



# Benchtop Constant Current Regulator and Portable Field Unit Option

## User Manual

96A0468, Rev. L, 2025/04/24





## A.0 Disclaimer / Standard Warranty

### CE certification

The equipment listed as CE certified means that the product complies with the essential requirements concerning safety and hygiene. The European directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

### ETL certification

The equipment listed as ETL certified means that the product complies with the essential requirements concerning safety and C22.2 No.180:13 (R2018) regulations. The CSA directives that have been taken into consideration in the design are available on written request to ADB SAFEGATE.

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## Note

See your sales order contract for a complete warranty description.

Replaced or repaired equipment under warranty falls into the warranty of the original delivery. No new warranty period is started for these replaced or repaired products.

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## Liability



### WARNING

Use of the equipment in ways other than described in the catalog leaflet and the manual may result in personal injury, death, or property and equipment damage. Use this equipment only as described in the manual.

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- Making changes to equipment that have not been recommended or described in this manual or using parts that are not genuine ADB SAFEGATE replacement parts or accessories.
- Failing to make sure that auxiliary equipment complies with approval agency requirements, local codes, and all applicable safety standards if not in contradiction with the general rules.
- Using materials or auxiliary equipment that are inappropriate or incompatible with your ADB SAFEGATE equipment.
- Allowing unskilled personnel to perform any task on or with the equipment.

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# 1.0 Safety

## Introduction to Safety

This section contains general safety instructions for installing and using ADB SAFEGATE equipment. Some safety instructions may not apply to the equipment in this manual. Task- and equipment-specific warnings are included in other sections of this manual where appropriate.

## 1.1 Safety Messages

### HAZARD Icons used in the manual

For all HAZARD symbols in use, see the Safety section. All symbols must comply with ISO and ANSI standards.

Carefully read and observe all safety instructions in this manual, which alert you to safety hazards and conditions that may result in personal injury, death or property and equipment damage and are accompanied by the symbol shown below.



**WARNING**

Failure to observe a warning may result in personal injury, death or equipment damage.



**DANGER – Risk of electrical shock or ARC FLASH**

Disconnect equipment from line voltage. Failure to observe this warning may result in personal injury, death, or equipment damage. ARC Flash may cause blindness, severe burns or death.



**WARNING – Wear personal protective equipment**

Failure to observe may result in serious injury.



**WARNING – Do not touch**

Failure to observe this warning may result in personal injury, death, or equipment damage.



**CAUTION**

Failure to observe a caution may result in equipment damage.



**ELECTROSTATIC SENSITIVE DEVICES**

This equipment may contain electrostatic devices.

## Qualified Personnel



**Important Information**

The term **qualified personnel** is defined here as individuals who thoroughly understand the equipment and its safe operation, maintenance and repair. Qualified personnel are physically capable of performing the required tasks, familiar with all relevant safety rules and regulations and have been trained to safely install, operate, maintain and repair the equipment. It is the responsibility of the company operating this equipment to ensure that its personnel meet these requirements.

Always use required personal protective equipment (PPE) and follow safe electrical work practice.

### 1.1.1 Introduction to Safety



#### CAUTION

##### Unsafe Equipment Use

This equipment may contain electrostatic devices, hazardous voltages and sharp edges on components

- Read installation instructions in their entirety before starting installation.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Install all electrical connections to local code.
- Use only electrical wire of sufficient gauge and insulation to handle the rated current demand. All wiring must meet local codes.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning prior to returning power to the circuit.

**Failure to follow this instruction can result in serious injury or equipment damage**

### Additional Reference Materials



#### Important Information

- IEC – International Standards and Conformity Assessment for all electrical, electronic and related technologies.
- IEC 60364 – Electrical Installations in Buildings.
- CSA – C22.2 No.180:13 (R2018), series isolating transformers for airport lighting.
- FAA Advisory: AC 150/5340-26 (current edition), Maintenance of Airport Visual Aid Facilities.
- Maintenance personnel must refer to the maintenance procedure described in the ICAO Airport Services Manual, Part 9.
- ANSI/NFPA 79, Electrical Standards for Metalworking Machine Tools.
- National and local electrical codes and standards.

### 1.1.2 Intended Use



#### CAUTION

##### Use this equipment as intended by the manufacturer

This equipment is designed to perform a specific function, do not use this equipment for other purposes

- Using this equipment in ways other than described in this manual may result in personal injury, death or property and equipment damage. Use this equipment only as described in this manual.

**Failure to follow this instruction can result in serious injury or equipment damage**

### 1.1.3 Material Handling Precautions: Storage



#### CAUTION

##### Improper Storage

Store this equipment properly

- If equipment is to be stored prior to installation, it must be protected from the weather and kept free of condensation and dust.

**Failure to follow this instruction can result in equipment damage**

### 1.1.4 Material Handling Precautions: Fasteners



#### DANGER

##### Foreign Object Damage - FOD

This equipment may contain fasteners that may come loose - torque properly.

- Only use fasteners of the same type as the one originally supplied with the equipment.
- Use of incorrect combination of gaskets, bolts and nuts can create severe damages to the product installation and create safety risk .
- You need to know what base the light fixture will be installed in, in order to chose the correct gasket, bolts and nuts.
- Bolt type, length, and torque value are determined by type of base, height of spacers used, and clamp force required in FAA Engineering Brief No 83 (latest revision).
- Due to the risk of bolts vibrating loose, do not use any type of washer with the fixing bolts (such as split lock washers) other than an anti-vibration washer. Anti-vibration washers as defined in FAA EB 83 (latest edition) must be used. For installations other than FAA, use the base can manufacturer's recommendations.
- Always tighten the fasteners to the recommended torque. Use a calibrated torque wrench and apply the recommended adhesive type.
- Obey the instructions of the adhesives necessary for the fasteners.

**Failure to follow these warnings may cause the fasteners to loosen, damage the equipment, potentially to loosen the equipment. This can lead to a highly dangerous situation of FOD, with potential lethal consequences.**



#### Note

To minimize the risk of errors, the ADB SAFEGATE Sales Representative will have information on which gasket goes with which base. This information is also provided in the product Data sheets, the User Manuals and the Spare Part Lists.



#### CAUTION

Use of incorrect combination of gaskets, bolts and nuts can create severe damages to the product installation and create multiple safety risks.

To obtain a safe and watertight installation the O-ring and retaining bolt stated in the document must be used.

You need to know what base the light fixture will be installed in, in order to choose the correct gasket, bolts and nuts.

**Failure to follow these cautions can result in equipment damage or aircraft FOD.**

### 1.1.5 Maintenance Safety



#### **DANGER**

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##### **Electric Shock Hazard**

This equipment may contain electrostatic devices

- Do not operate a system that contains malfunctioning components. If a component malfunctions, turn the system OFF immediately.
- Disconnect and lock out electrical power.
- Allow only qualified personnel to make repairs. Repair or replace the malfunctioning component according to instructions provided in its manual.

**Failure to follow these instructions can result in death or equipment damage**

### 1.1.6 Material Handling Precautions, ESD



#### **CAUTION**

---

##### **Electrostatic Sensitive Devices**

This equipment may contain electrostatic devices

- Protect from electrostatic discharge.
- Electronic modules and components should be touched only when this is unavoidable e.g. soldering, replacement.
- Before touching any component of the cabinet you shall bring your body to the same potential as the cabinet by touching a conductive earthed part of the cabinet.
- Electronic modules or components must not be brought in contact with highly insulating materials such as plastic sheets, synthetic fiber clothing. They must be laid down on conductive surfaces.
- The tip of the soldering iron must be grounded.
- Electronic modules and components must be stored and transported in conductive packing.

**Failure to follow this instruction can result in equipment damage**

### 1.1.7 Arc Flash and Electric Shock Hazard



## DANGER

### Series Circuits have Hazardous Voltages

This equipment produces high voltages to maintain the specified current - Do NOT Disconnect while energized.

- Allow only qualified personnel to perform maintenance, troubleshooting, and repair tasks.
- Only persons who are properly trained and familiar with ADB SAFEGATE equipment are permitted to service this equipment.
- An open airfield current circuit is capable of generating >5000 Vac and may appear OFF to a meter.
- Never unplug a device from a constant current circuit while it is operating; Arc flash may result.
- Disconnect and lock out electrical power.
- Always use safety devices when working on this equipment.
- Follow the recommended maintenance procedures in the product manuals.
- Do not service or adjust any equipment unless another person trained in first aid and CPR is present.
- Connect all disconnected equipment ground cables and wires after servicing equipment. Ground all conductive equipment.
- Use only approved ADB SAFEGATE replacement parts. Using unapproved parts or making unapproved modifications to equipment may void agency approvals and create safety hazards.
- Check the interlock systems periodically to ensure their effectiveness.
- Do not attempt to service electrical equipment if standing water is present. Use caution when servicing electrical equipment in a high-humidity environment.
- Use tools with insulated handles when working with airfield electrical equipment.

**Failure to follow these instructions can result in death or equipment damage**



## 2.0 Introduction

The CFB is a desktop 200 VA ferroresonant CCR used to bench test airfield fixtures. It offers manual control for 5-step (2.8 A – 6.6 A) operation and can be used to test both incandescent and LED fixtures. Its integrated touchscreen provides additional functionality including manual control of output current settings and mode control to provide for automatic cycling through all CCR step settings. The CFB includes a replaceable plug-to-receptacle cord set extension. A portable field-use version of the CFB is available. The field-use version is mounted on a two-wheeled, rugged, water-resistant, carrying case. It can be powered directly using an AC power source or +12V DC vehicle battery with DC/AC inverter (battery cables and inverter supplied separately).



### 2.1 About this manual

The manual shows the information necessary to:

- Setup
- Operate
- Calibrate
- Carry Out Maintenance
- Carry Out Troubleshooting

#### 2.1.1 How to work with the manual

1. Familiarize yourself with the structure and content.
2. Carry out the actions completely and in the given sequence.

## 2.2 Product Introduction

This section describes the ADB Safegate Benchtop constant current regulators.

## 2.3 Benchtop Power Supply

### Uses

- Benchtop 200 VA CCR for bench testing of airfield fixtures
- Portable 200 VA CCR version for field testing of airfield fixtures

## 2.4 Electrical Supply

**Table 1: CFB Power Input and Part Numbers**

Part Number	Frequency	Input Voltage
CFB/0210	60 Hz	120 Vac, +10%, -2.5%
CFB/0220	60 Hz	240 Vac, +10%, -2.5%
CFB/0230	50 Hz	220 Vac, +10%, -2.5%
CFB/0240	50 Hz	240 Vac, +10%, -2.5%
CFB/0250	60 Hz	120 Vac, +10%, -2.5% or +12VDC nominal (12-15 VDC)
CFB/0260	50 Hz	230 Vac, +10%, -2.5% or +12VDC nominal (12-15 VDC)

## 2.5 Remote Control

No external control is used.

## 2.6 Theory of Operation Introduction

Ferroresonant circuitry and a solid-state control system accurately regulate the output current from no load to the full 200VA load.

For more theory of operation see section [Theory of Operation](#).

## 2.7 Environmental Operating Conditions

- Temperature: -40°C to + 55°C (-40°F to +131°F)
- Humidity: 10 to 95%
- Altitude: 0 to 6,600 ft (2,000 m)

## 2.8 Benchtop CCR

See [Figure 1](#). This subsection describes the Benchtop CCR. The Benchtop CCR uses a Control PCB to provide regulator and control functions.

**Figure 1: Benchtop CCR (200 VA at 6.6 A)**



The Benchtop CCRs are designed to:

- Power circuits for testing, troubleshooting or repairing fixtures totaling 200 VA or less.
- Supply three or five precision output current levels (6.6 A maximum) to power airport series lighting products under test.
- Accurately regulate the output current to within  $\pm 1\%$  for standard 3 or 5-step output current levels from no load to full load and with input voltage variations of -2.5% to +10% of nominal.

## 2.9 Theory of Operation

This subsection describes the Benchtop and the Portable Field CCR theory of operation.

### Note

The general theory of operation is the same for both the Benchtop and the Portable Field CCR.

### 2.9.1 Power Circuit

See Figure 2. For the Benchtop CCR, a voltage of 120, 220 or 240 VAC is input into the unit. For the Portable Field CCR, there are two ways to power the unit. 120 VAC, 60 Hz may be directly connected to the Field CCR. Alternatively, +12 VDC may be connected using power from a vehicle battery. +12 VDC is then input into an industrial power inverter that outputs a good quality 120 VAC 60 Hz sine wave. A Ferroresonant network consisting of T1, C1, and the SCRs draw from the input lines. Power from the resonant tank comprised of C1 and part of T1 is sent to the CFB output.

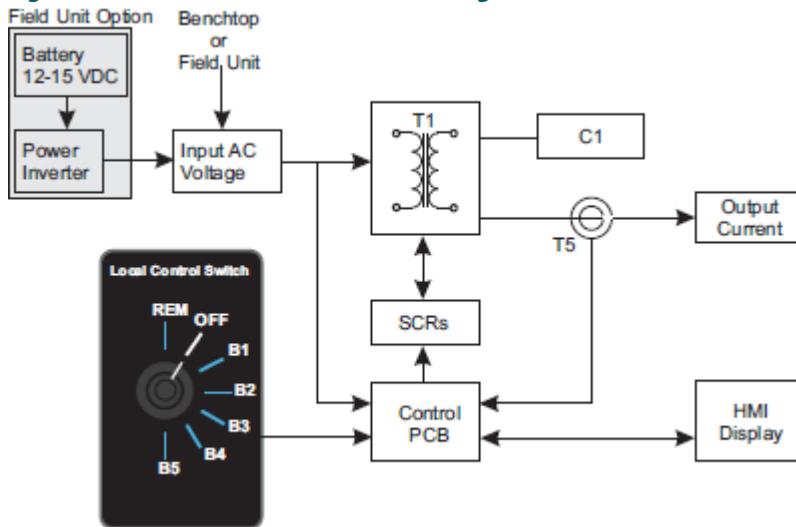
As more power is allowed to flow into the resonant tank, less is available to flow to the output. It is by regulating the current in this tank that the SCRs regulate throughput current to the airfield. The output of the regulator will be the smallest when the SCRs are conducting 100% of the time. This is the opposite of what is seen in simple SCR regulators where the SCRs are used to directly control the output of the regulator.

### 2.9.2 Output Measurement

The output current flows through the current transformer T5. T5 provides feedback to the Control PCB indicating the actual current output to the airfield series circuit. The Control PCB then interacts with the SCRs to adjust the output current to ensure it matches the requested current level.

The Human Machine Interface (HMI) on the front of the unit displays output current.

Figure 2: CFB CCR Power Circuit Block Diagram



### 2.9.3 Control PCB

This subsection describes the board level circuitry found on the Control PCB.

See Figure 13. The CFB Control PC board is designed to provide all regulator and control functions. This is accomplished with a microcontroller and interface circuitry contained on a single printed circuit board. The control PCB is physically the same PCB as used on the Ferroresonant L-828/L-829 CSF style manufactured by ADB Airfield Solutions. However, the firmware is unique to the Benchtop and Field CCR and has its own part number (44A7293/CFB).

## 2.9.4 Control PCB Inputs/Outputs

The Control PCB receives the inputs listed below. See [Figure 13](#) and [Wiring Diagrams, Figure 16](#) through [Figure 18](#).

- Local control signals from the front panel rotary switch and Touchscreen Panel.
- A current proportional to the output current from current transformer T5.
- Phase angle reference voltage derived from the input voltage.
- 24 VAC center tapped supply voltage from T4.
- 24VDC from the DC power supply.

The Control PCB provides the outputs listed below.

- A contact to activate input power relay (RELAY 1).
- Gate drive signals to the SCR block used to regulate the output current.

**Table 2: Output Current Levels (5-Step/6.6 A)**

Rotary Switch or in REM, Display set to ...	The result is...
B1	2.8 A current output
B2	3.4 A current output
B3	4.1 A current output
B4	5.2 A current output
B5	6.6 A current output

## 2.9.5 Power Relay Drive

The power relay drive circuit on the Control PCB pulls in the main power relay (RELAY 1) by shorting points J4-1 to J4-3. This connects the input voltage at J4-3 to the coil of the relay.

## 2.9.6 Fault Protection

This subsection describes CCR fault protection.

### Overcurrent Protection

The microcontroller on the Control PCB detects an over current condition by checking to see if the output current exceeds 105% of the full current (6.6 A). If the output current exceeds this value, the controller will shut the CFB down by removing drive to the coil of the input power relay. This power relay will remain de-energized until the Control PCB is reset either by selecting the OFF position or by cycling the input power off for a minimum of 2 seconds and then back on. The Control PCB will not recognize momentary over currents caused by load switching or other transient conditions.

### Open Circuit Protection

The microcontroller detects an open circuit by the absence of current in the regulator output. If the output current is less than 1.5 amps, the Control PCB will shut the CCR down within one second by removing drive to the input power relay. This power relay will remain de-energized until the Control PCB is reset either by selecting the OFF position or by cycling the input power off for a minimum of 2 seconds and then back on.

## 2.10 Benchtop CCR Required Equipment

Refer to [Table 3](#) for required equipment that is supplied.

Refer to [Table 4](#) for required equipment that is not supplied.

**Table 3: Required Equipment Supplied**

Description	Quantity
CFB benchtop constant current regulator See: <a href="#">Table 1</a> for available Benchtop CCR part numbers.	1 per CCR
CCR output, secondary cordset, 16/2 SOW 600V Benchtop CCR (6 ft): 73A0109/6/US Portable field CCR (8 ft): 73A0109/8/US	1 per CCR
AC input power cord 120V CCR: 18/2 SOW 10A/125V (6ft) 73A0184 220-240V CCR: 3 x 1,0 mm 250V 10A; IEC884/CEE7-VII (6 ft) 73A0187 and UK BS1363A (6 ft) 73A0188	120V CCR (Qty 1); 220-240V CCR (Qty 1 each)
Instruction manual	1 per CCR

**Table 4: Required Equipment Not Supplied**

Description	Quantity
Shorting jumper wire, AWG 16 minimum, 600 V (standard L-824, AWG 6 wire also acceptable)	As required
Ground wire, 6 AWG and clip/connector to connect the Portable Field CCR to an Earth ground when using the Voltage Inverter powered by a vehicle battery.	As required
DC/AC inverter (for portable field CCRs only). 120V/60hz: 105A1117, 230V/50hz: EB00481-000-01.	As required
Battery cable assembly to connect the portable field CCR to a +12V vehicle battery. 44A7519	As required

## 2.11 Specifications

This subsection provides specifications for Benchtop CCR (6.6 A). [Table 5](#): Output Current Ratings

**Table 5: Output Current Ratings**

CCR Max Output Current	Brightness Steps	Nominal Output Current	Power Rating
6.6 A	5	2.8 A, 3.4 A, 4.1 A, 5.2 A, 6.6 A	200VA

### Note

Output current can also be manually set to any value from 2.8 to 6.6 A, including 3-step levels of 4.8 A, 5.5 A, and 6.6 A.

### 2.11.1 Environmental Operating Conditions

The Benchtop CCR is designed for indoor use only in an area with adequate ventilation for cooling the constant current regulator. The environmental operating conditions include temperature range, relative humidity, and altitude as shown in .

The Portable Field CCR may be used in any DRY well ventilated area. It operates the same as the Benchtop CCR. When used outdoors with the lid open, the unit is rated IP20/NEMA 1. This means the unit should be protected from water ingress/rain when it is being used.

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There is a ground connection provided on the Portable Field CCR. The cable used should be a minimum of 6 AWG and is supplied by the user/operator.



## 3.0 Installation



### WARNING

Read installation instructions in their entirety before starting installation.

- Refer to the FAA Advisory Circular AC 150/5340-26, Maintenance of Airport Visual Aids Facilities, for instructions on safety precautions.
- Observe all safety regulations. To avoid injuries, always disconnect power before making any wiring connections or touching any parts.
- Become familiar with the general safety instructions in this section of the manual before installing, operating, maintaining or repairing this equipment.
- Read and carefully follow the instructions throughout this manual for performing specific tasks and working with specific equipment.
- Make this manual available to personnel installing, operating, maintaining or repairing this equipment.
- Follow all applicable safety procedures required by your company, industry standards and government or other regulatory agencies.
- Control PCB is static-sensitive. Must be grounded when handling PCB.
- Route electrical wiring along a protected path. Make sure they will not be damaged by moving equipment.
- Protect components from damage, wear, and harsh environment conditions.
- Allow ample room for maintenance, panel accessibility, and cover removal.
- Protect equipment with safety devices as specified by applicable safety regulations.
- If safety devices must be removed for installation, install them immediately after the work is completed and check them for proper functioning prior to returning power to the circuit.

This section provides instructions for installing Benchtop constant current regulators (CCRs). Refer to the airport project plans and specifications for the specific installation instructions.

### 3.1 Unpacking

The equipment is shipped ready for installation. Handle equipment very carefully to prevent component damage. Unpack the carton upon receipt and check the contents and their condition. Note any exterior damage to the carton that might lead to detection of equipment damage.

If you note any damage to any equipment, file a claim with the carrier immediately.

The carrier may need to inspect the equipment.

### 3.2 Benchtop CCR Installation



### WARNING

Read installation instructions in their entirety before starting installation.

Place the regulator inside a well ventilated room on a bench or desk with sufficient clearance for personnel to inspect and maintain the unit.

Plug into a wall socket with a 15A circuit breaker for protection. Insure that the incoming voltage is within -2.5% to +10% of the nominal voltage as shown in .

**i Note**

50 Hz units are supplied with a Euro-style or UK-style plug. Replace the plug with a locally supplied 10A, 250 V power cord if a different type plug is required.



### 3.2.1 Connecting the Field CCR to a Vehicle Battery

**i Note**

These instructions are applicable to the portable field CCR only. DC to AC inverter and battery cables sold separately.



**CAUTION**

- The power inverter must be OFF when connecting the battery leads.
- Do not connect the power inverter to a battery with the Field CCR power circuit breaker ON.
- When connecting to the battery source, insure proper polarity connections. A reverse polarity may blow the internal thermal fuse in the power inverter. If this happens disconnect the unit and wait 1 minutes to reconnect properly.

Failure to observe these cautions may result in equipment damage.

1. Turn off the rotary switch, turn off the power circuit breaker to the Field CCR and turn off the Power Inverter. See [Figure 3](#).

**Figure 3: Circuit Breaker (Power ON) switch and Power Indicators**



Input Power Connected and Available (Green illuminated)

Output Active and Connected (Yellow illuminated)

---

### Circuit Breaker Shown in the ON position

- Immediately turn off the Field CCR if the FAULT LED is illuminated. Allow the inverter to cool before continuing. Make sure that the ventilation vents are not blocked.
- If an inverter shutdown was preceded by a buzzing sound, there may be an excessive load in combination with a low voltage or cable problem.

Audible Alarm (internal) — If an audible alarm makes a buzzing sound, the inverter may be sensing a low battery condition. The user should either reduce the AC load, charge the vehicle battery, or check the DC cable for excessive losses.

2. Connect the AC input power cord from the Field CCR to the power inverter.
- 



#### Note

You may connect the Field CCR directly to a VAC outlet via the power cord (stored separately in the lid), thus bypassing the power inverter and steps 3, through 7.

---

3. Connect an insulated copper wire to the ground terminal.

Connect the front panel Earth ground lug to a proper grounding point. The power inverter is connected to the front panel ground lug at manufacturing. Use the shortest practical length of wire. Connect this wire to the chassis of your vehicle or to a known good local Earth ground. In the unlikely event of a short circuit, operating the inverter without proper grounding can result in electric shock.

---



#### Note

Do not directly connect this ground wire to the negative DC terminal.

---

### Front Panel Earth Ground Lug



Light connected, power inverter ON, Field CCB circuit breaker ON and rotary switch OFF.

4. Connect the battery leads to the power inverter 12 VDC coupling.
  5. While observing the polarity coloring of the leads, connect the positive (red) lead to the positive battery post.
  6. Connect the negative (black) lead to the negative battery post.
- 



#### Note

A reverse polarity may blow the internal thermal fuse in the power inverter. If this occurs, wait 1 minute prior to reconnecting.

---



Power Inverter 12 VDC Coupling.

7. Place the inverter ON/OFF power switch in the "ON" position.  
The green "Power LED" should turn on, indicating the inverter is powered and operating normally.

Rotary switch in the 5 step position.



8. Connect the airfield light to test.
9. Turn on the power circuit breaker to the Field CCR.  
On the power inverter, the Green "Power LED" should be lit and the Red "Fault LED" (on the inverter) should be OFF.
10. Turn the Field CCR to the desired current step.

**Note**

If the power inverter emits an audible tone at turn ON, the input voltage may be too low. See the troubleshooting section.

---

11. Before switching to the next fixture, if further testing is to be accomplished, turn off the Field CCR.

Do not disconnect a light or load with the Field CCR in operation.

---

**CAUTION**

- Turn the step selector rotary switch to OFF and the power circuit breaker to the Field CCR to OFF prior to disconnecting any load or light under test.
- When the inverter is not in use, place the inverter's ON/OFF Power Switch to the OFF position.

Failure to observe these cautions may result in equipment damage.

---



## 4.0 Operation



### WARNING

Read the instructions in their entirety before starting installation.

### 4.1 Introduction

This section provides the operational procedures listed below for the Benchtop CCR and the Portable Field CCR.

- CCR operation
- CCR shutdown procedures
- CCR adjustment procedures

### 4.2 CCR Control Procedures

This subsection describes the regulator operations in local.

Plug the 2-conductor, 6-foot (1.8m) extension cord (part number 73A0109/6) between the Benchtop CCR and the unit under test. Use of the cord allows for easy replacement after receptacle contacts get worn from repeated use. An 8-foot (2.4m) cord (part number 73A0109/8) is available for purchase separately.

**Figure 4: Circuit Breaker (Power ON) switch and Power Indicators**



Input Power Connected and Available (Green illuminated)

Output Active and Connected (Yellow illuminated)

Circuit Breaker Shown in the ON position

#### 4.2.1 Remote/Local Control

See [Figure 5](#). The front panel rotary selector switch is used for 5-step regulator local control. The rotary switch for the 5-step has seven positions. The regulator automatically maintains the output current within  $\pm 1\%$  of the nominal value for the brightness position selected.



### Attention

3-step settings can be set in REM using the touchscreen. See [Main Screen](#) section. Touch the Current field. When the appears, the 3 Step field will be on the right.

**Figure 5: Switch (5-Step)**



**Table 6: Output Current from Rotary Switch (5-Step/6.6 A)**

If you set the rotary switch to the following...	The result is...
B1	2.8 A current output
B2	3.4 A current output
B3	4.1 A current output
B4	5.2 A current output
B5	6.6 A current output

## 4.2.2 Main Screen



From this screen you can view the current, VA, and CCR output voltage and watch the values in real time.

You can also view the firmware version of the CCR.

The user is able to select the step of the CCR or turn it off.

If alarms are active there is scrolling text on the top of the screen with the alarm name.

### 4.2.2.1 About Screen

You can navigate to the about screen by touching the firmware version (upper left corner) on the main screen.

This screen shows the version of the firmware on the desktop CCR as well as the version of software the panel is running.

#### 4.2.2.2 Panel Control

**Figure 6: Circuit Breaker - ON with the Rotary Switch - OFF**



Manually select the desired output by setting the rotary switch to B1 through B5.

**Figure 7: Circuit Breaker - ON with the Rotary Switch - Remote**

**Step Indicators:**

There are five step indicators in 5-step mode.

They become solid green from left to right to indicate which step is selected.



- Select OFF, Step 1 through Step 5, Test and Alarms.
- While the Local Control Switch is in REM, this screen can be reached from any screen by pressing the green box step indicators in the upper right corner of the display.
- Here the user can select the desired step as well as view the max steps on this CCR. There are five green step indicators in the upper right to indicate the actual CCR step. They indicate which step is selected by turning solid green. The green step indicator boxes are not used for 3-step operation.
- Pressing the left arrow (left side of the screen) will return the user to the previous page. This allows you to change the step from any screen in the display and quickly return to the previous screen.



**Note**

Touch the current display and the Current Adjust Screen will be displayed.  
See section [Current Adjust Screen](#).

### 4.2.2.3 Current Adjust Screen

The actual current values will be most accurate at the normal output current settings of a standard L-828 CCR.

5-step:

Step 1 is 2800mA

Step 2 is 3400mA

Step 3 is 4100mA

Step 4 is 5200mA

Step 5 is 6600mA

3-Step

Step B10 is 4800mA

Step B30 is 5500mA

Step B100 is 6600mA

Tolerances for the above are +/- 50 mA.

Tolerance is +/- 130 mA for current settings other than the normal L-828 CCR output current settings. If needed, use the manual adjustments to reach the desired current level.

---



#### Note

3-step operation may be selected from this screen. The right side of this screen is independent from the current adjustment feature

---

Pressing the "Current" section of the main screen will take you to the Current Adjust Screen.

Here a user can see the requested current as well as the actual current which will vary.

The up and down arrows will increment the current by 10 mA. Range is 2500 mA - 7000 mA.

Pressing the "Requested Current" area will pop open a number pad if the user wants to set a specific value.

There are also 3 presets (B10, B30, B100) which set the current to 4800 mA (4.8 A), 5500 mA (5.5 A) or, 6600 mA (6.6 A) respectively.

---



#### Note

Touch the presets portion of the display and the Step Adjust Screen will be displayed. See section [Step Adjustment Screen](#).

---



#### Note

Adjustments made from this screen are temporary. For testing purposes only. Calibration is done using the CCR Control Board. See section [Output Current Adjustment \(Part 1\)](#).

---

#### 4.2.2.4 Step Adjustment Screen

Requested Step may be adjusted from 1 through 5.



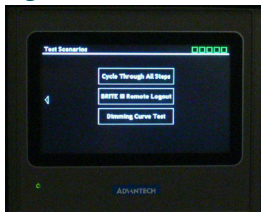
You may adjust the Requested Step field and use the arrow keys to select the desired 5-step current steps to apply to the output.

#### 4.2.2.5 Test Scenarios Screen

The test home screen is reached by pressing the "Tests" button on the main screen.

Here the user can view all available tests on this unit.

**Figure 8: Test Scenarios**



- Cycle Through All Steps,
- Remote Logout,
- Dimming Curve Test.

#### Cycle Through All Steps

From the "Cycle Through All Steps" screen, the user can view the real time values of current and voltage.



#### Note

The "Use Second Cordset" check-box is for future use. Only select the "Continuous Loop" check-box.

If the user presses the "Start" button the test will commence. It starts with the CCR at Step 1 and waits 6 seconds before incrementing the step to the next value. After the test is complete, the CCR will be set to Step 0.

The "Continuous Loop" check box will cause the test to run continuously until the test is stopped.

The test can be stopped by navigating away from the page or pressing the "Running..." button.

This scenario can be used to test a new or repaired fixture to make sure it is able to work at all steps or to burn-in a fixture in "Continuous Loop" mode.

### Remote Logout

Figure 9: Test Remote Logout Screen



This screen can be reached by pressing the "Remote Logout" screen on the "Test Scenarios" screen. A separate box is used to connect the CCR to the Remote. Contact the ADB Sales Department for further details.

The user can view the real time values of current and voltage.

Pressing the "Start" button will begin the test which runs the logout sequence for the remotes.

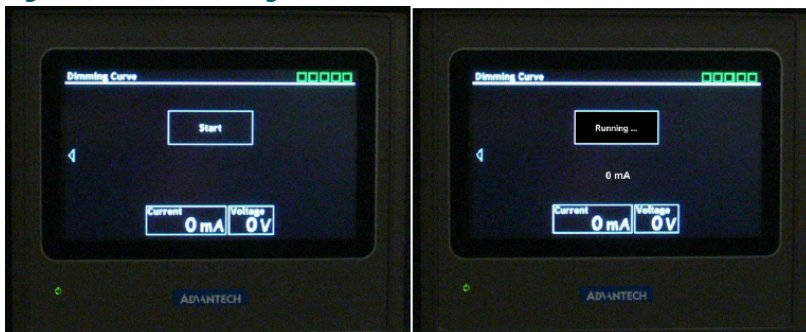
When the test is running the user will see a status message indicating the current phase of the logout sequence.

The test can be stopped by navigating away from the page or pressing the "Running..." button.

This scenario can be used to log off one or more remotes without needing to manually go through the sequence using a full size CCR.

### Dimming Curve Test

Figure 10: Test Dimming Curve Screen



This screen can be reached by pressing the "Dimming Curve Test" button on the "Test Scenarios" screen. This follows the dimming curve detailed in FAA Engineering Brief 67D.

The user can view the real time values of current and voltage.

---

This test sets the current to 2700 mA (2.7 A) and slowly increments it by 10 mA (0.1 A) every 15 seconds up to 6600 mA (6.6 A).

When the test is running the user will see a status message indicating the requested current from the test.

When the test is complete the CCR is set to step 0 or OFF.

The test can be stopped by navigating away from the page or pressing the "Running..." button.

This scenario can be used for photometric testing of a fixture or to make sure a fixture will perform at a wide range of current values.

#### 4.2.2.6 Alarms & Errors screen

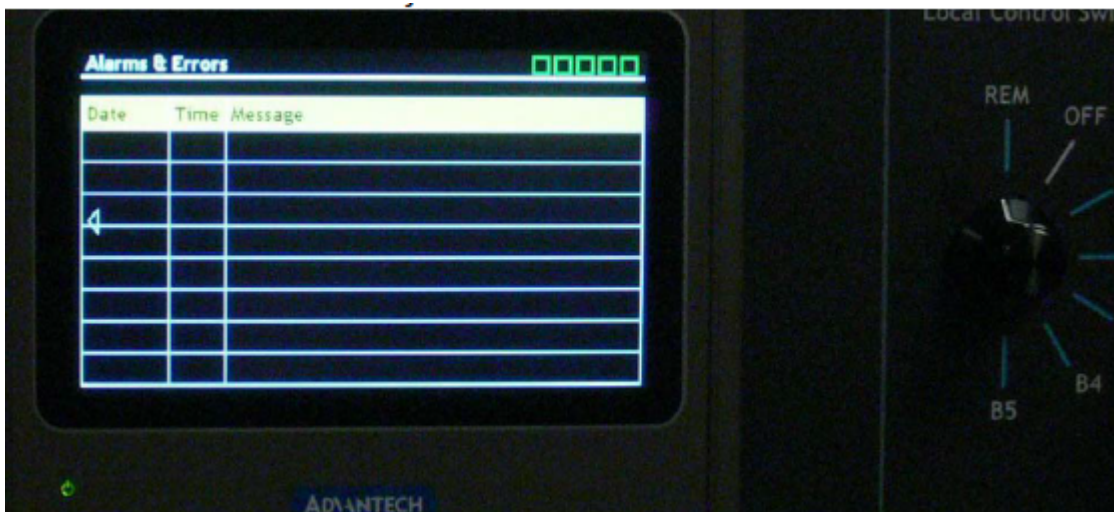


Pressing the alarms & errors button on the main screen will take you to the Alarms & Errors screen.

This screen shows current active alarms along with the date and time they occurred.

Select the "Alarm & Errors" function to see any errors in the log.

**Figure 11: Circuit Breaker - ON with the Rotary Switch - B1 <Alarm> screen**



#### Alarms:

Over Current Shutdown (OVC) - This alarm is produced when an over current event occurs and the Benchtop CCR output shuts down.

Open Circuit Shutdown (OVV) - This alarm is produced when an open circuit event occurs and the Benchtop CCR output shuts down.

Overload - This alarm is produced when an overload event occurs and the Benchtop CCR output shuts down.

Communication Lost To Host - This alarm is shown when the panel can't talk to the Control board inside the Benchtop CCR. This likely means that the microprocessor has stopped working on the Control board.

**Note**

To return to the main screen touch the back arrow on the left side of the screen.

---

### 4.3 Shutdown Procedure

See [Figure 5](#). To shut down the CFB, set the rotary switch to position OFF and then turn OFF the front panel circuit breaker.

To remove input power, disengage disconnect switch or external power.

## 4.4 Adjustment Procedures (Benchtop ONLY)

This subsection provides adjustment procedures for the Benchtop CCR ONLY.

---



### Note

The CFB has been adjusted at the factory to provide the nominal output current levels. If the current level settings need to be adjusted, read the following warning statement before proceeding.

---



### WARNING

Read the instructions in their entirety before starting calibration.

Only personnel qualified to work on high voltage systems should attempt to make any adjustments on the constant current regulator.

Turn the rotary selector switch on the front panel of the regulator to position OFF. Remove input power before servicing control circuitry.

---



### CAUTION

Do Not Attempt to calibrate the CCR using the remote (REM) position or by using the [Current Adjust Screen](#). Doing so will result in an incorrect actual reading on the display.

---

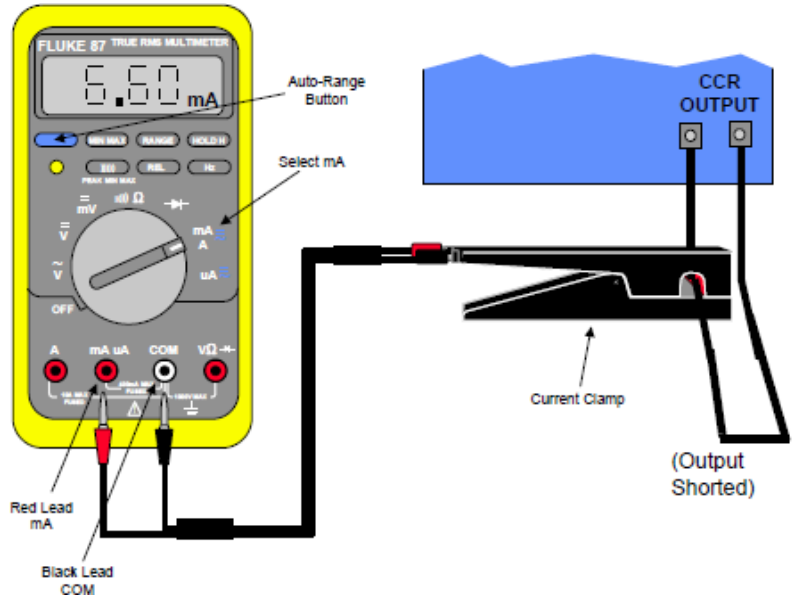
### 4.4.1 Output Current Adjustment (Part 1)

To adjust the output current, perform the following procedure:

1. Turn OFF all incoming power.
2. Access the internal Control PCB.
3. Benchtop CCR: remove the top cover.
4. Field CCR: contact your ADB representative to set up return shipment for adjustments.
5. Short the output with a shorting device.  
This is typically done using a L-823 secondary connector kit with an attached loop of wire.
6. Turn on the power switch or circuit breaker.
7. Connect a clamp-on true rms-reading instrument (such as a Fluke 87 multimeter with a current clamp) around one of the output current leads.

See Figure 12.

**Figure 12: Output Current Clamp**



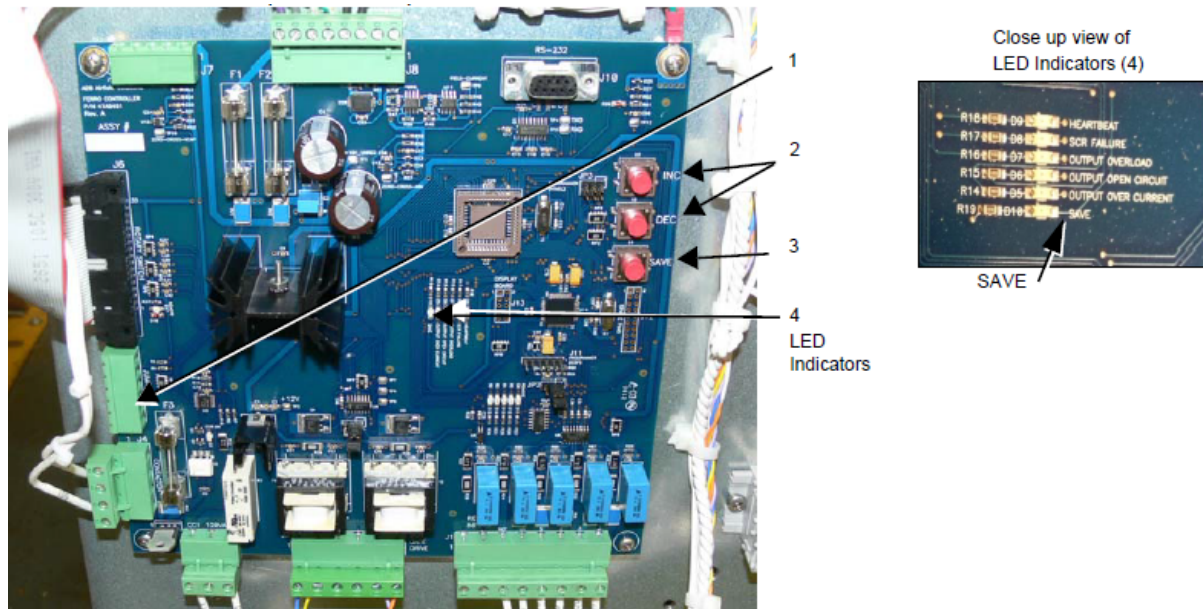
**Note**

Make sure the meter is set on the AC current scale.

Because the output current waveform is not a true sine wave, the ammeter must be of the true-rms (root mean squared) type. Field instruments such as clamp-on ammeters will give erroneous readings.

**4.4.2 Output Current Adjustment (Part 2)**

**Figure 13: Control PCB (44A7293/CFB)**



To adjust the output current of Regulator Control Board, perform the following procedure:

1. Turn on the CCR and set the local control switch to the highest intensity step, B5.
2. The external True-RMS ammeter should read  $6.60 \pm 0.1$  amps.

If the reading is outside of this range, adjust the output current with buttons INC and DEC ( [Figure 13](#), Item 2) on the Control PCB until the correct current is obtained. Press and hold the SAVE button ( [Figure 13](#), Item 3) for two seconds to save the setting.

3. Turn off the CCR by setting the local control switch to the OFF position and then turning the CCR OFF using the circuit breaker on the front panel.

Remove the short from the output and apply a load.

4. Again, turn on the CCR and set the local control switch to the highest intensity step, B5 for 5-step CCR.

5. The external True-RMS ammeter should read  $6.60 \pm 0.1$  amps.

If the reading is outside of this range, adjust the output current with buttons INC and DEC ( [Figure 13](#), Item 2) on the Control PCB until the correct current is obtained. Press and hold the SAVE button ( [Figure 13](#), Item 3) for two seconds to save the setting.



### Note

Each CCR output current step is independently adjustable and must be independently saved.

6. Set the local switch to the next lowest brightness step (Step B4), and verify that the True-RMS ammeter reading corresponds to specifications.

See [Table 7](#).

7. If the reading is not in the current value range given in [Table 7](#), adjust the appropriate step until the correct current value is obtained.

8. Repeat Step 7 and 8 for the remaining lower brightness step(s).

When the output current adjustment has been completed, turn off the CCR, reassemble the CFB, and remove the output shorting plug.

## 4.4.3 Adjusting Overcurrent Control Board

### Adjusting the CFB over current detection level

Before adjusting the Overcurrent Detection level, set up the regulator and adjust the output current per the previous section.



### Note

The Over Current setting is pre-set and should normally not need adjusted.

To adjust the over-current, perform the following procedure:

1. Short the output of the CFB during the adjustment.
2. Turn the local switch to the highest brightness step, B5 for 5-step CCR.

The true-RMS ammeter should read 6.6 amps.

3. Press and hold for three seconds both the INC and DEC buttons ( [Figure 13](#), Item 2).

The SAVE LED D10 ( [Figure 13](#), Item 4) will light when you are in the Over Current Adjustment Mode.



### Note

The CCR output current will increase to the level previously set as the Over Current level. This will be above 6.6 amps.

4. Press the INC or DEC buttons ( [Figure 13](#), Item 2) until you reach the desired Over Current detection level.

5. Press and hold the SAVE button for two seconds.

The SAVE LED D10 ( [Figure 13](#), Item 4) will go out and the CCR output will go back to the top step setting of 6.6 amps.

6. When the output over-current adjustment has been completed, turn off the CCR, reassemble the CFB, and remove the output shorting plug.

## 5.0 Maintenance and Repair

This section provides maintenance and repair instructions for the Benchtop and Field CCR.



### WARNING

Read the instructions in their entirety before starting installation.

- Only personnel authorized to work on high-voltage equipment should perform maintenance on the regulator.
- Operate regulator under local control (using rotary switch) when performing maintenance tasks on the regulator. This will prevent the regulator from accidentally being turned on and causing serious injury or death. De-energize regulator by turning rotary switch to OFF, and remove input power to regulator by turning off disconnect switch or main circuit breaker before opening top access panel to service regulator.
- If the regulator experiences an overvoltage or an over-current fault, it will enter protective shutdown mode. In this mode, the regulator turns off until either power to the regulator is cycled, or the regulator is turned OFF and then back ON, with the rotary switch.

This section discusses maintenance procedures for the CFB CCR.

### 5.1 Short-Circuit Test



### WARNING

Read the instructions in their entirety before starting installation.

Only personnel authorized to work on high-voltage equipment should perform maintenance on the regulator. Since high open-circuit voltages may result by opening the primary of a series lighting circuit, only personnel authorized to work on high-voltage equipment should be allowed to perform the short-circuit test.

To perform the short-circuit test, perform the following procedure:

1. Turn the rotary switch to OFF and then turn the circuit breaker OFF.  
Remove input power to the CFB (turn off disconnect switch or main circuit breaker).
2. Remove any load present on the output.  
Use AWG 16 or larger wire to short the output connection.
3. Energize the CFB and turn the rotary selector switch to the lowest brightness step (B1) and then to the remaining brightness steps.  
Check the output current on the front panel display for each step.



### Note

The output current should be within the tolerance given below. Any calibrations should be performed with a calibrated true-rms current ammeter.

4. If the output current is not within the limits specified in the table below, check the input supply voltage.  
It should be within  $-2.5\%$  to  $+10\%$  of the nominal input voltage given on the regulator label. Refer to .
5. Turn off disconnect switch or main circuit breaker to remove input power to regulator.

6. Disconnect the shorting jumper and reconnect output cables.
7. Close input-power disconnect switch or main circuit breaker.

**Table 7: Output Current from Rotary Switch**

Step Selection	The result is...	Tolerance Range (A rms)
B1	2.8 A current output	2.7 - 2.9 A
B2	3.4 A current output	3.3 - 3.5 A
B3	4.1 A current output	4.0 - 4.2 A
B4	5.2 A current output	5.1 - 5.3 A
B5	6.6 A current output	6.5 - 6.7 A

---

## 5.2 Open-Circuit Test



### WARNING

Read the instructions in their entirety before starting installation.  
Only personnel authorized to work on high-voltage equipment should perform maintenance on the CFB.

---

To perform the open-circuit test, perform the following procedure:

1. Remove input power to CFB (turn off disconnect switch or main circuit breaker) and turn the rotary switch to OFF.
2. Remove any load from the output terminal.
3. Turn on input power to the CFB.
4. Turn the rotary switch to the lowest brightness position (B1).  
The open-circuit protective device should automatically deenergize the CFB in less than 2 seconds.
5. If CFB operation is satisfactory, turn the rotary switch to OFF, and turn off the disconnect switch or main circuit breaker before reconnecting the load.
6. The open-circuit protective device should reset.
7. After the load has been reconnected, turn on input power to the CFB.
8. Turn the CFB ON again to any step and verify that the CFB is operating normally.

---

## 5.3 Troubleshooting



### WARNING

Read the instructions in their entirety before starting installation.

- Only personnel authorized to work on high-voltage equipment should perform maintenance on the regulator.
  - Allow only qualified personnel to perform the following tasks. Observe and follow the safety instructions in this document and all other related documentation.
  - De-energize regulator by turning the rotary switch to OFF, and remove input power to regulator by turning off disconnect switch or main circuit breaker. Discharge capacitors and ground output terminals bushings by using a grounding rod prior to touching any parts.
  - If the regulator de-energizes, the output circuit could be interrupted by an over-current, open-circuit, or undervoltage condition. Before inspecting the output circuit. Place the front panel rotary selector switch in the OFF position and turn off disconnect switch or main circuit breaker. Without this precaution, a dip in the power line may reset the regulator and turn it on, resulting in an electrical shock hazard.
  - The control board is static-sensitive. The PCB must be grounded when handling.
  - Short the output terminals before switching the regulator on. The wire should be AWG 16 or larger.
-

### 5.3.1 Preliminary Troubleshooting

The following is a check list of initial steps to perform.

- Visually examine all areas of the CCR. Do burnt or loose connections/parts exist?
- Is the input voltage present and within +10 to –2.5% of nominal? In order to operate properly with a full load of 200 VA, the input voltage cannot be too low.
- Check all the fuses.
- Are the wire harness connectors to the control board fully seated?
- Have the PCBs been adjusted in accordance with the instruction manual?
- Can the CCR be re-energized by turning the rotary switch from OFF to Step B1?
- Short the output of the CCR with an AWG 16 wire, and turn on the CCR. If the regulator operates normally, the problem is probably load related.
- If the CCR turns on and then shuts off after a few seconds and the ammeter has a high current reading, the problem is overcurrent. Adjust the output current accordingly. See. If this does not solve the problem, replace the control board and restart the regulator.
- **For the FIELD CCR:** Was the inverter manually turned OFF before connecting to the battery? If so, and there is no power input to the CFB (green indicator “INPUT POWER” above the circuit breaker) is OFF, disconnect the battery, turn off the rotary switch, turn off the power circuit breaker to the Field CCR and turn off the Power Inverter. Reconnect to the battery while observing proper polarity. Turn ON the power inverter.
- If the CCR still fails in over-current, replace the SCR and restart.

### 5.3.2 Troubleshooting Control Board

Figure 14: The Control Board

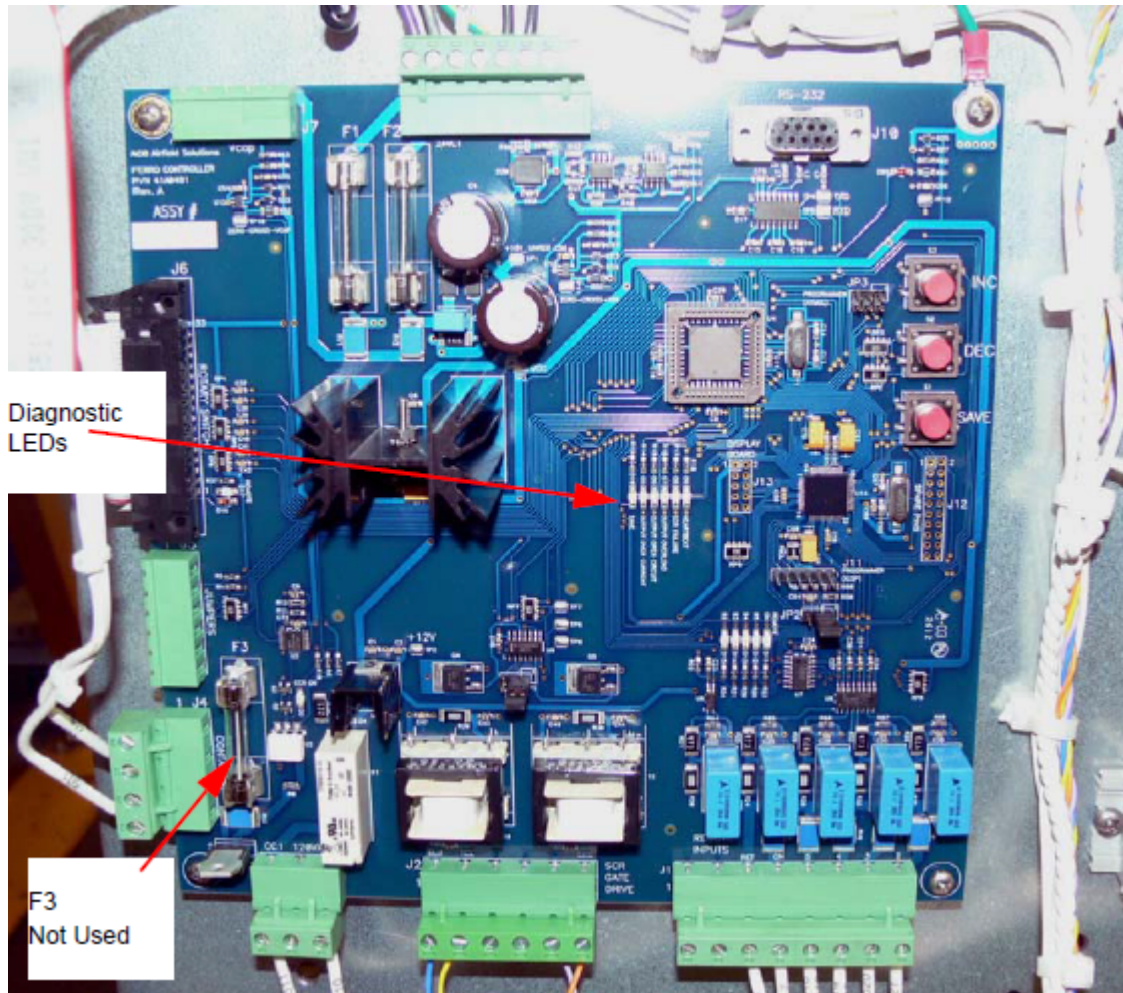


Table 8: Diagnostic LEDs on the Control Board

LED	Indication	Description
D9	Heartbeat	Will flash continuously in normal operation
D8	SCR Failure	Indicates that the SCR has failed
D7	Output Overload	CCR is overloaded
D6	Output Open Circuit	CCR has detected an open circuit
D5	Output Over Current	CCR has detected an over current condition
D10	Save	Indicates the step current has been saved during calibration

### 5.3.3 Troubleshooting Fuses


This subsection provides information for troubleshooting fuses.

### 5.3.4 CFB Fuses

47A0017 - F1/F2 - 1.0A SB (on Control PCB)


47A0232 - F4 - 8A, 250V, Fast, 5x20 mm (input)

47A0004 - F5/F6 - 2A, 250V, 3AG, Fast

 **Note**  
F3 - not used

### 5.3.5 CFB General Troubleshooting

This subsection provides general troubleshooting procedures for the Benchtop and the Field CCR.

 **WARNING**  
Read the instructions in their entirety before starting installation.  
Only personnel authorized to work on high-voltage equipment should perform maintenance on the regulator.  
Operating a regulator for long periods of time while seriously overloaded may cause the regulator to overheat.


**Table 9: CFB Troubleshooting**

Problem	Possible Cause	Corrective Action
1. Regulator not turning on	Main power supply off	Verify presence of input voltage.
	If no input power, check integrated socket fuse F4 Verify CB1 engaged (Green Lamp will be lit) Check for 120Vac at T4 primary (Check fuses F5 and F6 if none) Verify 24VDC is output from DC power supply. Replace PCB if no output. Verify Relay I is commanded On (Yellow Lamp will be lit). Check fuses F1 and F2 on the Control PCB if not. Verify "Contactor On" LED is lit on PCB. Replace PCB if not On. Replace SCR PCB 44A7489/1	Replace any blown fuse. Check the input supply AC voltage and make sure that it is between -2.5% and +10% of the nominal value listed on the CCR nameplate.
	Defective Control PCB	Replace Control PCB.
2. Field Unit Only - There is no power input to the CFB (green indicator "INPUT POWER" above the circuit breaker is OFF.)	Power inverter was ON when the battery was connected.	Disconnect the battery, turn off the rotary switch, turn off the power circuit breaker to the Field CCR and turn OFF the Power Inverter. Reconnect to the battery while observing proper polarity. Turn ON the power inverter.
	Battery was connected to the wrong terminals.	
3. Field Unit Only - Low or No Power Inverter Output Voltage - Power Inverter Fault LED Lit	Poor contact with battery, inverter terminals, or DC socket.	Clean terminals thoroughly. Reinstall and tighten. Clean DC socket with nonmetallic abrasive emery stick.
4. Field Unit Only - Field CCR Inverter Auto Shut Down – Fault LED Lit	Vehicle battery voltage is below 9.5 volts.	Charge or replace battery.
	Inverter is too hot (thermal shut down mode).	<ul style="list-style-type: none"> <li>• Allow inverter to cool.</li> <li>• Check for adequate ventilation.</li> </ul>

**Table 9: CFB Troubleshooting (Continued)**

Problem	Possible Cause	Corrective Action
5. Field Unit Only - Field CCR Continuous Inverter Buzzing Sound	Input voltage is below 10.5 Volts	<ul style="list-style-type: none"> <li>• Keep input voltage above 10.5 Volts.</li> </ul>
	Poor or weak battery condition	<ul style="list-style-type: none"> <li>• Recharge or replace the vehicle battery.</li> </ul>
	Poor or loose cable connections	<ul style="list-style-type: none"> <li>• Inspect terminals and tighten all connections.</li> </ul>
	Inadequate power being delivered to the inverter or excessive voltage drop	<ul style="list-style-type: none"> <li>• Keep cable length as short as possible (use only battery cables supplied with the Field unit)</li> </ul>
6. Regulator turns on but de-energizes suddenly	Open circuit on output.	<p>Apply a short to the regulator output. Turn the regulator on. If the regulator works correctly, repair the lighting load. This may also be caused by a load greater than 200VA.</p> <p>If all that is desired is to illuminate a fixture during troubleshooting, try operating the CCR only in the lowest steps for a load larger than 200 VA.</p>
	CFB trips into an open-circuit condition when connected to an airfield sign.	<p>The load may be too large. For example, constant light output signs, such as FAA L-858 signs, require constant VA power at all intensity steps. This high load may cause the CFB to see a load so large that it looks like an open circuit and shuts down. Use a standard CCR for testing in these cases.</p>
	Defective printed circuit board	Replace Control PCB.
	Over-current condition	<p>Verify that SCR is triggering by replacing the PCB.</p> <ol style="list-style-type: none"> <li>1. Check feedback transformer T5 for damage and proper connections. Polarity does not affect operation. Compare input voltages across J8-4 to J8-3 with expected values. If the voltage at the terminals is correct for the selected step and the output is not correct, and the difference cannot be corrected by calibrating the regulator as specified in <a href="#">Output Current Adjustment (Part 1)</a>.</li> <li>2. Check SCRs and wiring. Replace SCR board.</li> </ol>
7. Output Current always 6.6 A or more	Control PCB not calibrated	<p>Calibrate the CCR as shown in <a href="#">Adjustment Procedures (Benchtop ONLY)</a>. Check remaining steps to verify the values. For the Field CCR, contact the ADB Service Department to have the unit calibrated.</p>
8. More than 2 seconds required for CCR to deenergize on open-circuit load	Faulty open-circuit protection	<p>Replace Control PCB. Afterwards, calibrate the CCR as shown in <a href="#">Adjustment Procedures (Benchtop ONLY)</a>. For the Field CCR, contact the ADB Service Department to have the unit calibrated.</p>

**Table 9: CFB Troubleshooting (Continued)**

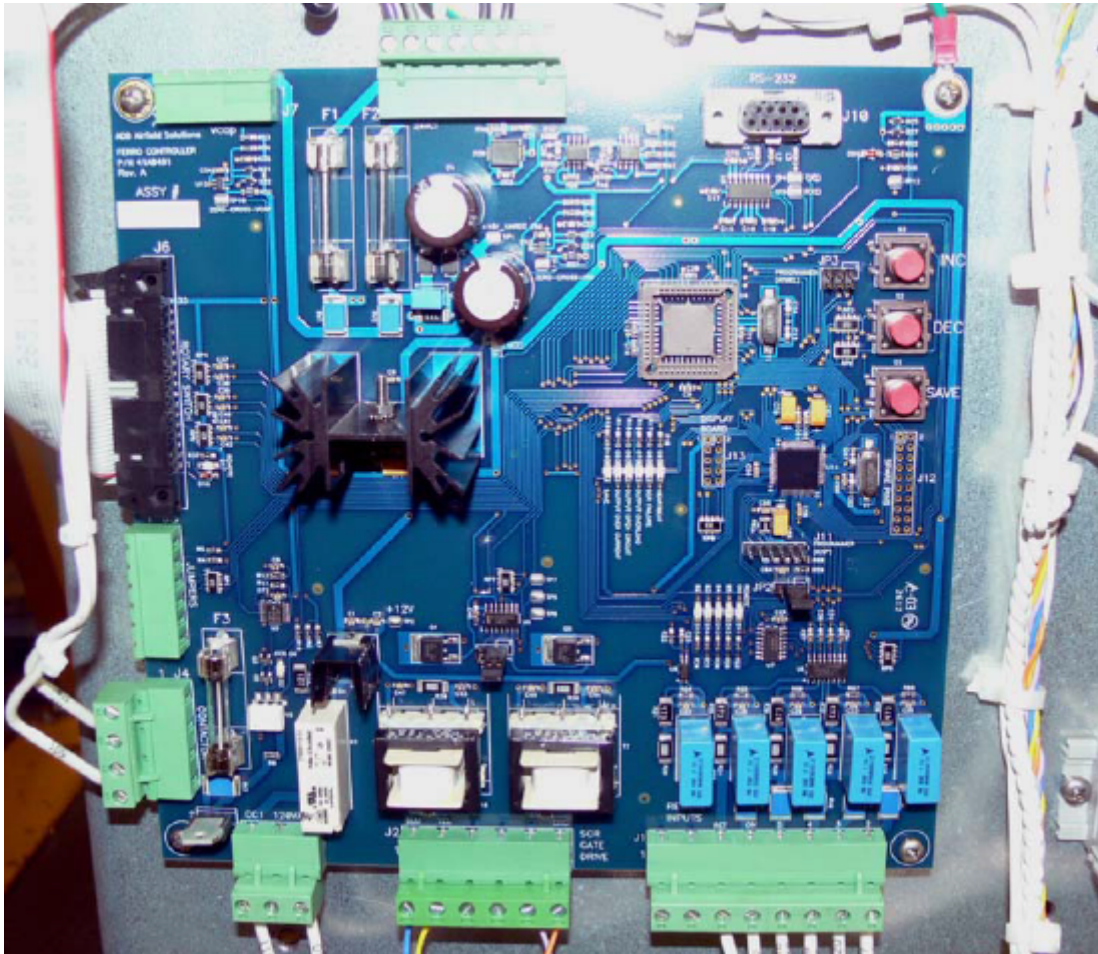
Problem	Possible Cause	Corrective Action
9. Regulator not indicating proper current	Incorrect output current adjustment	(Benchtop CCR ONLY) Refer to <a href="#">Output Current Adjustment (Part 1)</a> . For the Field CCR, contact the ADB Service Department to have the unit calibrated.
	Touchscreen failed	Turn the regulator to the top step (6.6 A). Verify the current with an externally connected true-rms current meter. If proper current is shown on the meter after performing the <a href="#">Output Current Adjustment (Part 1)</a> , replace the touchscreen.
10. Output current not able to be adjusted up to 6.6 A	Regulator load too large	Reduce the load to no more than 200 VA.   <b>Note</b> This problem can also be verified by shorting the output of the CCR and verifying output current can be adjusted correctly in each step.
	Capacitor failed	Check the value of capacitor C1. Replace if necessary.

## 5.4 Component Replacement Procedures

### 5.4.1 Removing and Replacing Control PCB

1. Turn CCR local switch to the OFF position.

**Figure 15: Control PCB**



2. Unplug and remove power cord.
3. Remove the top panel on the Benchtop CCR or the front plate of the Field CCR.
4. Unplug green connectors J8, J2, J4, and J7 from the PCB.
5. Disconnect the ribbon cable from J6 by pressing out on the tabs at both sides of the ribbon connection and pull the cable away from the board.
6. Disconnect the ribbon cable from J10.
7. Remove the 4 screws at the 4 corners of the PCB.  
Remove the ground wire from the top right corner. Remove and label the ground wire from the top left corner of the PCB.
8. Ensure the DIP switch SW1-8 is in the ON position.
9. Mount the new PCB by replacing the 4 screws at the corners of the PCB including the ground wire on the top right corner.
10. Plug the ribbon cable back into J6 by pressing it in.  
It is keyed and will only go in one way. Also verify the tabs on the side have locked into place.
11. Connect ribbon cable from J10.

12. Plug in all of the green connectors to the board J8, J2, J4, and J7.
13. Restore primary power to the CCR at the breaker panel.

## 5.5 Wiring Diagrams

Figure 16: Wiring Diagram Benchtop and Field CCR 120 Vac or 12 VDC Input

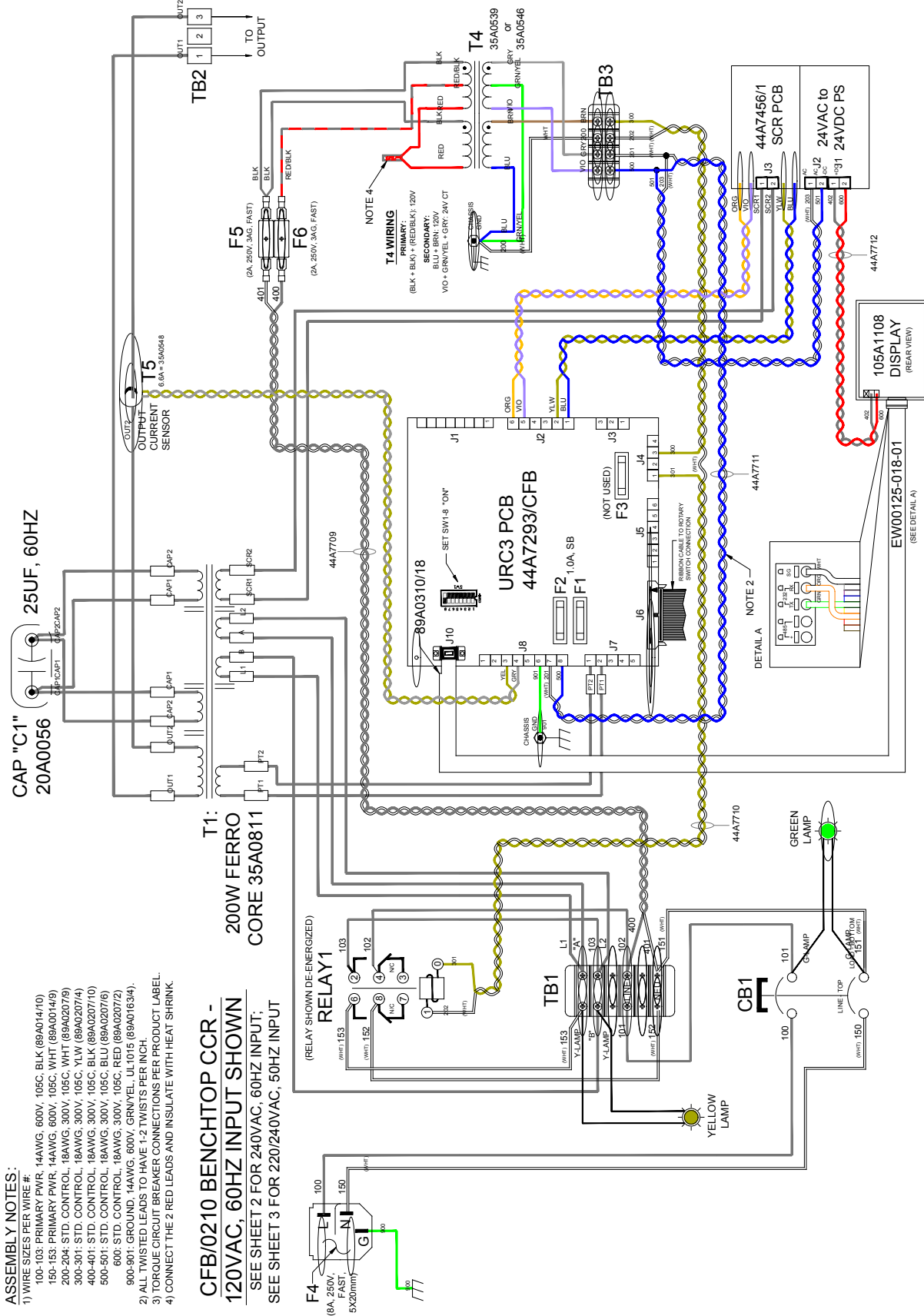


Figure 17: Wiring Diagram 240 Vac 60 Hz Input

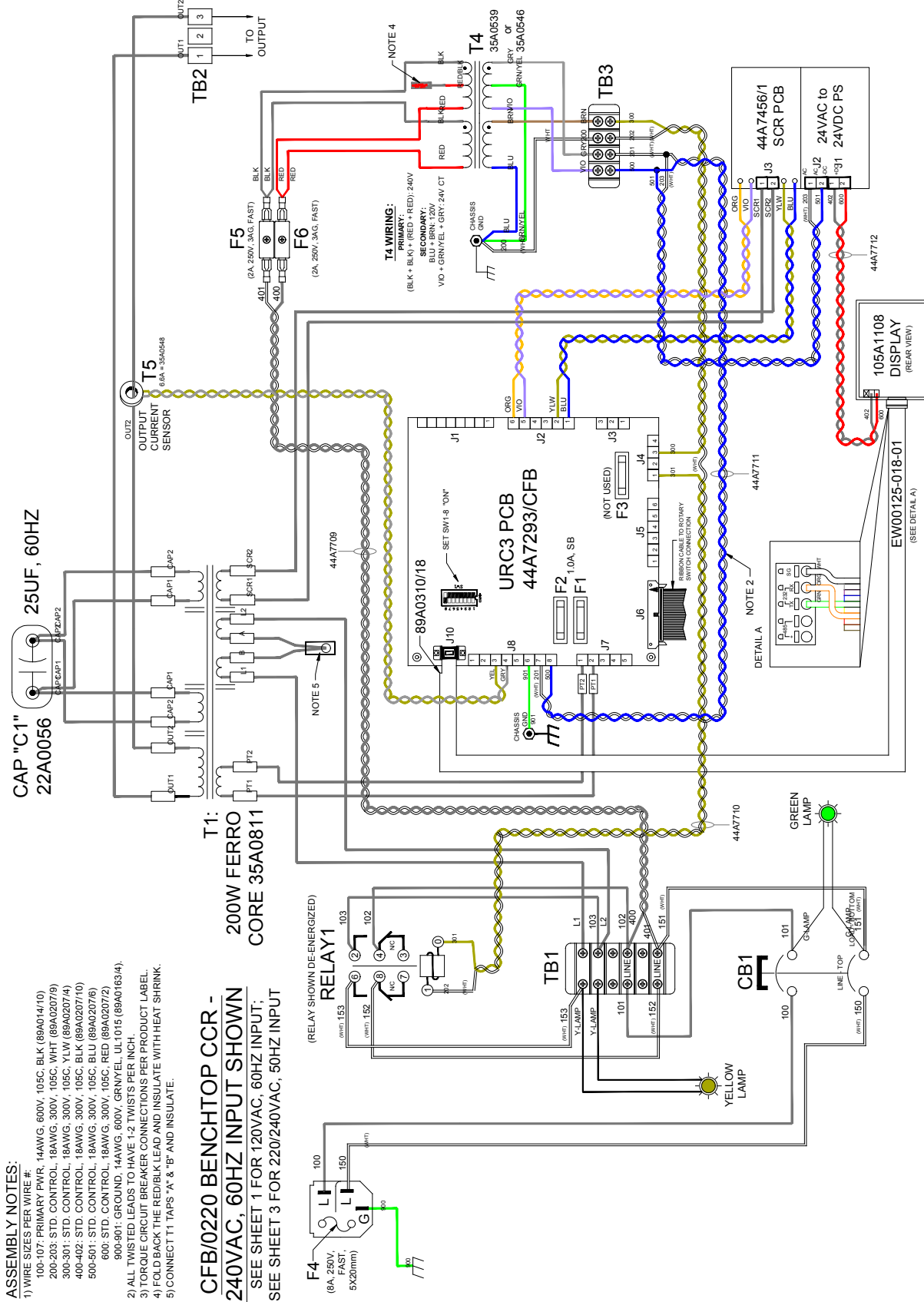
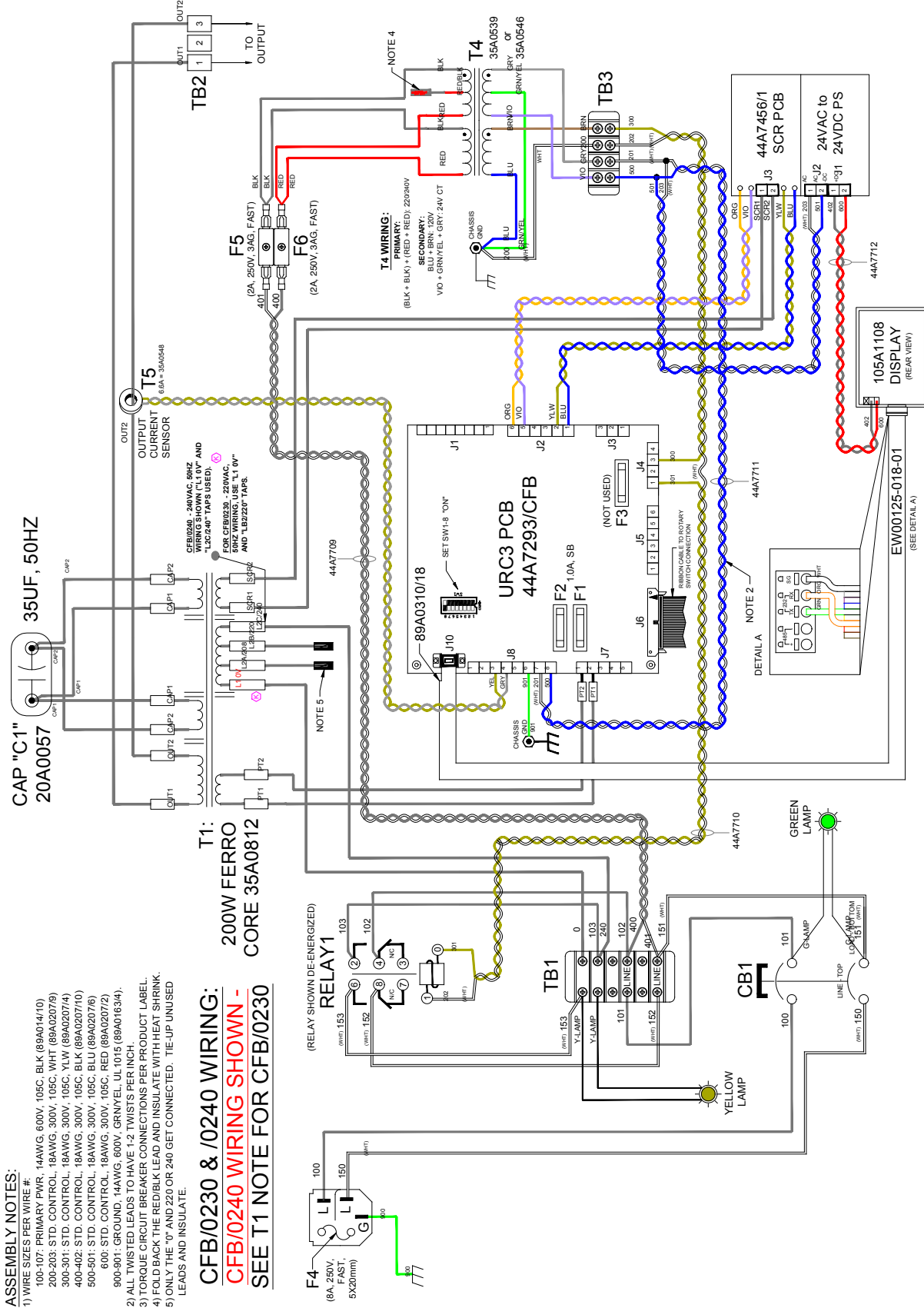


Figure 18: Wiring Diagram 220 and 240 VAC, 50 Hz Input



**ASSEMBLY NOTES:**

- 1) WIRE SIZES PER WIRE #:  
 100-107: PRIMARY PWR, 14AWG, 600V, 105C, BLK (89A014/10)  
 200-203: STD. CONTROL, 18AWG, 300V, 105C, WHI (89A0207/9)  
 300-301: STD. CONTROL, 18AWG, 300V, 105C, YLW (89A0207/4)  
 400-402: STD. CONTROL, 18AWG, 300V, 105C, BLK (89A0207/10)  
 500-501: STD. CONTROL, 18AWG, 300V, 105C, BLU (89A0207/6)  
 600: STD. CONTROL, 18AWG, 300V, 105C, RED (89A0207/2)  
 900-901: GROUND, 14AWG, 600V, GRN/YEL, UL1015 (89A0163/4).
- 2) ALL TWISTED LEADS TO HAVE 1-2 TWISTS PER INCH.
- 3) TORQUE CIRCUIT BREAKER CONNECTIONS PER PRODUCT LABEL.
- 4) FOLD BACK THE RED/BLK LEAD AND INSULATE WITH HEAT SHRINK.
- 5) ONLY THE "0V" AND 220 OR 240 GET CONNECTED. TIE-UP UNUSED LEADS AND INSULATE.

**CFB/0230 & /0240 WIRING:**  
**CFB/0240 WIRING SHOWN -**  
**SEE T1 NOTE FOR CFB/0230**

## 6.0 Parts

### 6.1 Ordering Code

#### Ordering Code

CFB / 02   0

#### Input Voltage

- 1 = 120 VAC, 60 Hz/Benchtop
- 2 = 240 VAC, 60 Hz/Benchtop
- 3 = 220 VAC, 50 Hz/Benchtop
- 4 = 240 VAC, 50 Hz/Benchtop
- 5 = 120 VAC, 60 Hz or +12 VDC/Field<sup>1</sup>
- 6 = 240 VAC, 50 Hz or 12 VDC/Field<sup>1</sup>

#### Ordering Code Notes

1. +12VDC inverter not included with the portable CFB. Optional inverter and battery cable accessory kit: AK00067-120-01 for 120V CFB and AK00067-240-01 for 240V CFB.

## 6.2 Illustrations

Figure 19: Benchtop CCR Rear View

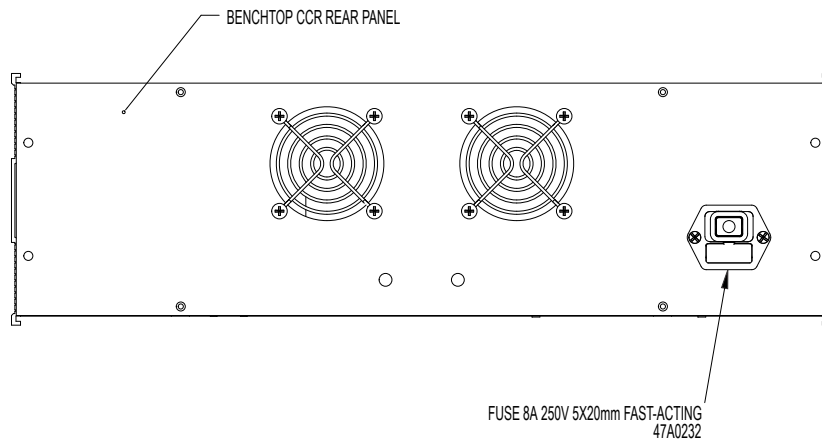
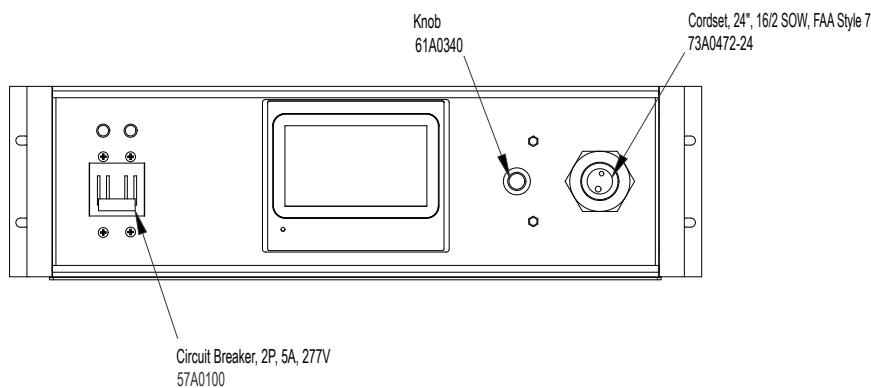


Figure 20: Benchtop CCR Front Panel



**Figure 21: Benchtop CCR Component Panel**

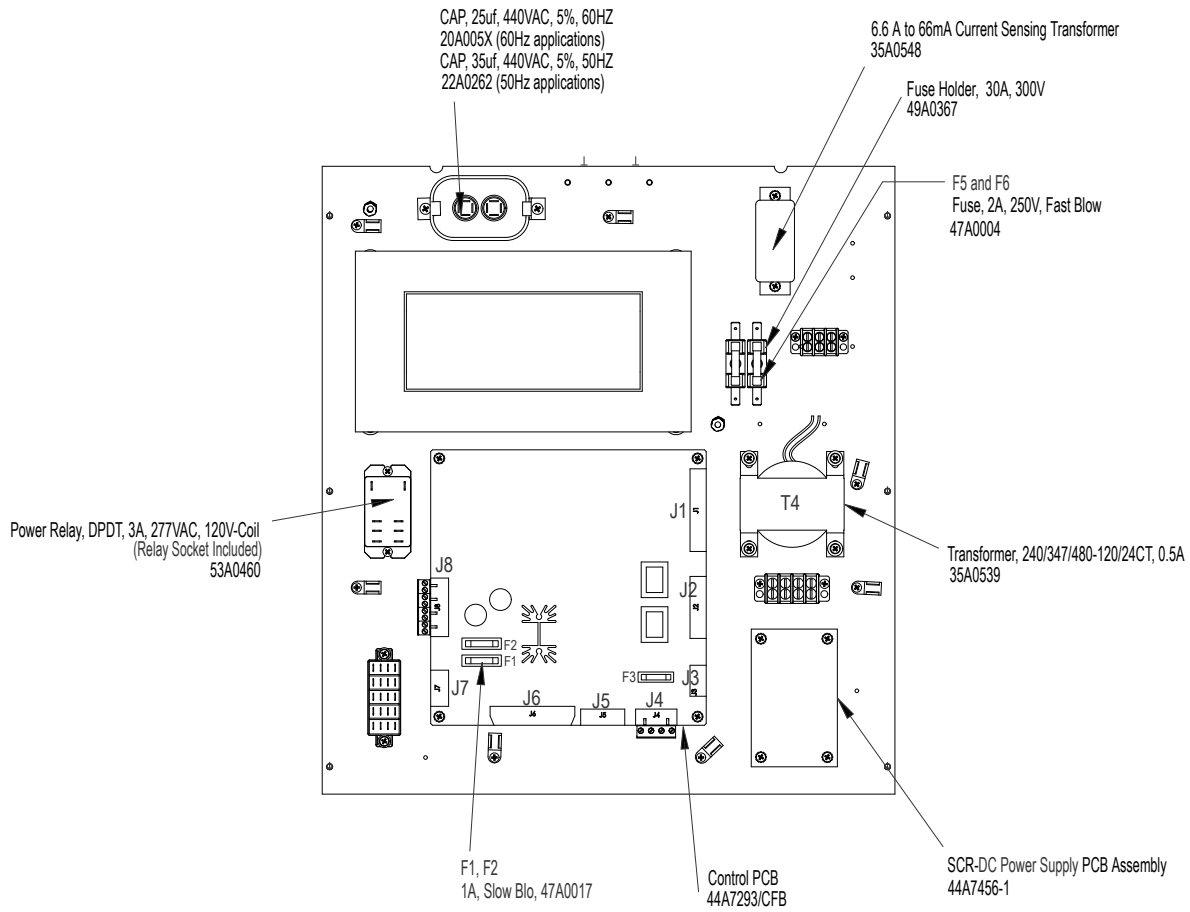
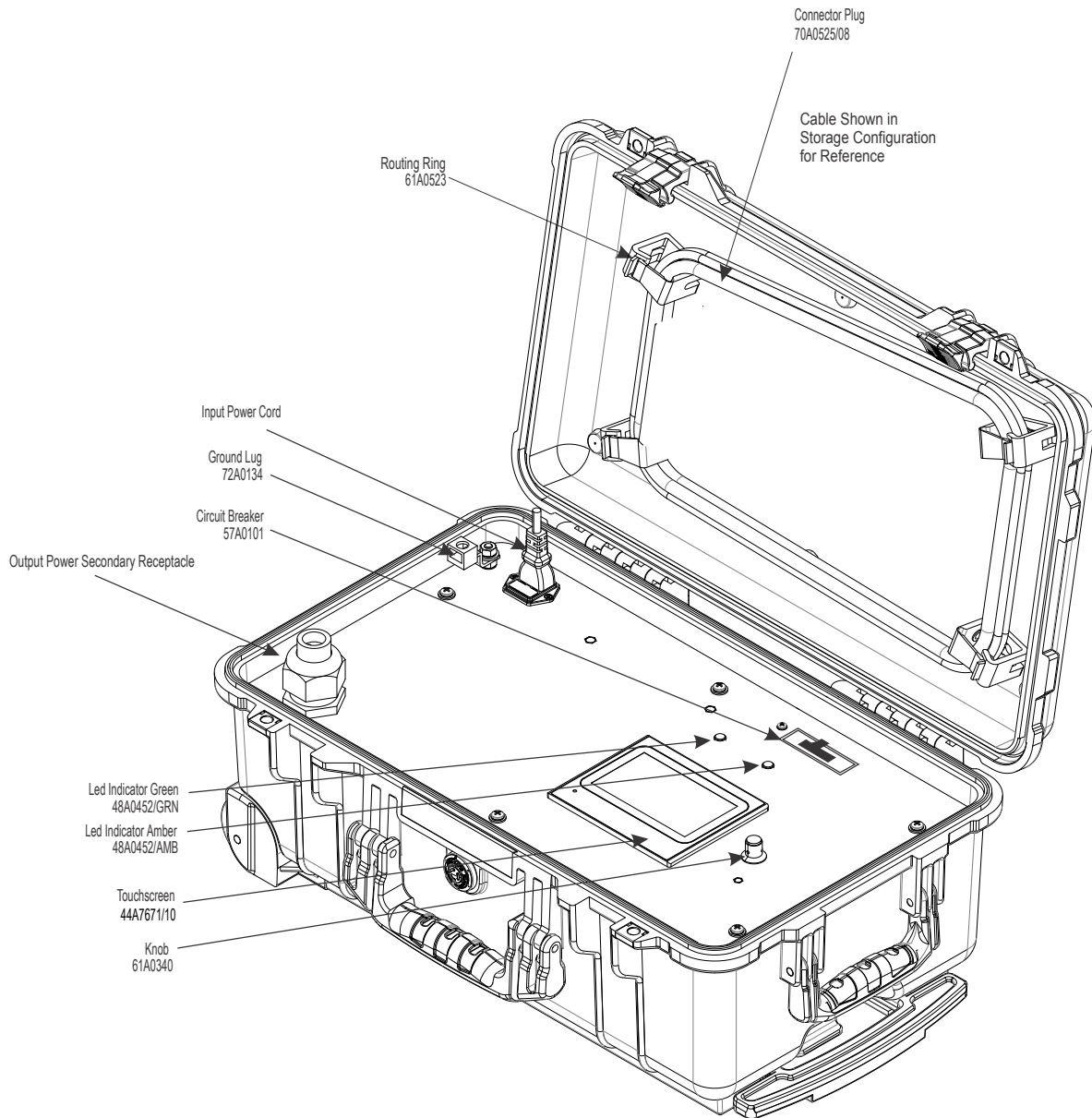


Figure 22: Portable Field CCR

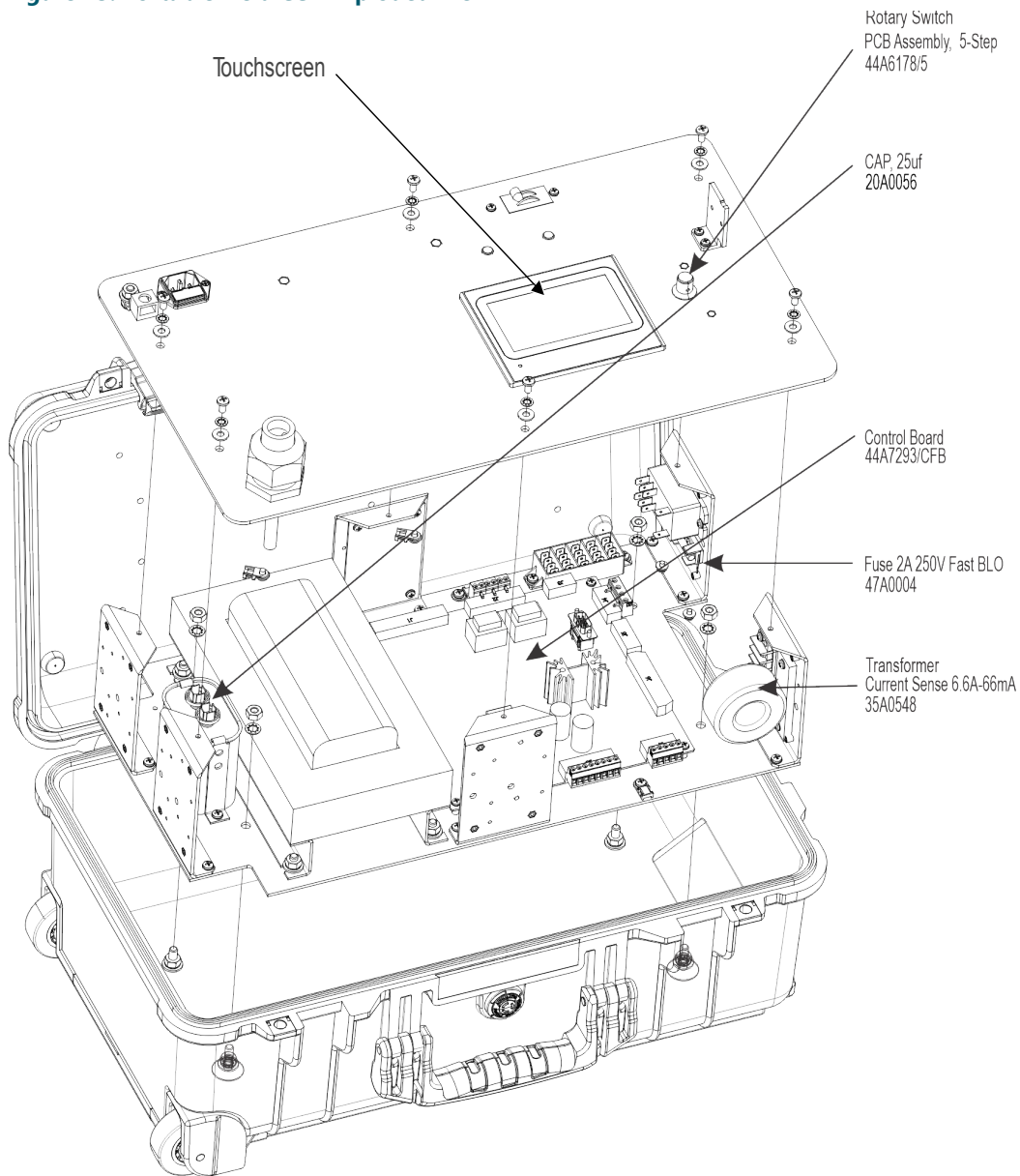


**CAUTION**

- Do not connect the power inverter to a battery with a load connected to the Field CCR.
- Turn off the power switch to the Field CCR prior to connecting to the power inverter.

**Failure to observe these cautions may result in equipment damage.**

**Figure 23: Portable Field CCR Exploded View**



Wagan Tech® Elite™ Pure Sine Power Inverters convert 12V DC power into 120V AC power.

Inverter manual available at: <http://www.wagan.com/elite-400w-pro.html>

- TrueRated Power™: 400W
- Surge power: 800W
- AC output: 120V\*
- Frequency: 60Hz
- Socket type: U.S. standard grounded (2x)
- Maximum efficiency: 90%
- Output waveform: Pure sine wave
- Total harmonic distortion: < 3%
- USB power port: 2.1A (NOT USED)
- Overload protection: Automatic shutdown

- Overheating protection: Thermal cooling fan with automatic shutdown
- Short circuit and reverse polarity protection: Internal thermal fuse
- DC input: 12V
- Input range: 10V to 15V
- High voltage protection: 15.5 V  $\pm$  0.5 V
- Low battery audible alarm: 10.5V  $\pm$  0.5V
- Low battery auto shutdown: 9.5V  $\pm$  0.5V
- No load current draw: < 0.4A
- Dimensions WxLxH (in.): 6.0 x 8.0 x 2.0 (150 x 200 x 50 mm)
- Weight: 2.0 lbs

### 6.3 Spare Parts

It is recommended to create a sufficiently large stock of spare parts to maintain the CFB unit. Consider acquiring approximately 10% spare final assemblies (with a minimum quantity of 1) for the total amount of equipment in the field. This allows for repairs to be made in the shop. Components that are more likely to need replacement, such as fuses, should be stocked at higher quantities, while PCB sub assemblies should be stocked in smaller quantities. For the CFB unit, it is recommended to have at least one entire CFB unit as a spare.

For the CFB unit, see the table below for spares.

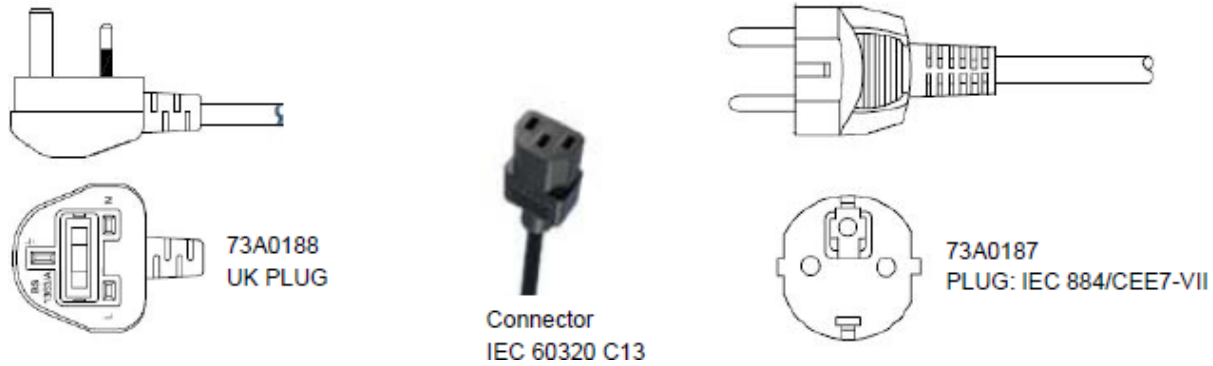
**Table 10: Spares**

Part Number	Description	CFB Type	Recommended Spares
44A7293/CFB	Control PCB	All	1
See Section 6.4	Touch Screen	All	1
44A7456-1	SCR-DC Power Supply Assembly	All	1
47A0017	Fuse, 1A, Slow Blow	All	4
47A0232	Fuse, 8A, Fast Blow	All	2
47A0004	Fuse, 2A, Fast Blow	All	4
73A0109/6/US	Secondary cordset, 6-foot, 16 AWG, 2C, 600 V, Style 1 & 8	Benchtop CCR (All)	1
73A0109/8/US	Secondary cordset, 8-foot, 16 AWG, 2C, 600 V, Style 1 & 8	Portable Field CCR (all)	1
73A0184	Power Cord, 6 ft (1750mm) 115v, 60hz	CFB/0210, CFB/0250	1
73A0185	Power Cord, 6 ft (1750mm) 240v, 60hz	CFB/0220	1

**Table 10: Spares (Continued)**

Part Number	Description	CFB Type	Recommended Spares
73A0186	Power Cord, 16-in (420mm)	CFB/0250	1
73A0187	Power Cord, IEC 884/CEE7-VII, 6 ft (1750mm) 50hz	CFB/0230, CFB/0240, CFB/0260	1
73A0188	Power Cord, UK PLUG BS1363A, 6 ft (1750mm) 50hz	CFB/0230, CFB/0240, CFB/0260	1

**Figure 24: EU Plug and UK Plug Types**



## 6.4 Spare Touchscreen

For touchscreen replacement, see the figure below to identify which touchscreen is installed in your CFB. For some older models of the CFB, the CCR will need to be factory modified to replace the touchscreen. Contact ADB Safegate for assistance.

**Figure 25: Spare Touchscreen**



Contact Factory  
for Replacement



Touchscreen Kit  
AK00046-000-01

## Appendix A: SUPPORT

Our experienced engineers are available for support and service at all times, 24 hour/7 days a week. They are part of a dynamic organization making sure the entire ADB SAFEGATE is committed to minimal disturbance for airport operations.

### ADB SAFEGATE Support

#### Technical Support – Global

Customers in Europe, the Middle East, Africa or Asia Pacific are more than welcome to our portal for technical support. Trained in all areas of system issues, troubleshooting, quality control and technical assistance, our highly experienced Technical support specialists are available 24 hours a day, seven days a week to provide assistance over the phone. In the Americas, we also offer live technical support.

#### Live Technical Support – Americas

If at any time you have a question or concern about your product, contact ADB SAFEGATE's US-based technical support specialists, available 24 hours a day, seven days a week, to assist you via phone.

ADB SAFEGATE Americas Technical Service & Support (US & Canada) : **+1-800-545-4157**

ADB SAFEGATE Americas Technical Service & Support (Canada): **+1-905-631-1597**

ADB SAFEGATE Americas Technical Service & Support (International): **+1-614-861-1304**

We can also be reached via email during regular business hours:

Airfield and Gate: **techservice.us@adbsafegate.com**

Gate: **gateservice.us@adbsafegate.com**

We look forward to working with you!

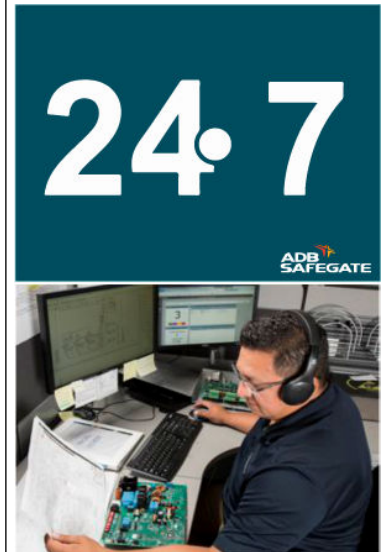
#### Before You Call

When you have an airfield lighting or system control system problem, prior to calling, please ensure the following:

- Review the product's manual and troubleshooting guide.
- Be located with the product ready to troubleshoot.
- Have all necessary information available: airport code/company name, customer id number, contact phone number/email address, product/part number.
- Have a *True RMS* meter available and any other necessary tools.

When calling about an issue with Safedock A-VDGS, we can serve you better if you collect the following information before you call:

- Relevant information regarding the issue you are calling about, such as gate number, flight number, aircraft type and time of the event.
- What, if any, actions have been taken to resolve the issue prior to the call.
- If available, provide a CCTV recording of the incident to aid in aligning the information from the Safedock log file.



#### Note

For more information, see [www.adbsafegate.com](http://www.adbsafegate.com), contact ADB SAFEGATE Support via email at [support@adbsafegate.com](mailto:support@adbsafegate.com) or

Europe: +32 2 722 17 11

Americas: +1 614 861 1304. Press 3 for technical service or press 4 for sales support.

China: +86 (10) 8476 0106

Middle East and Africa: +971 4 452 7575

## A.1 ADB SAFEGATE Website

The ADB SAFEGATE website, [www.adbsafegate.com](http://www.adbsafegate.com), offers information regarding our airport solutions, products, company, news, links, downloads, references, contacts and more.

## A.2 Recycling

### A.2.1 Local Authority Recycling

The disposal of ADB SAFEGATE products is to be made at an applicable collection point for the recycling of electrical and electronic equipment. The correct disposal of equipment prevents any potential negative consequences for the environment and human health, which could otherwise be caused by inappropriate waste handling. The recycling of materials helps to conserve natural resources. For more detailed information about recycling of products, contact your local authority city office.

### A.2.2 ADB SAFEGATE Recycling

ADB SAFEGATE is fully committed to environmentally-conscious manufacturing with strict monitoring of our own processes as well as supplier components and sub-contractor operations. ADB SAFEGATE offers a recycling program for our products to all customers worldwide, whether or not the products were sold within the EU.

ADB SAFEGATE products and/or specific electrical and electronic component parts which are fully removed/separated from any customer equipment and returned will be accepted for our recycling program.

All items returned must be clearly labeled as follows:

- For *RoHS/WEEE* Recycling
- Sender contact information (Name, Business Address, Phone number).
- Main Unit Serial Number.

ADB SAFEGATE will continue to monitor and update according for any future requirements for *EU directives* as and when *EU member states* implement new *regulations* and or *amendments*. It is our aim to maintain our *compliance plan* and assist our customers.



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## Powering Your Airport Performance from Approach to Departure

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