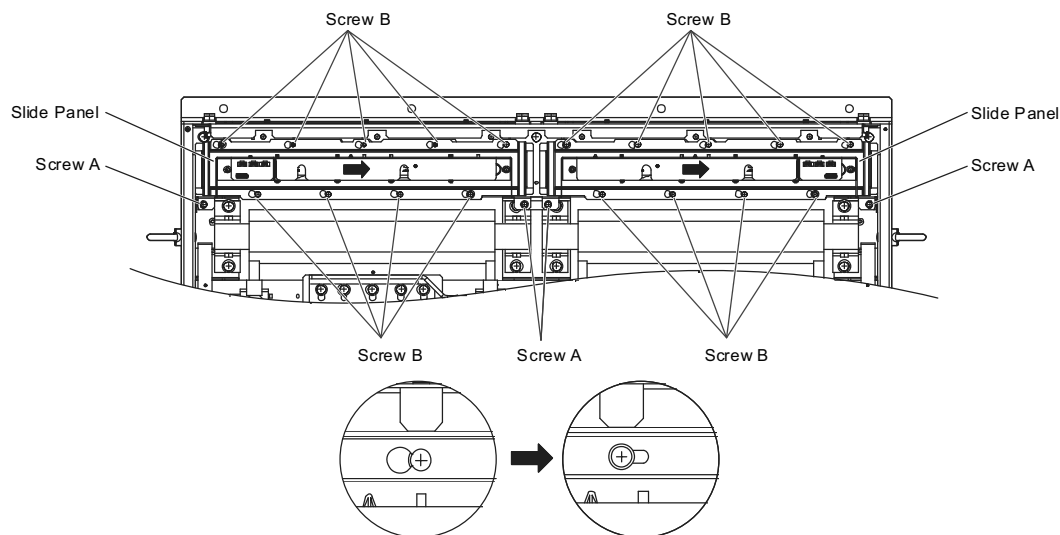


Figure 7.42 Removing the Fan Unit: 4A0930 and 4A1200

4. Remove the slide panel, fan unit, cooling fan unit, and circuit board cooling fan unit.

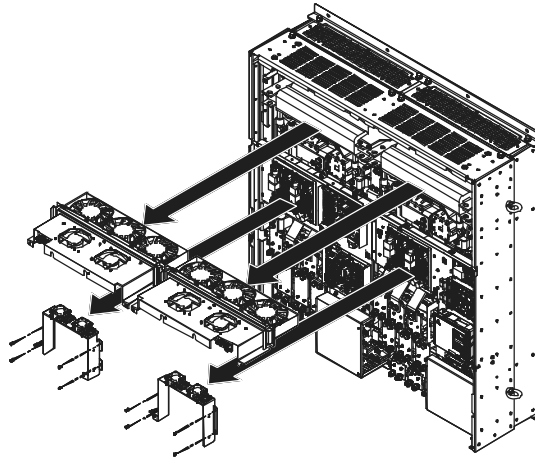
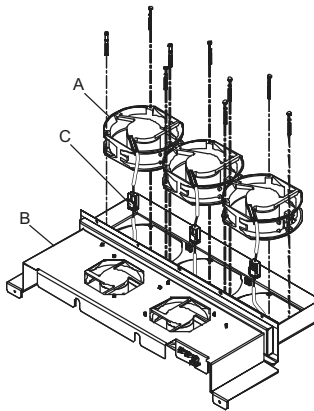


Figure 7.43 Removing the Fan Units: Models 4A0930 and 4A1200

■ Replacing the Cooling Fans

1. Replace the Cooling Fans.

Note: 1. *Figure 7.44* shows the right side fan unit.
2. Do not pinch the fan cable between parts when reassembling the fan unit.



A – Cooling Fan
B – Fan Unit Case

C – Cooling Fan Connector

Figure 7.44 Replacing the Cooling Fans: Models 4A0930 and 4A1200

2. Place the cooling fan connectors and guide the lead wires so that they are held in place by the cable hooks.

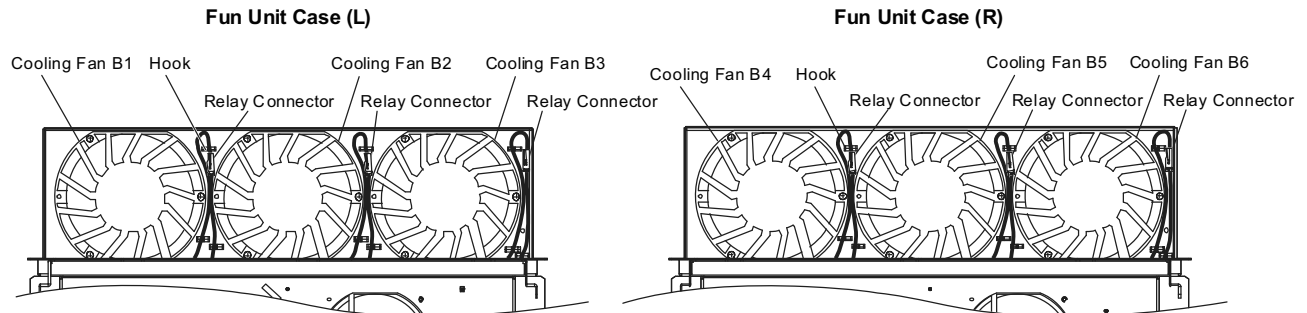
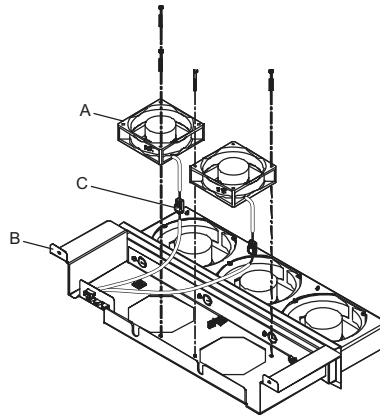


Figure 7.45 Cooling Fan Wiring: Models 4A0930 and 4A1200

3. Turn the fan unit over and replace the circulation fans.



A – Cooling Fan
B – Fan Unit Case

C – Cooling Fan Connector

Figure 7.46 Replacing the Circuit Board Cooling Fans

4. Place the cooling fan connectors and guide the lead wires so that they are held in place by the cable hooks.

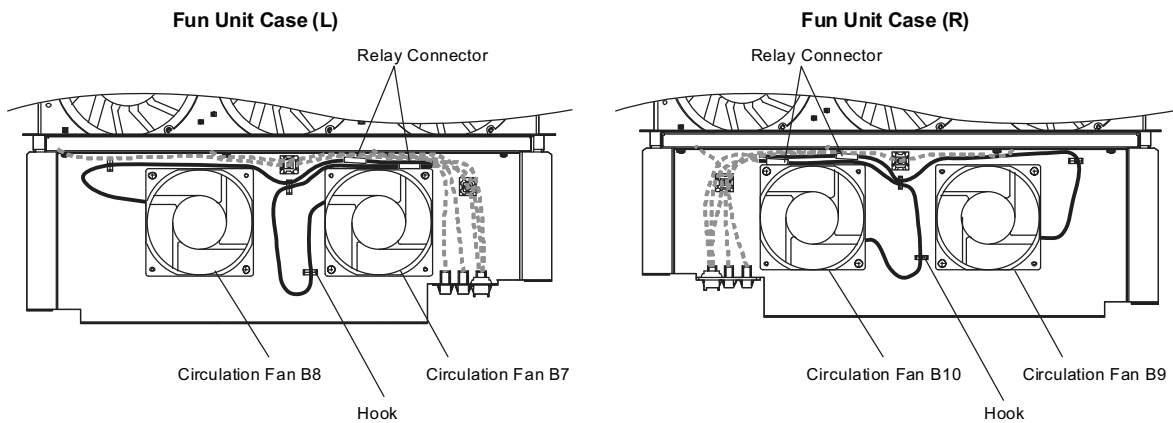
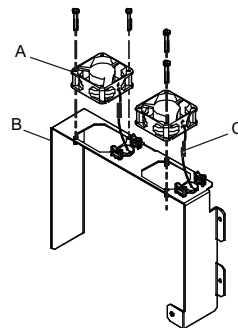


Figure 7.47 Cooling Fan Wiring: Models 4A0930 and 4A1200

5. Replace the circuit board cooling fans.

Note: *Figure 7.48* shows the right side circuit board cooling fan.

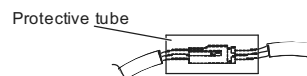


A – Circuit Board Cooling Fan

B – Circuit Board Cooling Fan Case

Figure 7.48 Replacing the circuit board cooling fans: Models 4A0930 and 4A1200

6. Position the protective tube so that the fan connector sits in the center of the protective tube. (Only for circuit board cooling fans).



7. Guide lead wires through the provided hooks so the wires are held in place.

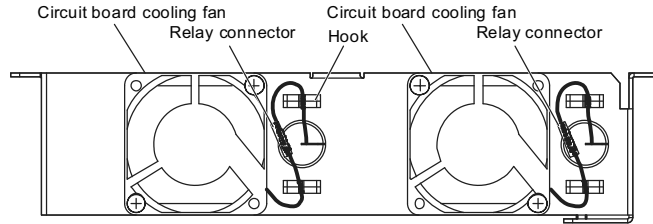


Figure 7.49 Circuit Board Cooling Fan Wiring: 4A0930 and 4A1200

8. Double-check the relay connector to ensure that it is properly connected.

■ Installing the Cooling Fan Unit

1. Reverse the procedure described above to reinstall the cooling fan unit.

Note: Properly connect the relay connectors to the fan unit connectors.

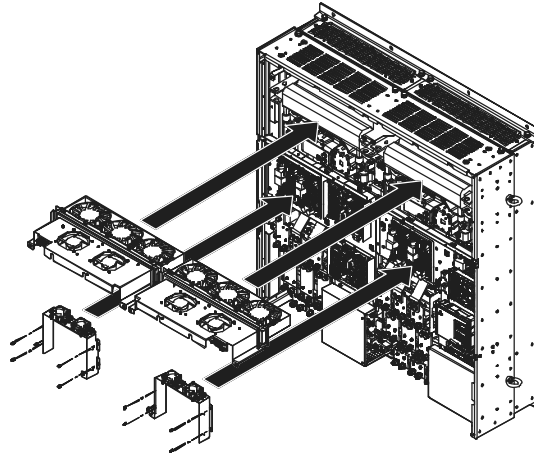


Figure 7.50 Installing the Cooling Fan Units: 4A0930 and 4A1200

2. Reattach the covers and digital operator.
3. Turn the power supply back on and reset the cooling fan operation time for the Maintenance Monitor by setting o4-03 to 0.

7.5 Replacing the Air Filter

Models CIMR-E□4A0930 and 4A1200 have built-in air filters.

Contact your Yaskawa representative or the nearest Yaskawa sales office to order new replacement air filters necessary.

Follow the instructions below to remove and replace the air filter.

◆ Air Filter Replacement

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

CAUTION! Burn Hazard. Do not touch a hot drive heatsink and filter cases. Failure to comply could result in minor or moderate injury. Shut off the power to the drive when replacing the cooling fan. To prevent burns, wait at least 15 minutes and ensure the heatsink and the filter cases have cooled down.

NOTICE: Prevent Equipment Damage. Follow cooling fan and circulation fan replacement instructions. Improper fan replacement could result in damage to equipment. When installing the replacement fan into the drive, make sure the fan is facing upwards. To ensure maximum useful product life, replace all fans when performing maintenance.

■ Removing the Air Filter

1. Remove the terminal cover. Refer to **Terminal Cover** on page 66 for more information.
2. Remove the screws holding the blind cover in place on the bottom of the drive. Pull forward on the blind cover to free it from the drive.

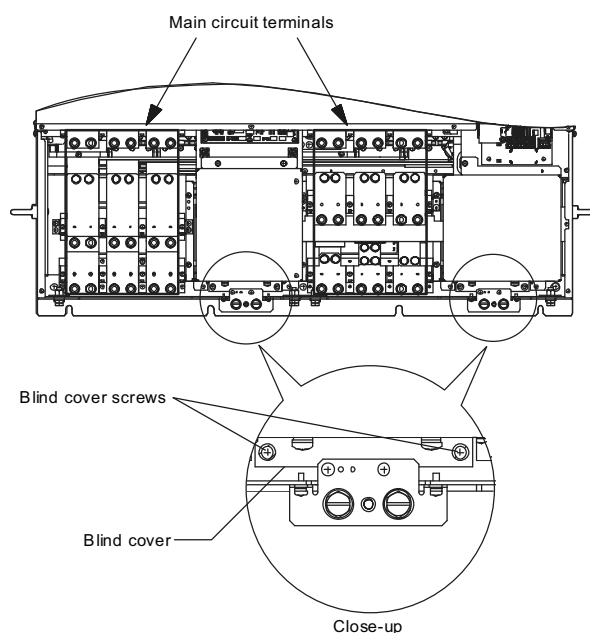


Figure 7.51 Air Filter Replacement: Removing the Blind Cover

7.5 Replacing the Air Filter

3. Loosen the screws holding the filter case in place.

Note: The filter case should not be removed, only loosened.

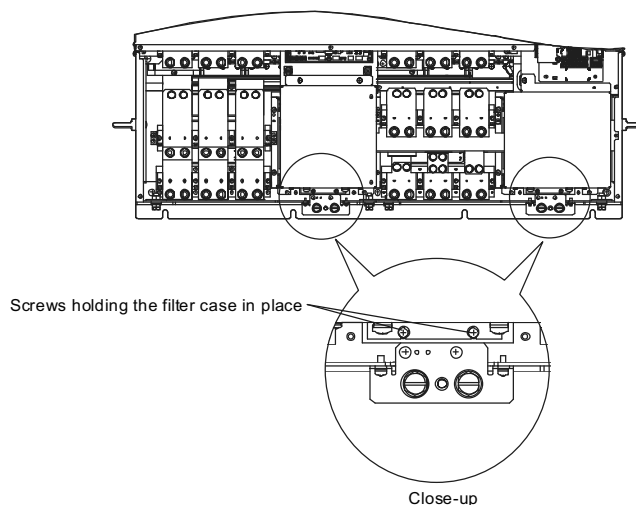


Figure 7.52 Air Filter Replacement: Loosening the Filter Case Screws

4. While holding onto the bottom of the filter case, slide it out from the drive.

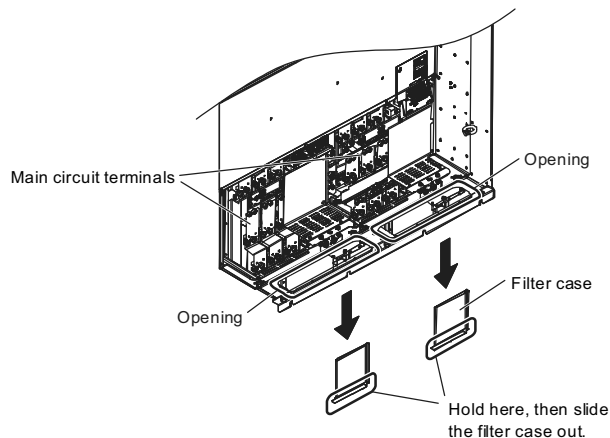


Figure 7.53 Air Filter Replacement: Sliding Out the Filter Case

5. Take the filter out of the filter case.

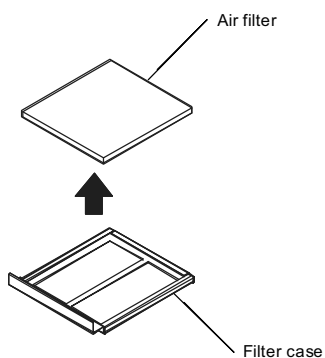


Figure 7.54 Air Filter Replacement: Taking Out the Filter

■ Installing the Air Filter

Reverse the procedure described above to reinstall the air filter.

7.6 Drive Replacement

◆ Serviceable Parts

The drive contains some serviceable parts. The following parts can be replaced over the life span of the drive:

- Terminal board I/O PCBs
- Cooling fan(s)
- Front cover

Replace the drive if the main power circuitry is damaged. Contact your local Yaskawa representative before replacing parts if the drive is still under warranty. Yaskawa reserves the right to replace or repair the drive according to Yaskawa warranty policy.

◆ Terminal Board

The drive has a modular I/O terminal block that facilitates quick drive replacement. The terminal board contains on-board memory that stores all drive parameter settings and allows the parameters to be saved and transferred to the replacement drive. To transfer the terminal board, disconnect the terminal board from the damaged drive then reconnect it to the replacement drive. Once transferred, there is no need to manually reprogram the replacement drive.

Note: If the damaged drive and the new replacement drive have different capacities, the data stored in the terminal board cannot be transferred to the new drive and an oPE01 error will appear on the display. The terminal board can still be used, but parameter setting from the old drive cannot be transferred. The replacement drive must be initialized and manually programmed.

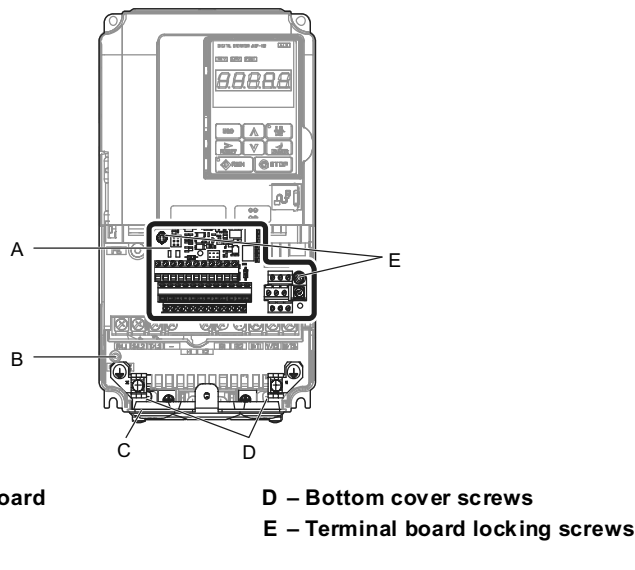


Figure 7.55 Terminal Board

◆ Replacing the Drive

WARNING! Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply can result in serious personal injury. Before servicing the drive, disconnect all power to the equipment. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components.

WARNING! Electrical Shock Hazard. Do not allow unqualified personnel to perform work on the drive. Failure to comply could result in serious injury. Installation, maintenance, inspection and servicing must be performed only by authorized personnel familiar with installation, adjustment and maintenance of AC drives.

NOTICE: Damage to Equipment. Observe proper electrostatic discharge procedures (ESD) when handling the drive and circuit boards. Failure to comply may result in ESD damage to the drive circuitry.

The following procedure explains how to replace a drive. This section provides instructions for drive replacement only. To install option boards or other types of options, then refer to the specific manuals for those options.

NOTICE: When transferring a braking transistor, braking resistor, or other type of option from a damaged drive to a new replacement drive, make sure they are working properly before reconnecting them to the new drive. Replace broken options to prevent immediate break down of the replacement drive.

1. Remove the terminal cover. Refer to **Terminal Cover on page 66** for details.

NOTICE: The shape of the terminal covers and the numbers of screws differ depending on the drive models. Refer to **Component Names on page 32 for details.**

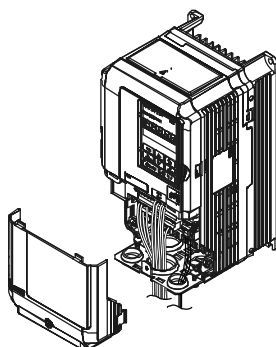


Figure 7.56 Drive Replacement: Removing the Terminal Cover

2. Loosen the screws holding the terminal board in place. Take out the screw securing the bottom cover and remove the bottom cover from the drive.

Note: Drives set up for compliance with IP00 do not have a bottom cover.

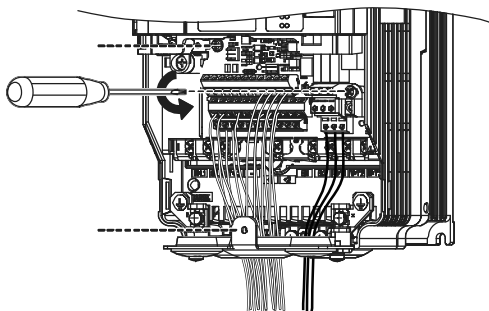


Figure 7.57 Drive Replacement: Removing the Terminal Board

3. Slide the terminal board as illustrated by the arrows, and remove it from the drive along with the bottom cover.

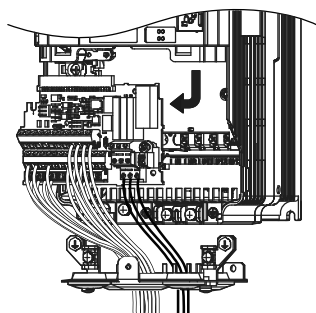


Figure 7.58 Drive Replacement: Remove the Terminal Board

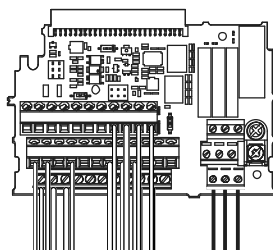


Figure 7.59 Drive Replacement:
Removable Terminal Board Disconnected from the Drive

4. Disconnect all option cards and options. Make sure they are intact before reusing them.
5. Replace the drive and wire the main circuit.

■ Installing the Drive

1. Once the main circuit has been wired, connect the terminal block to the drive as shown in **Figure 7.60**. Use the installation screw to fasten the terminal block into place.

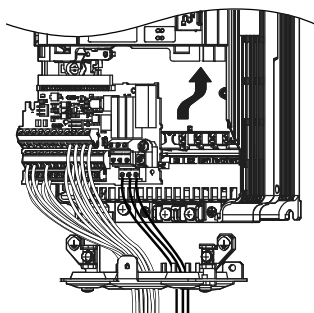


Figure 7.60 Drive Replacement: Installing the Terminal Board

2. Reconnect all options to the new drive in the same way they were installed in the old drive. Connect option boards to the same option ports in the new drive that were used in the old drive.
3. Put the terminal cover back into its original place.
4. When the power to the drive is first switched on, all parameter settings are transferred from the terminal board into the drive memory. Should an oPE04 error occur, load the parameter settings that have been saved on the terminal board onto the new drive by setting parameter A1-03 to 5550. Reset timers used for the Maintenance Monitor function by setting parameters o4-01 through o4-12 back to 0, and parameter o4-13 to 1.

