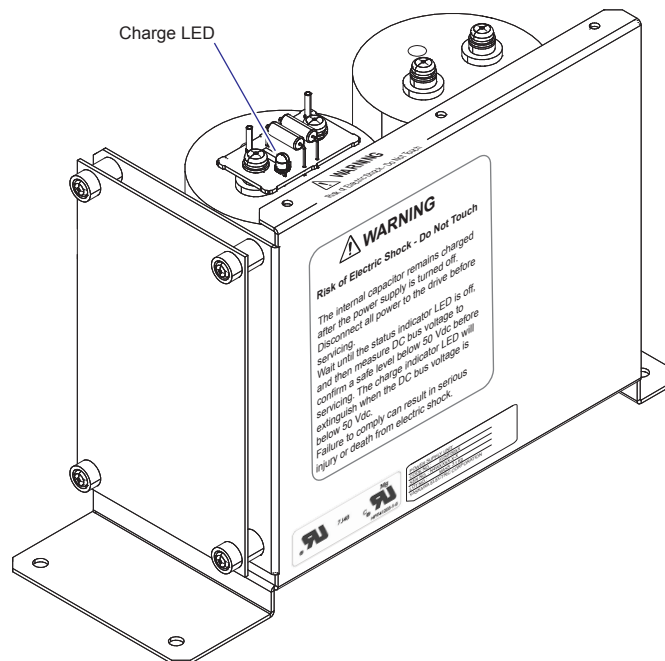


YASKAWA AC Drive-G5 HHP Power Supply Unit with Charge LED

Safety Precautions

Models: EUS61501□ and EUS61502□

To properly use the product, read this manual thoroughly and retain for easy reference, inspection, and maintenance. Ensure the end user receives this manual.



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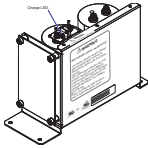
1 Preface and Safety

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◆ Applicable Documentation

These Safety Precautions apply to the G5 HHP Power Supply Unit with Charge LED, models EUS61501□ and EUS61502□.

G5 HHP Power Supply Unit with Charge LED

	Yaskawa AC Drive G5 HHP Power Supply Unit with Charge LED Safety Precautions: Document No. TOEP YEAOPT 06
	Read these safety precautions first. These safety precautions are packaged with the G5 HHP Power Supply Unit with Charge LED. It contains important safety information related to this product.

◆ Supplemental Safety Information

Read and understand these safety precautions before installing, operating, or servicing this Power Supply Unit.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

DANGER

Indicates a hazardous situation, which, if not avoided, will result in serious injury or death .

WARNING

Indicates a hazardous situation, which, if not avoided, could result in serious injury or death.

NOTICE

Indicates an equipment damage message.

■ General Safety

General Precautions

- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- When ordering a new copy of the manual due to damage or loss, contact your Yaskawa representative or the nearest Yaskawa sales office and provide the manual number shown on the front cover.

⚠ DANGER

Heed the safety messages in this manual.

Failure to comply will result in serious injury or death.

The operating company is responsible for any injuries or equipment damage resulting from failure to heed the warnings in this manual.

Danger - High Voltage Shock Hazard.

Failure to comply will result in serious injury or death.

Motor control equipment and electronic controllers are connected to hazardous line potentials. When servicing drives and electronic controllers, there may be exposed components with their cases and protrusions at or above line potential. Extreme care should be taken to prevent against electrical shock.

Stand on an insulating pad and make it a habit to use only one hand when checking components. Always work with another person in case an emergency occurs. Disconnect power and wait the proper amount of time for the DC bus capacitors to discharge to a safe level of 50 Vdc or less and 0 Vac on 4PCB TB1 on the power supply unit before servicing the controller.

Be sure equipment is properly grounded. Wear safety glasses whenever working on an electronic controller or electrical rotating equipment.

⚠ WARNING

Electrical Shock Hazard

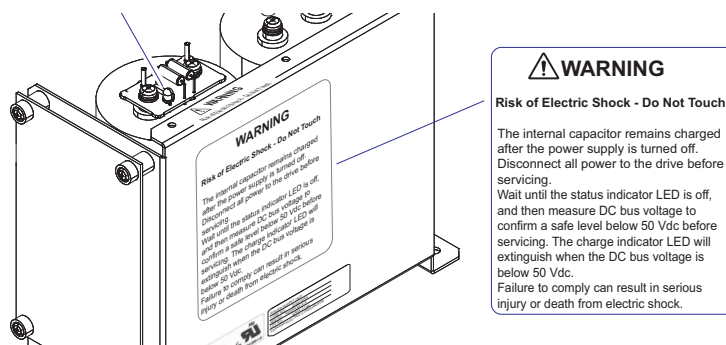
Do not allow unqualified personnel to use equipment.

Failure to comply could result in serious injury or death.

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

■ Warning Labels

Warning information is displayed on the Power Supply Unit with Charge LED as shown in the figure below. Follow all warnings and safety instructions when using the product.



2 Product Overview and Receiving

◆ About this Product

This document contains safety precautions and procedures for ensuring safety in discharging and removing the G5 HHP Power Supply Unit with Charge LED.

The Power Supply Unit with Charge LED has a printed circuit board (PCB) mounted charge LED which is lit when hazardous voltages over 50 Vdc are present on the power supply. The Power Supply Unit with Charge LED also has a tap change PCB attached to a bus capacitor bank assembly. The 1.4 kVA Power Supply Unit delivers 230 Vac fan and contactor power along with 300 Vdc power to the inverter gate drive PCB, and the G5 control assembly.

The Power Supply Unit can accommodate various input power supply ratings ranging from 200 thru 460 Vac for the 400 volt series and 500 thru 600 Vac for the 600 volt series. Several fuses on the tap change board protect the Power Supply Unit in the event of an overload or short circuit condition.

◆ Applicable Models

Refer to *Table 1* to make sure the Power Supply Unit with Charge LED is the correct replacement part.

Table 1 Power Supply Unit with Charge LED Model Numbers

Power Supply Unit with Charge LED Model	G5 HHP Drive Voltage Class
EUS61501□	200/400 V Class
EUS61502□	575/600 V Class

◆ Receiving

Perform the following tasks after receiving this product:

- Inspect the unit for damage.
If the unit appears damaged upon receipt, contact the shipper immediately.
- Verify receipt of the correct model by checking the model number.
- If you have received the wrong model or this product does not function properly, contact your supplier.

◆ Nameplate

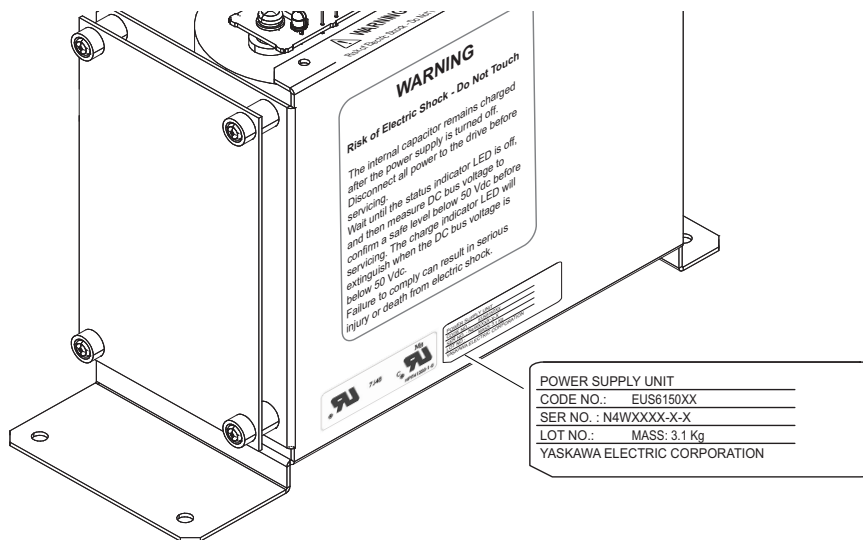
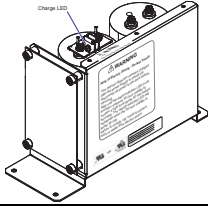
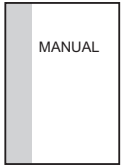


Figure 1 Power Supply Unit with Charge LED Nameplate

◆ Contents and Packaging

Table 2 Contents of Package

Description:	Power Supply Unit with Charge LED	Safety Precautions
		
Quantity:	1	1

◆ Safety Equipment Recommendations

The following safety equipment is recommended to safely replace the Power Supply Unit with Charge LED.

Use each item as indicated in the instructions.

WARNING! *Electrical Shock Hazard. Do not allow unqualified personnel to use equipment. Failure to comply could result in serious injury or death. Maintenance, inspection, and replacement of parts must be performed only by authorized personnel familiar with installation, adjustment, and maintenance of this product.*

Table 3 Recommended Safety Equipment

Equipment	Description
Calibrated multimeter (1000 Vdc)	Used to measure for unsafe voltages prior to Power Supply Unit with Charge LED removal
Personal protective equipment for working with hazardous voltages.	Example: electrical rubber gloves, protective eye wear, insulating floor mat.
Fuse puller	Suitable for 600 Vac circuits for 1-1/2 x 13/32 size midget fuses.
Optional Equipment - If Discharge Procedure 3 is Performed	
Resistor: <1> 2000 ohm 50 watt resistor (bleed resistor)	Used to bleed residual hazardous voltages from the Power Supply Unit with Charge LED prior to removal.
Wire: 14 Gauge 600V rated insulated electrical wire	Used to wire the bleed resistor circuit.
Electrical tape	Used to insulate electrical connections when bleeding the circuit.

<1> Resistor manufacturer- Ohmite 270 series power resistor 2.0 kohms 50 W, Ohmite part number: L50J2K0 or equivalent.

◆ Power Supply Unit - Electric Shock Warnings

Prior to removal of the Power Supply Unit from the G5 HHP drive, become familiar with the electrical shock hazard points shown in *Figure 2*.

All Power Supply Units previously installed in G5 HHP drives should be considered charged and a **Shock Hazard** until safe voltages of less than **50 Vdc on bus capacitors** and **0 Vac on 4PCB TB1** are verified by authorized personnel.

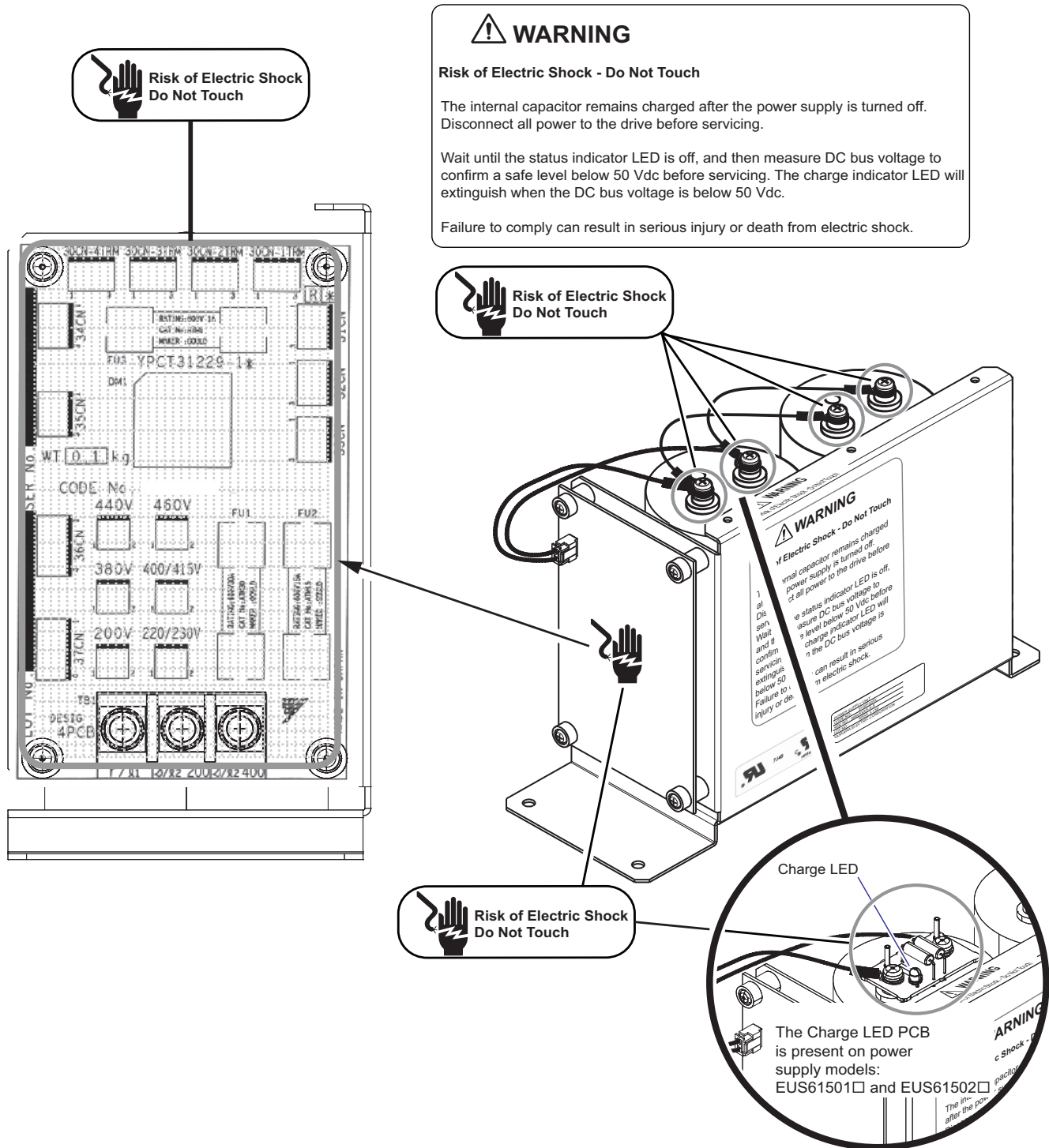


Figure 2 Power Supply Unit - Electric Shock Warnings

3 Safety Procedure

◆ Section Safety

DANGER

Electrical Shock Hazard

Risk of Electric Shock - Do Not Touch.

The internal capacitor remains charged after the power supply is turned off. Disconnect all power to the drive before servicing.

Wait until the status indicator LED is off and then measure DC bus voltage to confirm a safe level below 50 Vdc on bus capacitors and 0 Vac on 4PCB TB1 before servicing. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc.

Failure to comply can result in serious injury or death from electric shock.

WARNING

Electrical Shock Hazard

Do not allow unqualified personnel to use equipment.

Failure to comply could result in serious injury or death.

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

Do not use damaged wires, or damage the wire insulation.

Failure to comply could result in serious injury or death.

Fire Hazard

Tighten all terminal screws to the specified tightening torque.

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

NOTICE

Do not operate damaged equipment.

Failure to comply may cause further damage to the equipment.

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

Properly connect all pins and connectors.

Failure to comply may prevent proper operation and possibly damage equipment.

Check wiring to ensure that all connections are correct after installing the Power Supply Unit with Charge LED and connecting any other devices.

Failure to comply may result in damage to the option.

3 Safety Procedure

◆ Ensuring Safety Prior to Power Supply Unit Replacement

Refer to Recommended Safety Equipment in [Table 3](#) to ensure safe handling of the Power Supply Unit prior to removal.

■ Summary of Safe Discharge Procedures

The Power Supply Unit may be discharged of hazardous voltages by use of three possible procedures. Under normal conditions, assuming the drive is undamaged and fully operational, the Power Supply Unit may discharge to less than 50 Vdc within 10 minutes.

WARNING! Safe voltages must always be verified by use of a calibrated multimeter.

- **DISCHARGE PROCEDURE 1:** Wait 10 minutes after all power is turned off. Check for hazardous voltages with a calibrated multimeter according to [Figure 4](#). If voltage is **less than 50 Vdc on bus capacitors and 0 Vac on 4PCB TB1**, the unit is safe from a shock hazard.
- **DISCHARGE PROCEDURE 2:** If hazardous voltages greater than 50 Vdc remain after 1 hour, then the Power Supply Unit is defective and may take 8-12 hours or more to discharge. If waiting 8-12 hours is not possible then perform Discharge Procedure 3.
- **DISCHARGE PROCEDURE 3:** Trained authorized personnel should use this procedure only after attempting Discharge Procedure 1 and 2: Use a bleed resistor as shown in [Figure 7](#) to bleed off remaining hazardous voltage to less than 50 Vdc.

◆ PROCEDURE: Ensuring Safety Prior to Replacing the Power Supply Unit

DANGER! Electrical Shock Hazard

Disconnect and lock out all power to the drive, before servicing.

Voltage still remains in the drive capacitors even after the Power Supply Unit and drive are deenergized. The DC bus voltage and Power Supply Unit voltage must be **below 50 Vdc on bus capacitors and 0 Vac on 4PCB TB1 before removal**. To prevent electric shock, wait at least the amount of time specified on the drive and measure the Power Supply Unit and drive DC bus to determine safe voltages below 50 Vdc before touching any components.

1. Disconnect all power from the drive and lock out the main power source or switch. Also disconnect and lock out all remaining external power sources to the drive including separate control or I/O power supplies.

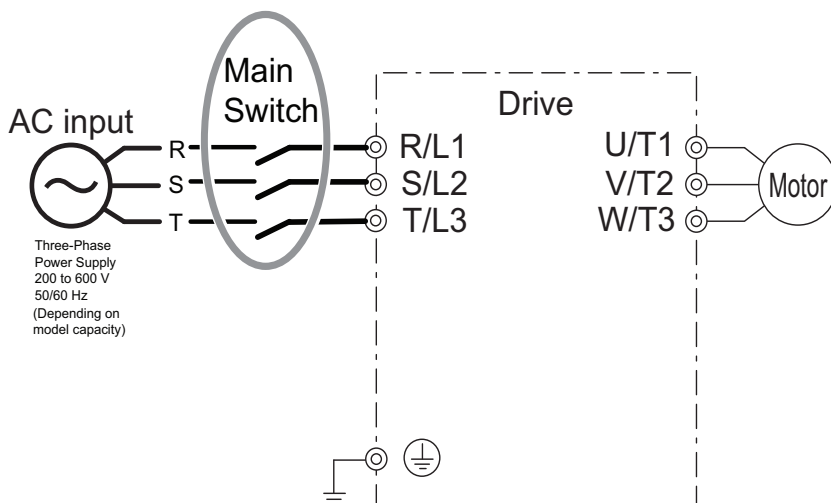


Figure 3 Deenergize All Power

2. DISCHARGE PROCEDURE 1: Verify safe voltage levels: After waiting for at least 10 minutes, using protective equipment recommended in [Table 3](#) and a calibrated multimeter, check to ensure voltages are reduced to less than **50 Vdc on bus capacitors** and **0 Vac on 4PCB TB1**. Refer to [Figure 4](#) for test points on the Power Supply Unit.

2.a. Verify the drive's main DC bus is below a safe voltage of 50 Vdc. The main DC bus voltages can be measured across the (+) and (-) terminals on the converter and inverter modules.

2.b. Check Test Point (A) on TB1 between r/11 and s200 for **0 Vac**, and between r/11 and s400 for **0 Vac**. See [Figure 4](#). Then proceed to **Step 2.c**.

If Test Point (A) is not at **0 Vac** then recheck that all main power and external power sources are disconnected from the drive.

2.c. Check Test Point (B) and then (C) on Power Supply Unit capacitors between (+) and (-) screw terminals respectively for less than **50 Vdc**. See [Figure 4](#).

If Test Points (B) or (C) are not at a safe level of **50 Vdc** or less then recheck again after **waiting 10 minutes**. If voltage is still not less than 50 Vdc, proceed to **Step 5**.

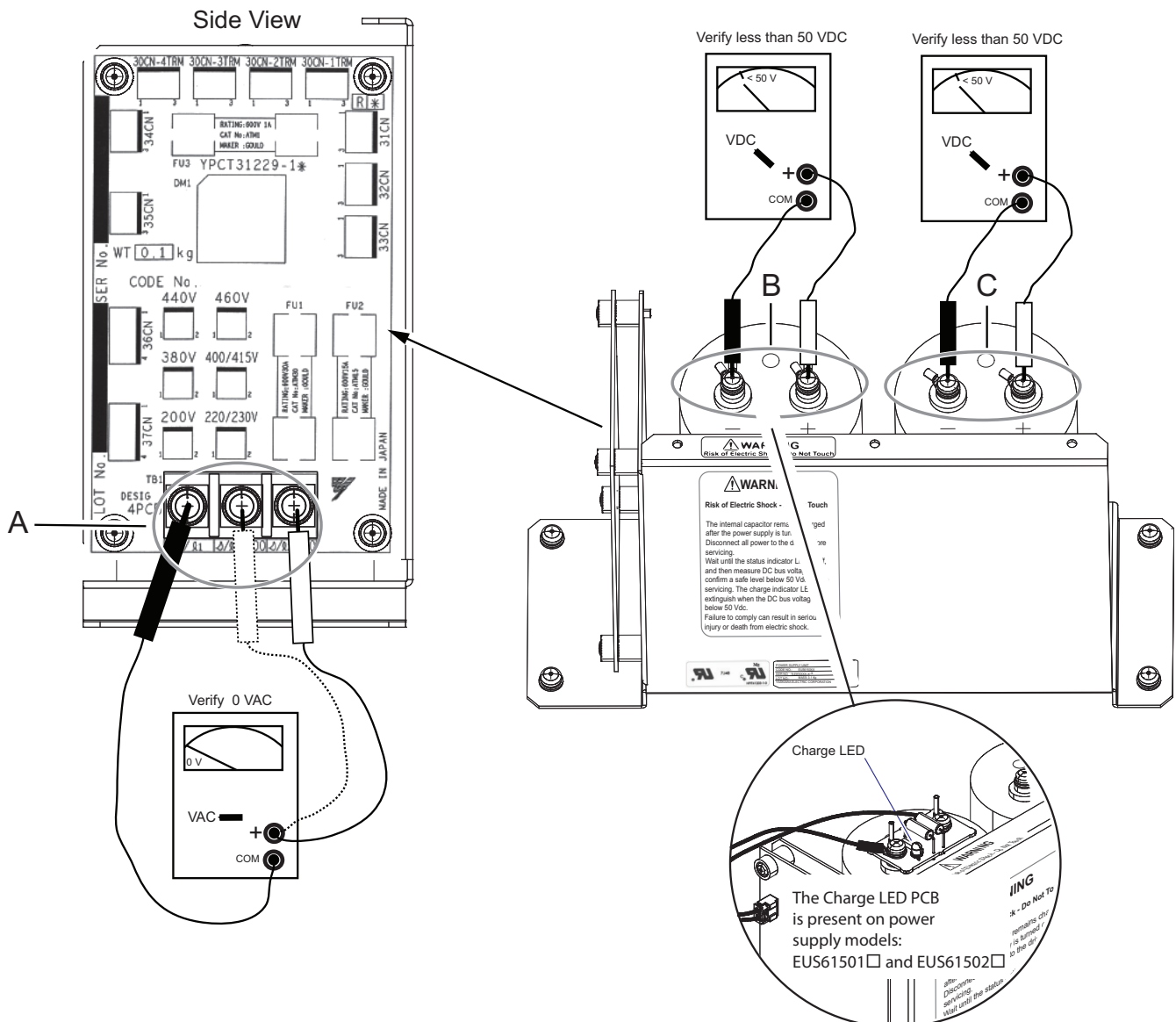


Figure 4 Verifying Safe Voltages

3 Safety Procedure

3. After verifying the Power Supply Unit is safe, unplug and disconnect all wire connections and plugs from 4PCB Tap Change Card as shown in **Figure 5**. Use an insulated #2 phillips screwdriver to remove wire connections on terminal TB1.

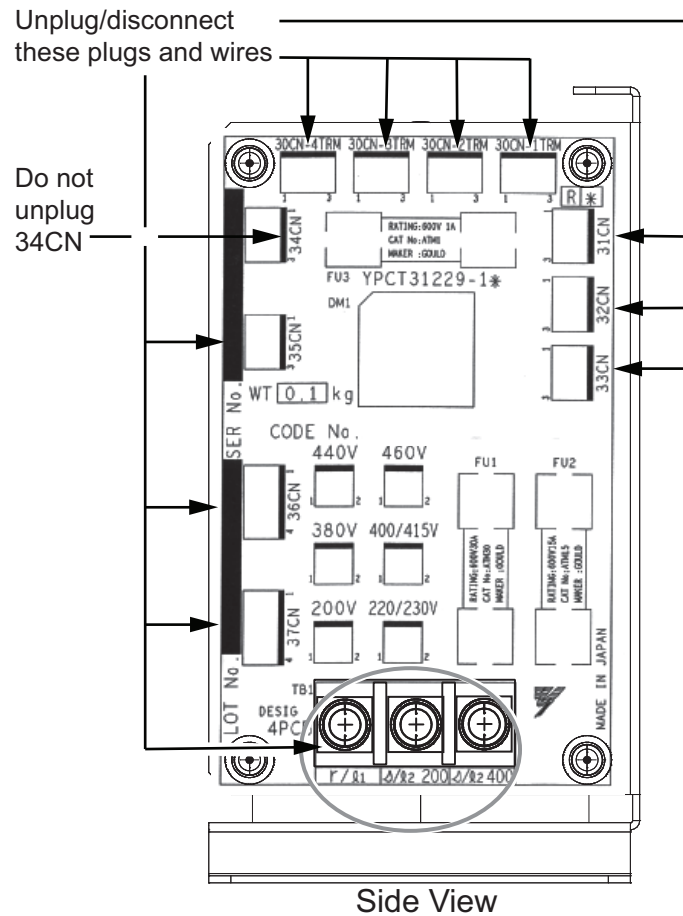


Figure 5 Power Supply Unit Plug and Removal on 4PCB

4. Remove the Power Supply Unit from the drive and install the replacement unit. Ensure all plugs and wires are properly connected prior to applying power to the drive. During removal, take precautions to ensure that nothing touches or comes into contact with the power supply bus capacitor terminals that may still contain low voltages.

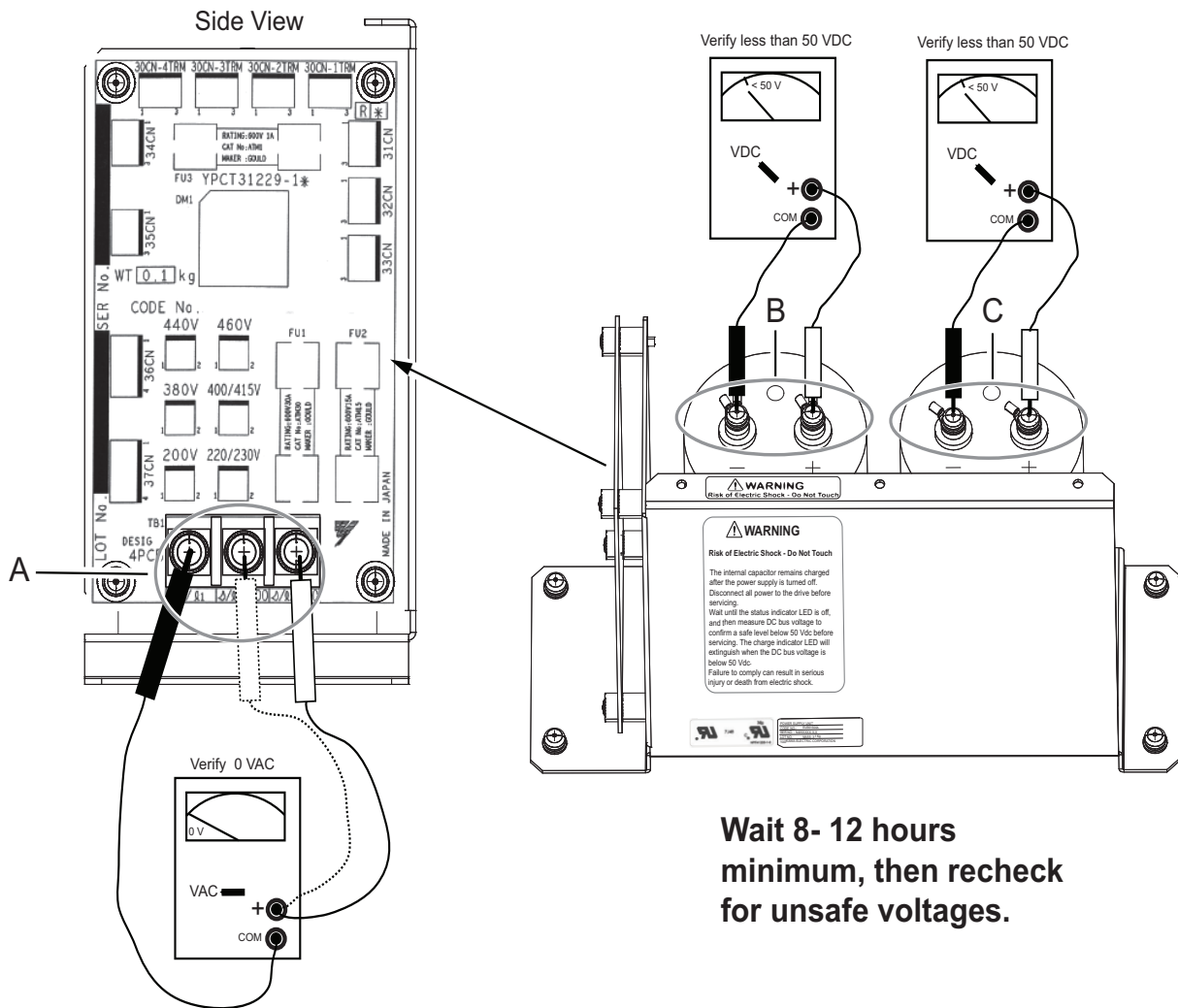
5. DISCHARGE PROCEDURE 2: If hazardous voltages remain greater than 50 Vdc on the power supply bus capacitors after 1 hour, then the Power Supply Unit is defective and may take 8-12 hours or more to discharge.

5.a. Wait overnight or a minimum of 8-12 hours with all power removed from the drive.

5.b. Recheck for hazardous voltages as shown in *Figure 6* test points (A), (B), and (C).

5.c. If voltage is reduced to a safe level of less than **50 Vdc on bus capacitors** and **0 Vac on 4PCB TB1** then remove the Power Supply Unit according to STEPS 3. and 4.

WARNING! Safe voltages must always be verified by use of a calibrated multimeter.



Wait 8- 12 hours minimum, then recheck for unsafe voltages.

Figure 6 Wait 8-12 Hours Then Recheck for Unsafe Voltage

3 Safety Procedure

6. DISCHARGE PROCEDURE 3: Use this procedure only if necessary: If unsafe voltages greater than 50 Vdc are present after 1 hour and waiting 8-12 hours is not possible.

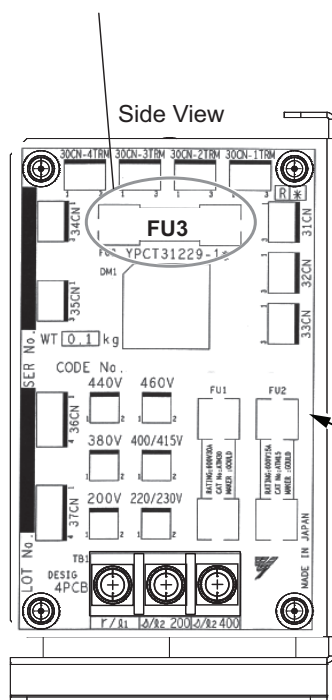
WARNING! Safe voltages must always be verified by use of a calibrated multimeter.

NOTICE: Spark Hazard. A small arc or spark may occur when touching the bleed resistor to the (+) and (-) terminals as shown in Figure 7. This is normal and does not present a hazard in non-combustible environments.

Following steps 6.a to 6.d below use the discharge circuit shown in **Figure 7** to bleed off remaining hazardous voltage to **less than 50 Vdc**. Utilize personal protective equipment as specified in **Table 3**.

- 6.a.** Remove fuse FU3 by use of a fuse puller to electrically isolate the drive from the power supply. See **Figure 7**.
- 6.b.** Connect the bleed resistor across the plus (+) and minus (-) bus capacitor terminals on the Power Supply Unit for 1 minute. Remove the bleed resistor. See **Figure 7**.
- 6.c.** Using a calibrated multimeter, recheck for hazardous voltages. Refer to **Figure 4**. If voltages are at a safe level less than **50 Vdc on bus capacitors and and 0 Vac on 4PCB TB1** then the Power Supply Unit can be safely removed according to **STEP 3**.
- 6.d.** If voltages on bus capacitors are still greater than 50 Vdc, repeat procedure steps 6.b and 6.c until **voltages are less than 50 Vdc**, then remove the Power Supply Unit.

Use fuse puller and remove fuse FU3 before connecting the 2000 ohm bleed resistor.



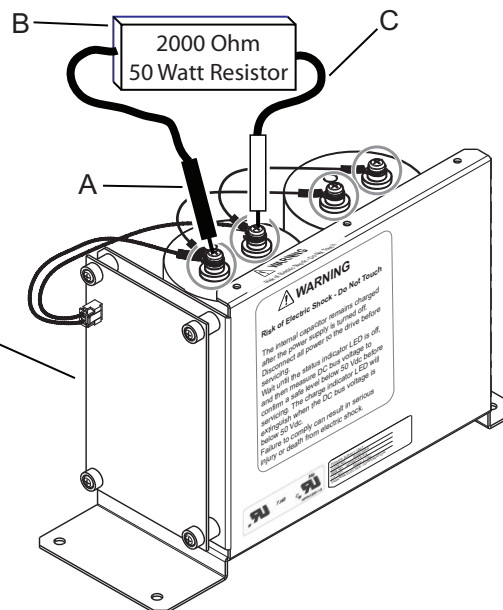
⚠ WARNING

Risk of Electric Shock - Do Not Touch

The internal capacitor remains charged after the power supply is turned off. Disconnect all power to the drive before servicing.

Measure Wait until the status indicator LED is off, and then measure the DC bus voltage to confirm a safe level below 50 Vdc before servicing. The charge indicator LED will extinguish when the DC bus voltage is below 50 Vdc.

Failure to comply can result in death or serious injury from electric shock.



A – Insulated test probes rated 600 Vac minimum

C – 14 ga insulated wire rated 600 Vac minimum

B – Insulated resistor: 2000 ohm 50 W. Resistor manufacturer- Ohmite 270 series power resistor 2.0 kohms 50 W, part number: L50J2K0 or equivalent.

NOTE: Resistor must be insulated. Use electrical tape or heat shrink tubing.

Figure 7 Discharge Procedure 3, Use of a Bleed Resistor

7. END.

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YASKAWA AC Drive - G5 HHP

Power Supply Unit

with Charge LED

Safety Precautions

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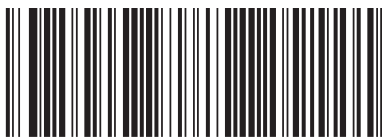
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