DONGAH ELECOMM

Model (DRS-54V)
Ver. 2.0 August

2011

DRS-54V

Dongah Rectifier System

Operating Manual

AC 240V 1Phase 3WIRE Input
-54VDC Output
55A per Shelf
18.5Amps per Module

CONTENTS

1. Specifications

1.1 Input Characteristics

1.1.1 Rated input voltage range: 180V ~ 240, Single Phase
Permitted input voltage range: 85Vac ~ 280Vac

1.1.2 Input frequency range: 47Hz ~ 63Hz

1.1.3 Power factor: 98% or above (50 ~ 100% load)

1.1.4 Efficiency: 91% or above (240Vac input, Typically)

1.1.5 Input voltage stabilization rate: Within (±0.5%) of rated voltage

1.2 Output Characteristics

1.2.1 Rated output voltage: -54.0Vdc±0.5%

1.2.2 Output current: Max 55.5A(18.5A x 3Modules)

1.2.3 Output voltage stabilized rate: Within ±0.5% of set voltage

1.3 Environmental Characteristics

1.3.1 Operating temperature range: -40°C ~ 65°C

1.3.2 Operating humidity range: 5% ~ 95%

1.4 Safety Standard

1.4.1 Lightning surge: Input terminal – EARTH 1.2 x 50us 2KV, 1.2 x 50us 1KV between input terminals

1.4.2 Insulation resistance : 10MΩ or above when measured at DC500V

1.4.3 Leakage current: 3mA or less (Measure by module unit in rated input/output condition)

1.4.4 High frequency (EMI): EN55022 Level A

1.5 Protection Function

1.5.1 Output high voltage protection: Shuts off output at -59.0V or above

1.5.2 Output over-current protection: 105% ~ 130% of rated current

2. Installation

2.1 Packaged Condition

This power equipment is shipped out as a packaged rectifier system unit.

2.2 Transportation

This power equipment can be damaged due to severe shock or vibration during transportation, so caution and careful measures should be taken to prevent damage from shock, vibration, rain, etc. during transportation.

2.3 Removal of Package

The equipment should be unpacked as close to its installation location as possible. Use caution to prevent admission of foreign matter into the equipment.

2.4 Installation Procedure

2.4.1 Frame Ground Wiring

Connect frame ground wiring as shown in Figure 1 below:

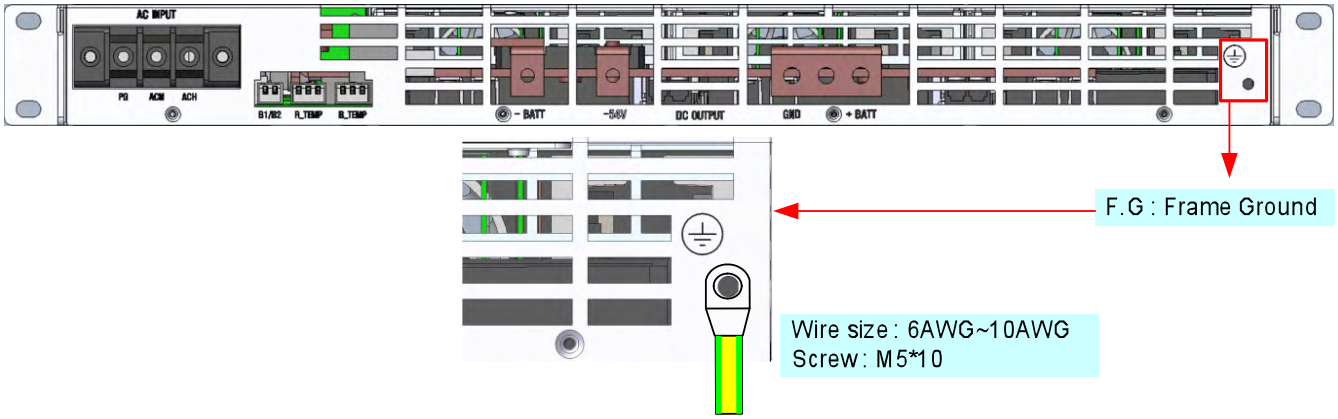


Figure 1) Frame Ground Wiring Diagram

■ Recommended method for frame ground wiring

a. Terminal size: 1Hole, M5, 10mm

b. Use of 10AWG wire or higher is recommended.

c. Maximum torque shall be 7.8 to 11.8kgf. *Caution: any torque beyond the standard level may lead to terminal damage.*

d. Connect wiring using a Phillips screwdriver.

2.4.2 Wiring of AC Input

Connect AC input wiring as shown in Figure 2 below:

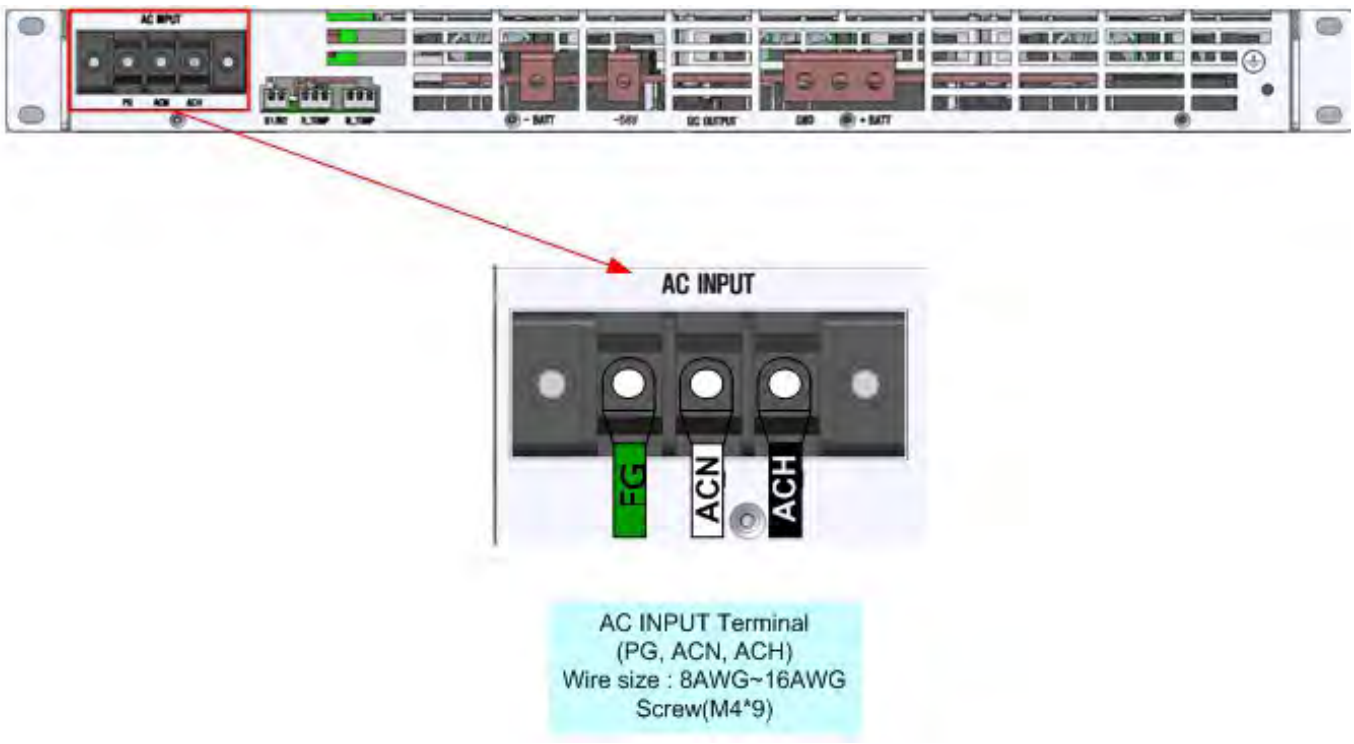


Figure 2) Input/Output Wiring Diagram

■ Recommended method for wiring single phase 3 wire AC input wiring

a. Terminal Block Size: M4, 9mm

b. For ACH, ACN and FG, 10AWG wiring is recommended.

c. Locking torque shall be kept within the standard value of 7.8 through 11.8kgf; any torque beyond this may lead to terminal damage.

d. Screw down wiring using a standard Phillips screwdriver.

2.4.3 DC Wiring Diagram

Connect DC output wiring as shown in Figure 3 below:

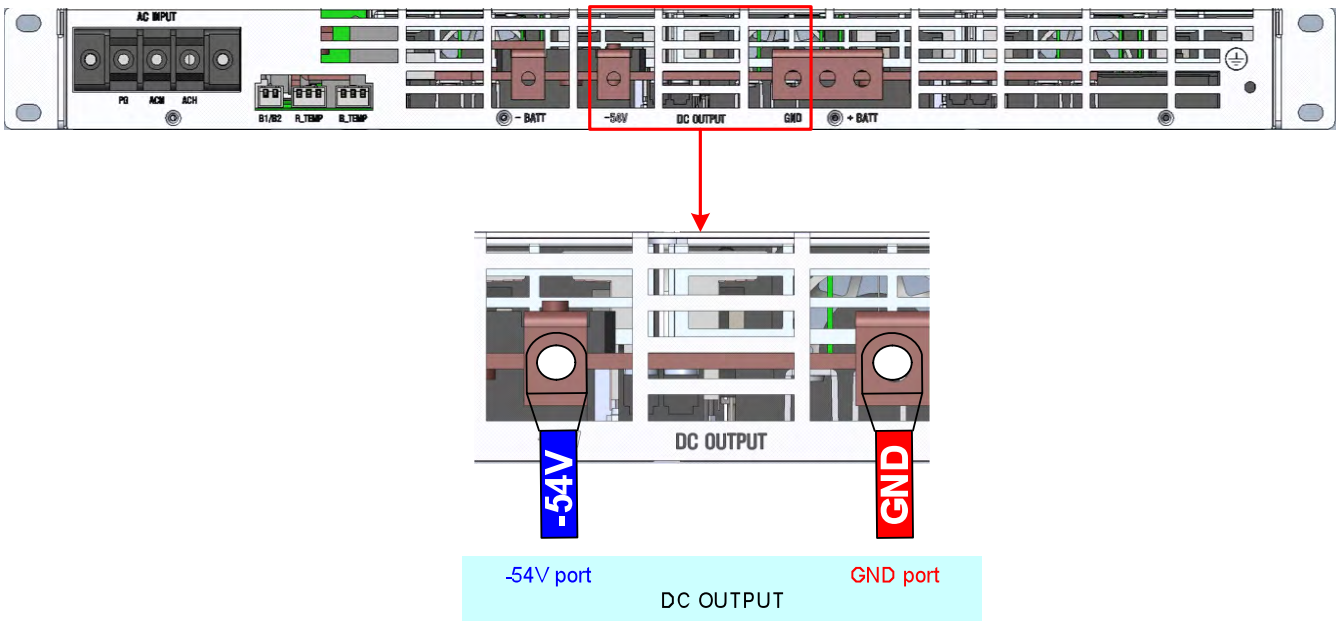


Figure 3) Output Wiring Diagram

■ Recommended method of DC output wiring

a. Terminal size: 1Hole, M6, 14mm

b. For -54V, GND, use of 6AWG wiring or higher is recommended.

c. Locking torque shall be kept within the standard value of 7.8 through 11.8kgf; any torque beyond this may lead to terminal damage.

d. Screw down wiring using a standard Phillips screwdriver.

2.4.4 Battery Wiring Diagram

Connect battery wiring as shown in Figure 4 below:

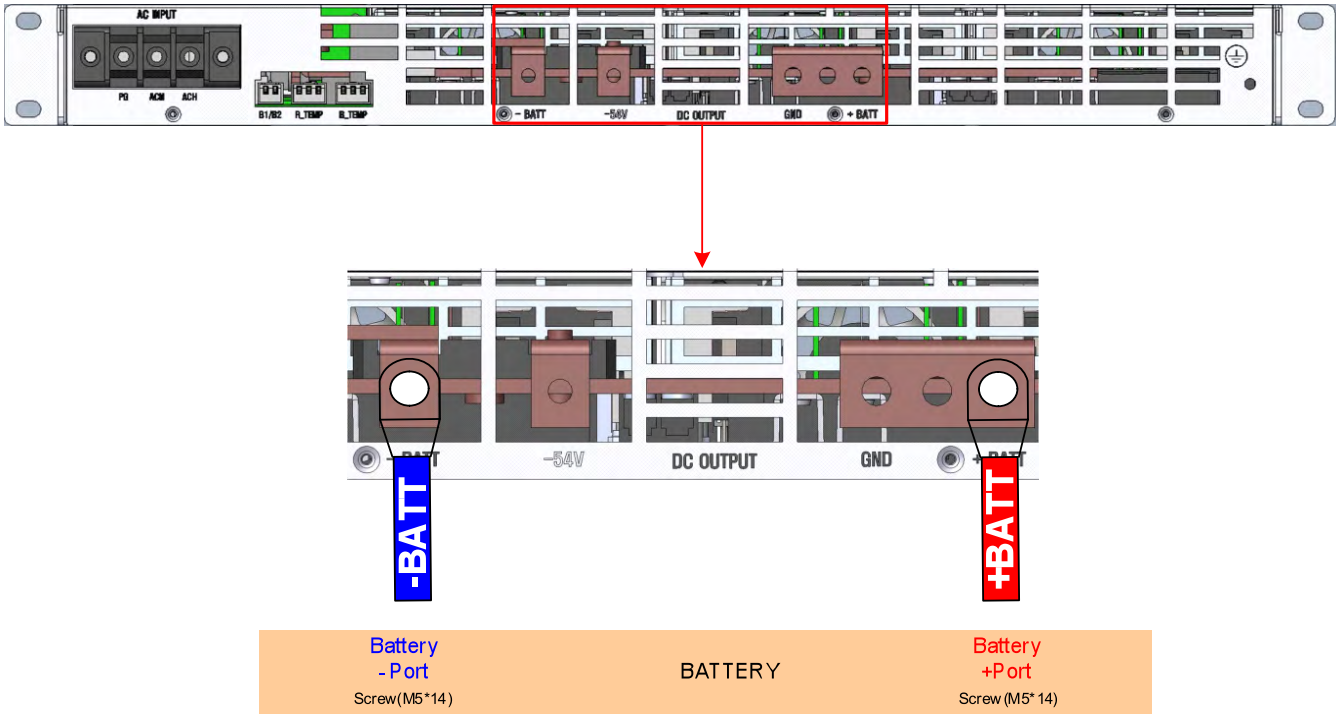


Figure 4) Battery Wiring Diagram

■ Recommended method for battery wiring

a. Terminal size: 1Hole, M6, 14mm

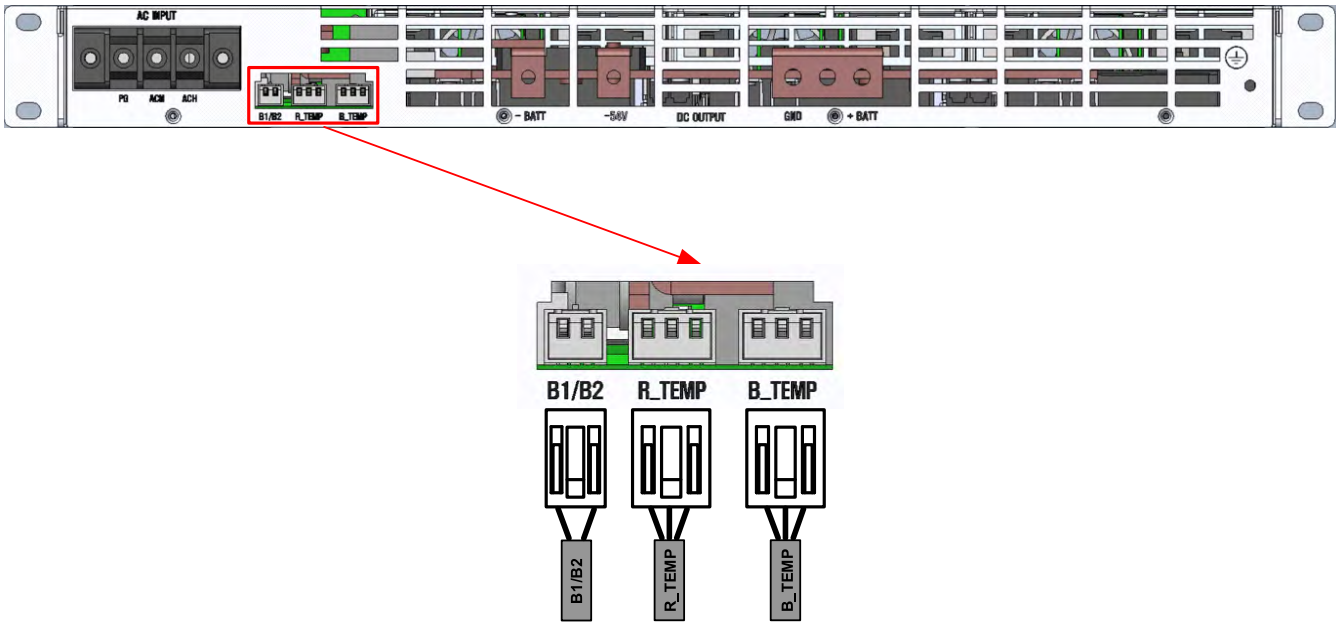
b. For - BATT, + BATT, use of 6AWG wire or higher is recommended.

c. Locking torque shall be kept within the standard value of 7.8 through 11.8kgf; any torque beyond this may lead to terminal damage.

d. Screw down wiring using a standard Phillips screwdriver.

2.4.5 Temperature Sensor Wiring Diagram

Connect temperature sensor wiring as shown below in Figure 5.



R_TEMP: Ractifier Temperature
B_TEMP: Battery Temperature
B1/B2: Battery Bank

Figure 5) Temperature Sensor Wiring Diagram

■ Recommended method of battery wiring

a. R_TEMP and B_TEMP shall be installed with manufacturer-provided wiring.

b. For R_TEMP, temperature sensor shall be placed inside the rack to measure the rack temperature.

c. The B_TEMP temperature sensor shall be placed near the battery terminals where battery temperature can be measured.

d. B1 is a cell check cable that can monitor 1 unit of battery cell.

e. B2 is a cell check cable that can monitor 4 units of battery cell.

2.4.6 TCP/IP Wiring Diagram

Connect TCP/IP wiring as shown below in Figure 6.

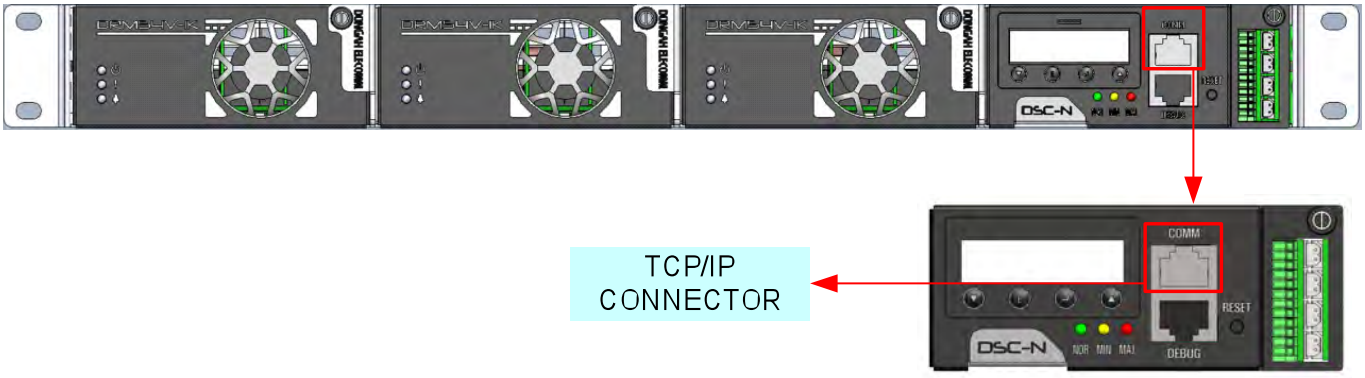


Figure 6) TCP/IP Wiring Diagram

Attach an Ethernet cable to the RJ45 COMM port at the front of control module (DSC-N) on the right side of the system.

2.4.7 Serial Cable Wiring

Connect the serial debug cable provided by the manufacturer to the RJ45 Debug port on the front of the control module.

3. Composition and Functions of Rectifier System

The rectifier shelf is composed of one control module (DSC-N) and three rectifier modules (DRM54V-1K) as shown in Figure 7.

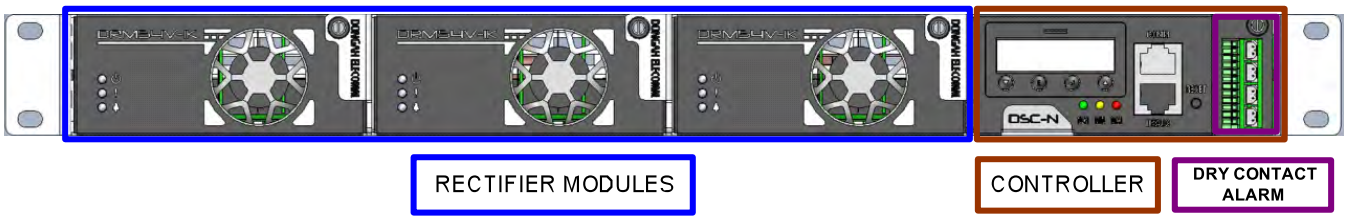


Figure 7) DRS-54V Shelf

3.1 SHELF (DRS-54V)

The (DRS-54V) includes one control module and 3 rectifier modules. Input/Output wiring is located at the rear; the COMM and DEBUG RJ45 connectors are at the front of the controller.

3.2 Control Module (DSC-N)

3.2.1 Main Control Module

The main control module controls the rectifier modules, displays the operating status of rectifiers, and provides alarms and configuration of the system.

The control module is composed as shown in Figure 8:

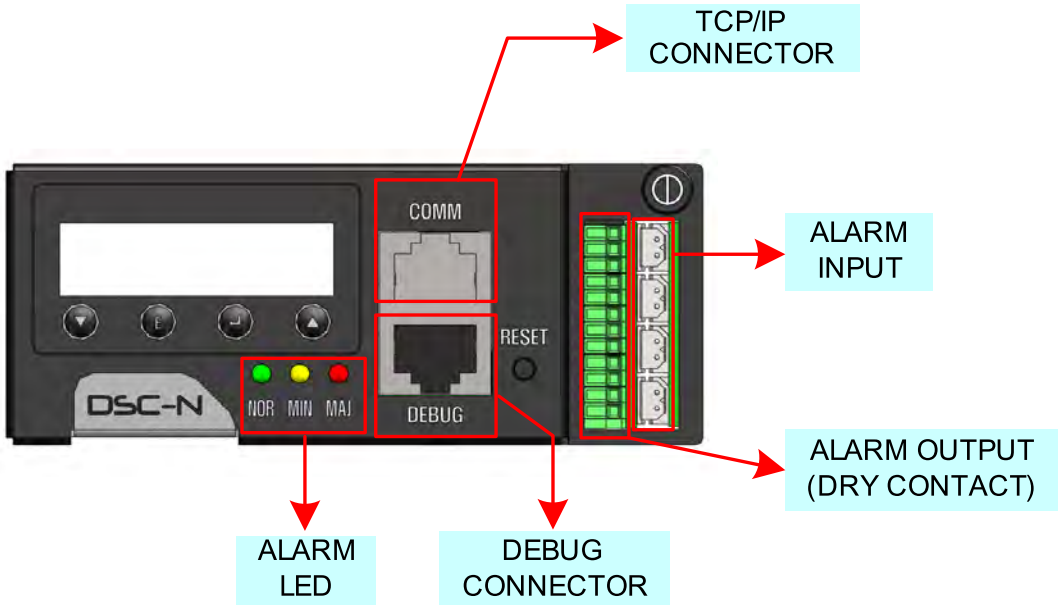


Figure 8) The composition diagram for control unit (DSC-N)

Table 1) Status of the Control Unit LEDS by Alarm

No.	Rectifier Status	LED Status			Remark
		Green (NOR)	Yellow (MIN)	Red (MAJ)	
1	Rectifier is normal	ON	OFF	OFF	
2	Output over-current (at 105% maximum output current)	OFF	ON	OFF	
3	Rectifier high temperature warning (65℃ or above)	OFF	ON	OFF	
4	Battery high temperature warning (55℃ or above)	OFF	ON	OFF	
5	Rectifier Temp Sensor Fail	OFF	ON	OFF	
6	Battery Temp Sensor Fail	OFF	ON	OFF	

7	Battery Low Voltage (44.0V)	OFF	ON	OFF	
8	AC Input Fail (75V or less or 300V or higher)	OFF	OFF	ON	
9	DC Over Voltage (58.0V or above)	OFF	OFF	ON	
10	DC Low Voltage (48.0V or below)	OFF	OFF	ON	
11	DRM54V Module 1~3 Fail	OFF	OFF	ON	
12	Battery Cell Fail	OFF	OFF	ON	
13	Battery Relay Open	OFF	OFF	ON	
14	User Define 1~4 Fail	OFF	OFF	ON	

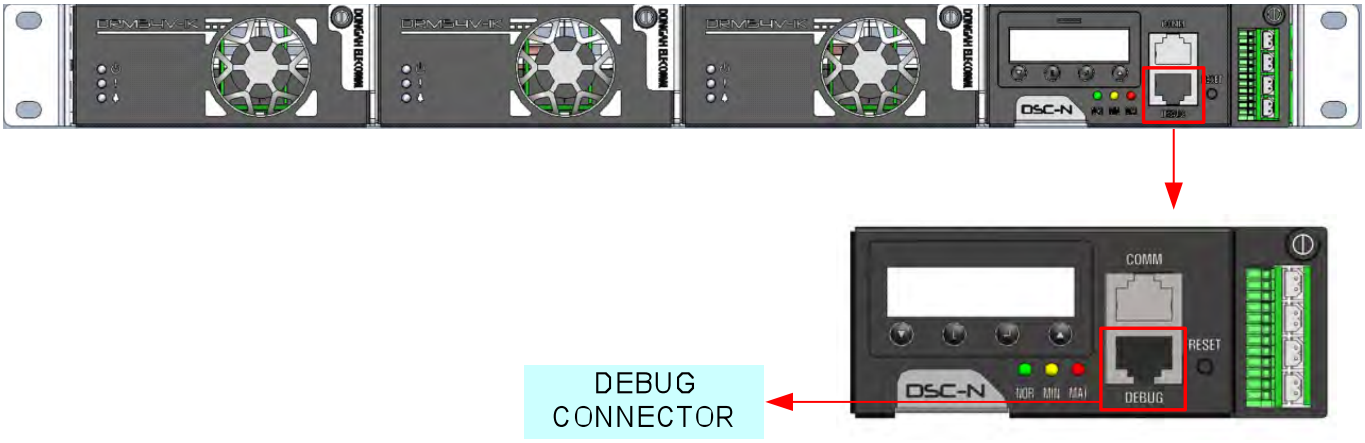


Figure 9) Debug Port Location

3.2.1.1 Communication Function

RS232 serial communication is from the DEBUG connector and Ethernet communication is from the Comm. connector on the front of the control module. TCP/IP and SNMP protocols are supported by the controller.

Programs can be updated through Debug (RS232) or Ethernet (TCP/IP). The proper wiring of a serial cable, from the RJ45 Debug connector to RS232 DB9 Male connector pinout, is listed below in Table 2:

Table 2) RJ45 to RS232 Pin Assignment

Pin Assignment	Description	
	Control Module Front Debug (RJ45)	PC (DB9 Male)
1	Reserve	Reserve
2	RXD	TXD

3	TXD	RXD
4	Reserve	Reserve
5	GND	GND
6	Reserve	Reserve
7	Reserve	Reserve
8	Reserve	Reserve
9		Reserve

3.2.2 Measurement and Monitoring Functions

3.2.2.1 Measuring Function

The Control module measures DC output voltage and DC output current, and reports them to a server program through the Debug (RS232) or Comm. (Ethernet) connectors.

3.2.2.2 Warning Monitoring Function

The Control module also monitors alarms and reports the information to a server program through the Debug (RS232) or Comm. (Ethernet) connectors.

Table 3) Types of Rectifier Alarms

No.	Type	Contents	Remark
1	AC FAIL	Input Voltage Fail	AC 75V or below or AC 300V or above
2	DC HIGH	DC Over Voltage	DC >58.0V. When DC < 57.5V alarm cancelled
3	DC LOW	DC Low Voltage	DC voltage <48.0V. When DC >48.5V alarm is cancelled.
4	DC OVER CURR	DC Over Current	No. of installed modules *105%
5	Rectifier Module Fail #1~#3	UNIT #1~#3 FAIL	Alarms when a rectifier module fails.
6	RECT. TEMP FAIL	RECTIFIER TEMPERATURE HIGH	Rack temperature >65 degrees Celsius. Alarm cancelled when temp <60 degrees Celsius.
7	BATT. TEMP FAIL	BATTERY TEMPERATURE HIGH	Rack temperature >55 degrees Celsius. Alarm cancelled when temperature <50 degrees Celsius.
8	RECT.SENSOR-F	RECTIFIER TEMPERATURE	Alarm occurs when the rack temperature sensor is not installed

		SENSOR	
9	BATT.SENSOR-F	BATTERY TEMPERATURE SENSOR	Alarm occurs when the battery temperature sensor is not installed
10	BATT.LOW VOLT	Battery Low Voltage	Alarm occurs when battery voltage is <44.0V +/- 0.3V.
11	BATT.CELL FAIL	Battery Cell Fail	Check for abnormality through battery discharge test.
12	BATT.DISCONNECT	Battery Relay Open	Battery relay open.
13	USER DEFINE #1~#4	User Define Alarm 1~4	Alarms occur according to user setting.

3.3 Rectifier Module (DRM54V-1K)

The rectifier module converts AC 220V power to DC -54V/18.5A power, controls output voltage through the signal of the control module, and emits warnings to the control module. The rectifier module is composed as follows.

** CAUTION: DO NOT manipulate the variable volume at module top arbitrarily, or output voltage may reach beyond current sharing specification.*

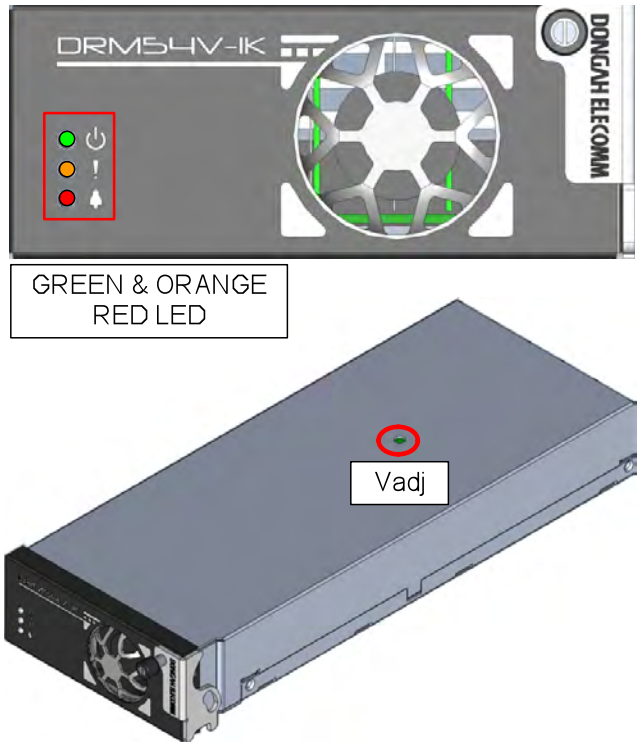


Figure 10) Module Composition Diagram

Type	Color	Status
Normal LED	Green	Normal output
Stand-by LED	Orange	ON in case AC power is supplied, DC output Off. OFF when output power is normal.
Alarm LED	Red	Rectifier module Alarm UV: Voltage dropped below 42V OV: Voltage rose beyond 59V FF: FAN FAIL, OT: 1st Heatsink 83 degree or above, and 2nd Heatsink 115 degrees or above

		AF: 75V or below or 300V or above

● Vadj : Volume resistor that enables fine adjustment of output voltage

4. System Operation

4.1 System Composition

When system is in normal operation, rectifier outputs supply DC power to the output.

4.1.1 SHELF (DRS-54V)

When AC is supplied to the shelf, and all modules are installed properly, the shelf should operate normally.

4.1.2 Control Module (DSC-N)

When operating properly, the Control module should have the Nor (normal) LED lit and the MAJ LED off.

4.1.3 Rectifier Module (DRM54V-1K)

During normal operation, each rectifier module installed should have the power display Green LED on. The Red Alarm LED should be off.

5. Rectifier System

5.1 The Operating Mechanism of Rectifier System

5.1.1 Composition and Function

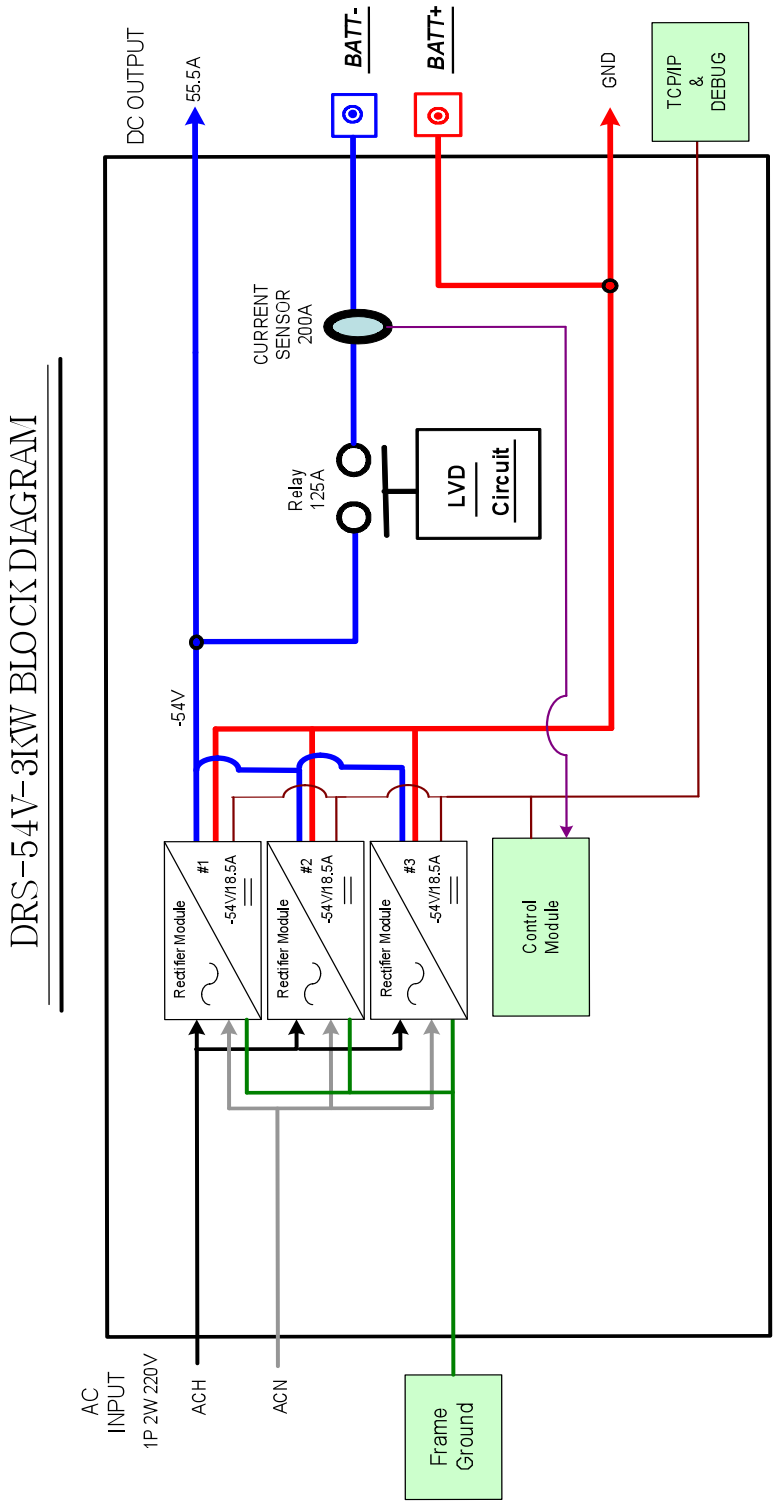
This rectifier system is composed of three rectifier modules (DRM54V-1K) and one control module. Capable of admitting single phase 220VAC as input power, the rectifier system can operate up to -44.0V ~ -58.0V for DC -54V output voltage, and can use max 55.5A of output current.

The output connection terminal is composed of one circuit at the rear of the rectifier. In addition, the rectifier is designed and produced to be able to supply high quality power to the system, and can emit warnings when equipped with the circuit required for warning and protection.

5.1.2 Composition of System Circuit

This rectifier system supplies power to the rectifier module by receiving commercial AC power, and the rectifier module supplies power to the system by converting commercial AC power to DC power.

5.2 System Diagram for Rectifier System



5.3 System Operation

5.3.1 Checklist prior to Operation

5.3.1.1 The input/output wiring of rectifier system should be wired with no input AC power present!

5.3.1.2 After wiring the input/output terminals, ensure proper torque on all bolts and visually check wires for proper installation.

5.3.2 Rectifier System Operation

* Check to confirm that the input AC power is correct. It should be single phase 3 wire 220V AC.
* Re-Check system output and the condition of the output wiring of the system.

5.3.2.1 Power Applying Procedure

1) Apply AC to DRS-54V.
2) Check output DC. It should be (-54V±0.5%).
3) Once power is applied, check to see if the rectifier module (DRM54V-1K) works normally, the green LED on module front illuminates, and the green LED on the control module illuminates.
   (When connecting wiring between system and output, be sure to check the polarity.)

6. Using the software tools to provision and monitor the DRS-54V Power System

6.1 Software tools

6.1.1 There are two Windows-based programs for the DRS-54V:

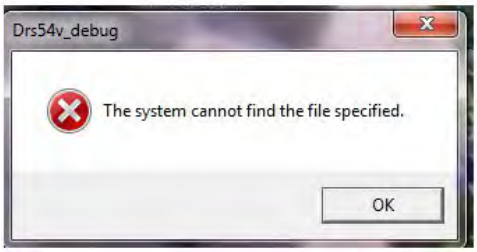
6.1.1.1 DRS54V_Debug the RS232 Serial Program

6.1.1.2 DRS54V_TCP_IP the Ethernet Program

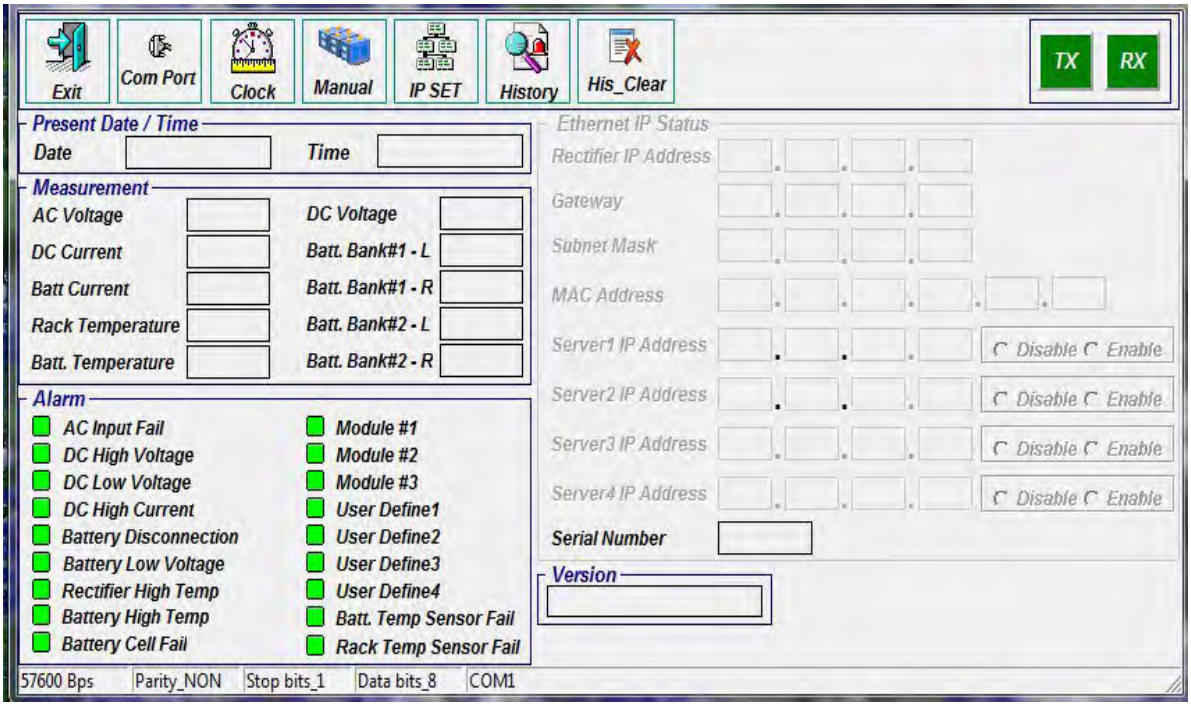
6.2 Using the Debug Port Program

6.2.1 The serial interface uses an RS232 DB9 to RJ45 cable wired as in Table 2. Install the cable between the PC and the system controller Debug port.

6.2.2 Run the program DRS54V_Debug on the PC. If the RS232 port on the PC is not Port 1, you will get the following warning screen. Press **OK** and continue on to the main program.

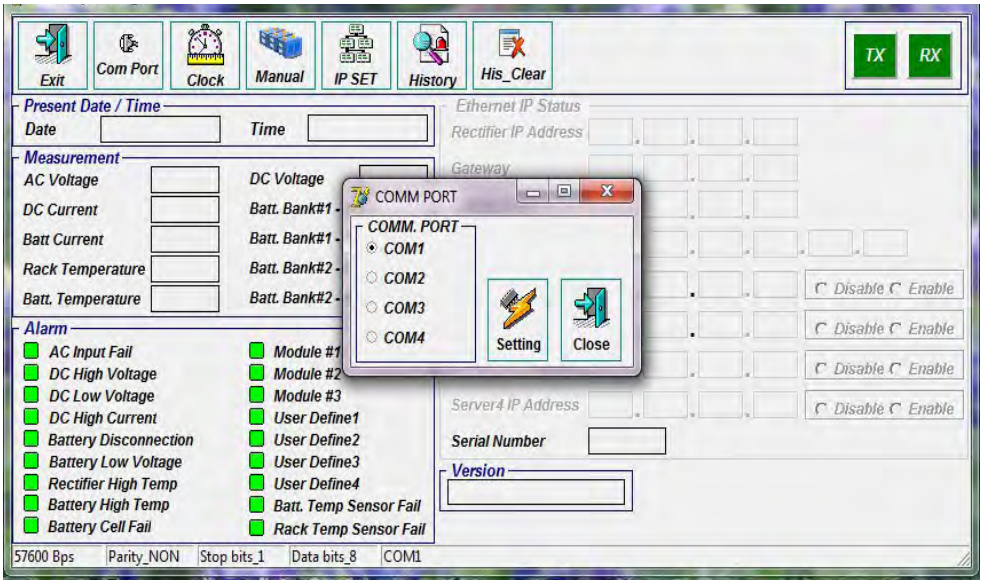


Debug Main Page



6.2.3 Setting up the RS232 Comm Port

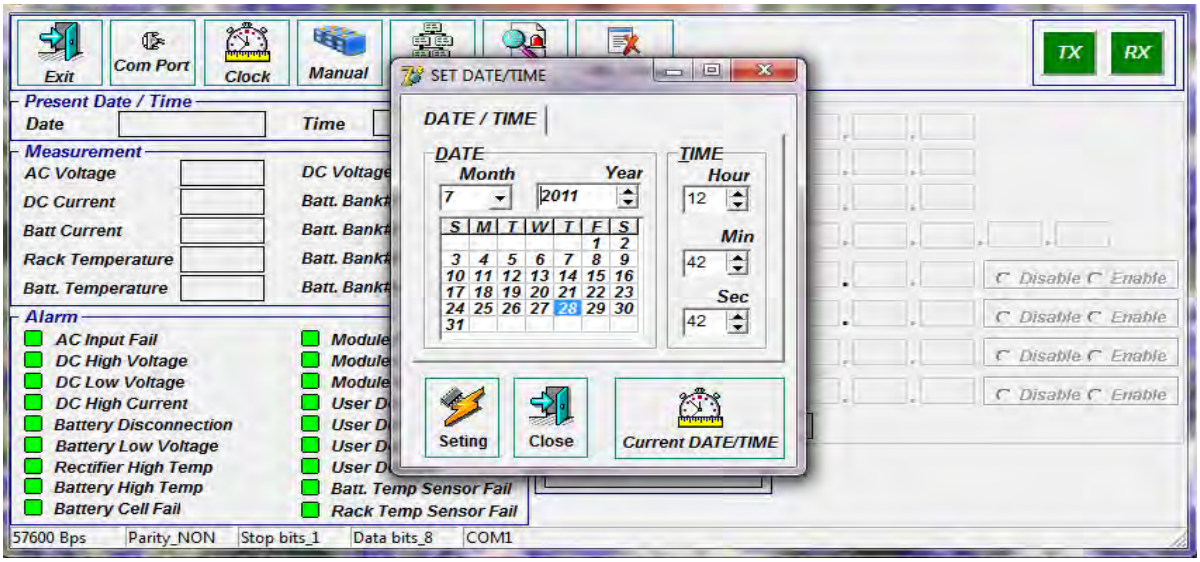
6.2.3.1 If the warning in section 6.2.2 is received, select the **Comm Port** button. The following screen will appear.



6.2.3.2 Select the proper Comm Port, and then press **Setting**. If the proper port has not been selected, the warning message in 6.2.2 will reappear. If the proper port is selected, press the **Close** button to close the dialog box.

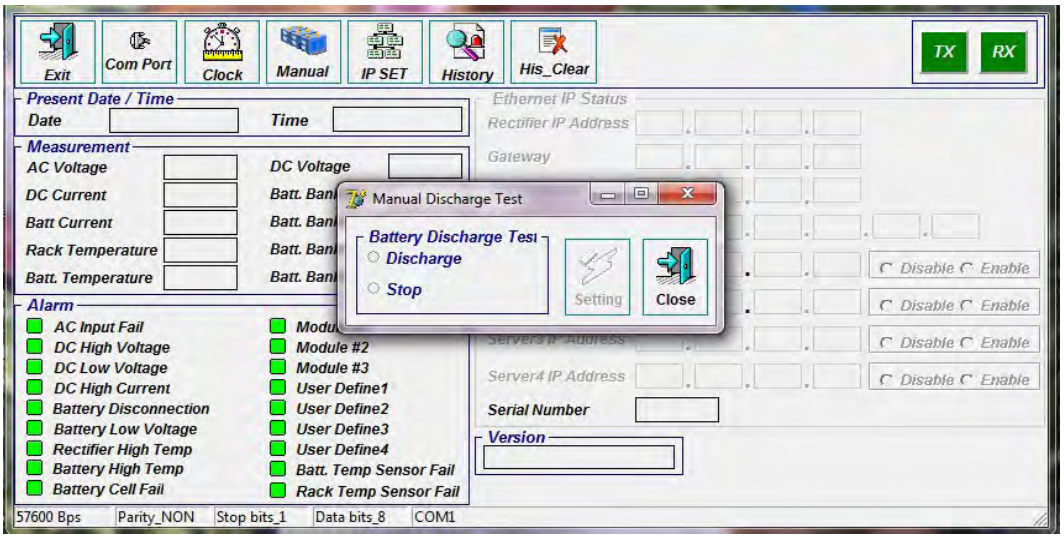
6.2.3.3 Once the power system is communicating with the PC, the date, time, measurement, Ethernet IP status, version and serial number boxes will be filled in. If there are any alarms, the associated check box will turn from green to red in the **Alarm** section.

6.2.3.4 To set the time and date, select the **Clock** box. The following screen will appear.



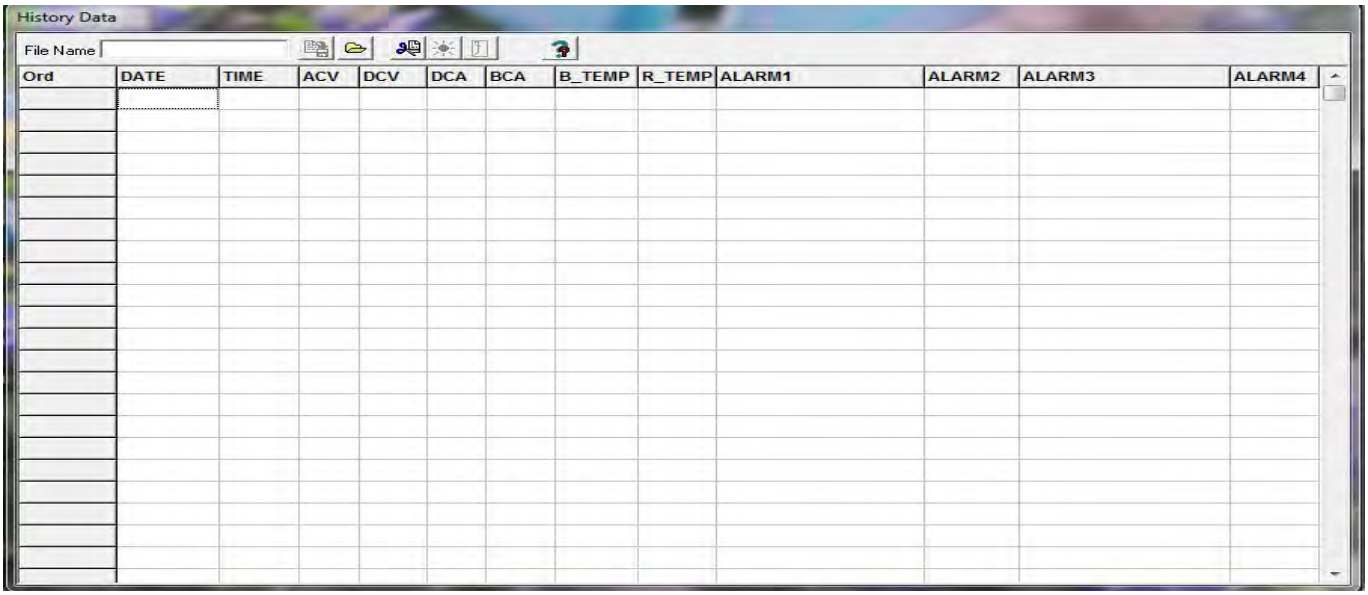
6.2.3.5 To set the date, enter the month and the year in the associated box. Select the day from the calendar. Select the hour, minute, and second in the associated fields to set the time. Press **Current DATE/TIME** to see if the time was set properly. Press the **Close** box to exit to main menu.

6.2.3.6 To manually start a Battery Discharge Test, select the **Manual** box from the top of the screen. The following menu will appear.



Select **Discharge** and setting to manually start a battery discharge test. Select the **Stop** button to stop the discharge test. Select **Close** to go back to main screen.

6.2.3.7 To view alarm history, select the **History** button. The following screen will appear:



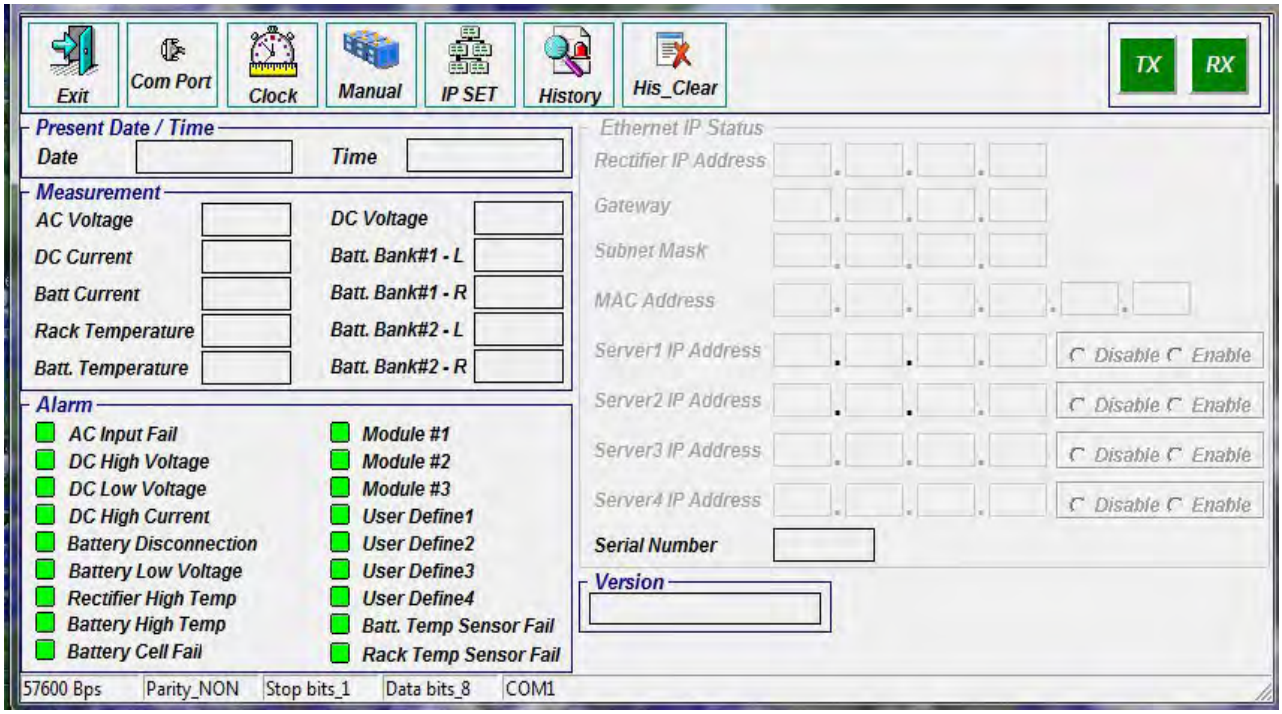
The alarm history should start filling the **History Data** form. To stop data flow, press the **Stop Request** button, (Scissors box). To re-start the flow of data, press the **New Request** button, (Light box). To save the data to disk, press the **Save File** button. To open a history file from the disk, press the **Open File** box at the top of the form.

6.2.3.8 To erase alarm history, press the **His_Clear** button at the top of the main menu.

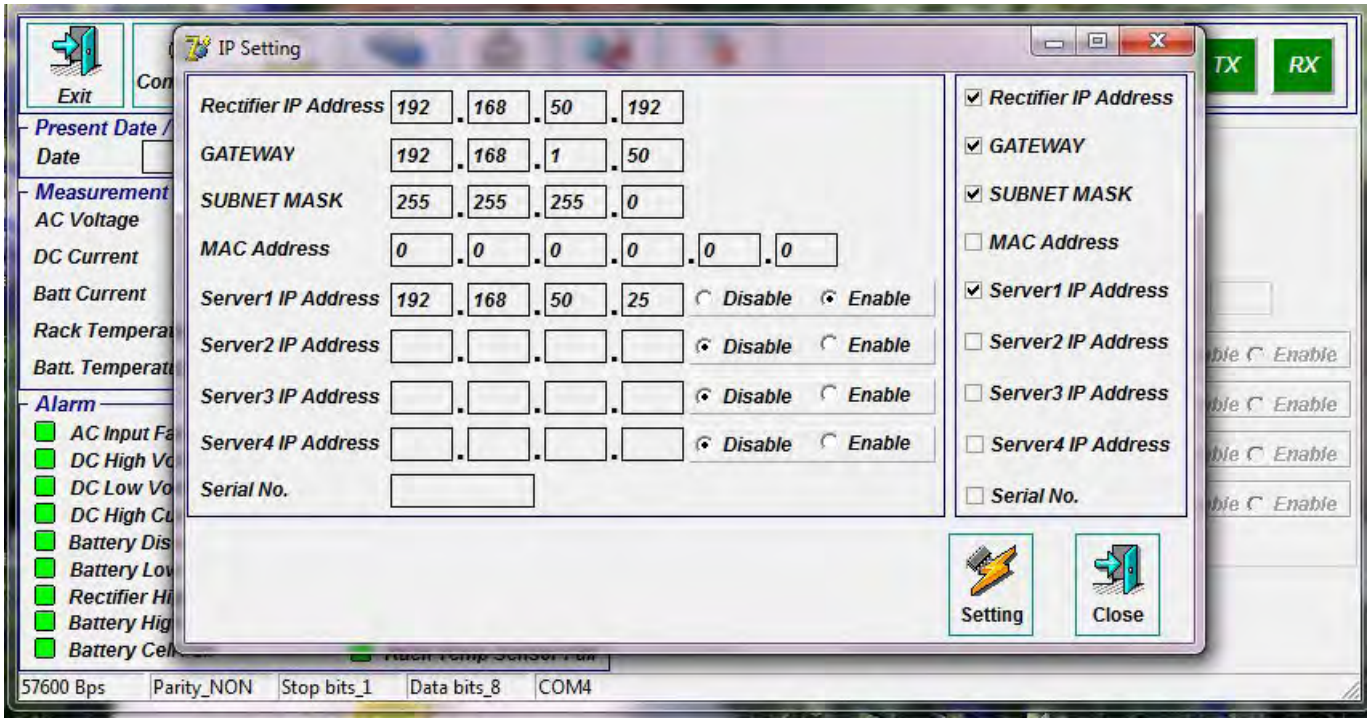
6.3 Ethernet Port Software

6.3.1 Prior to running the Ethernet Software, the Debug software **MUST BE USED** to set up TCP/IP.

6.3.2 With the unit powered on, start the DRS54V_Debug Program.



6.3.3 When you select **IP SET**, the following menu will appear on your screen.



6.3.3.1 To Change the default IP Address: Put the new address in the rectifier **IP Address** boxes, then select the rectifier **IP Address** check box.

6.3.3.2 To change the gateway, put the new address in the gateway address boxes and select the **GATEWAY** check box.

6.3.3.3 To change subnet mask: Place the new address in the **Subnet Mask** address boxes and then select the **Subnet Mask** check box.

6.3.3.4 The MAC Address will be automatically filled out by the system.

6.3.3.5 The Server address is the PC that is running the TCP/IP program. There are four IP addresses for servers.

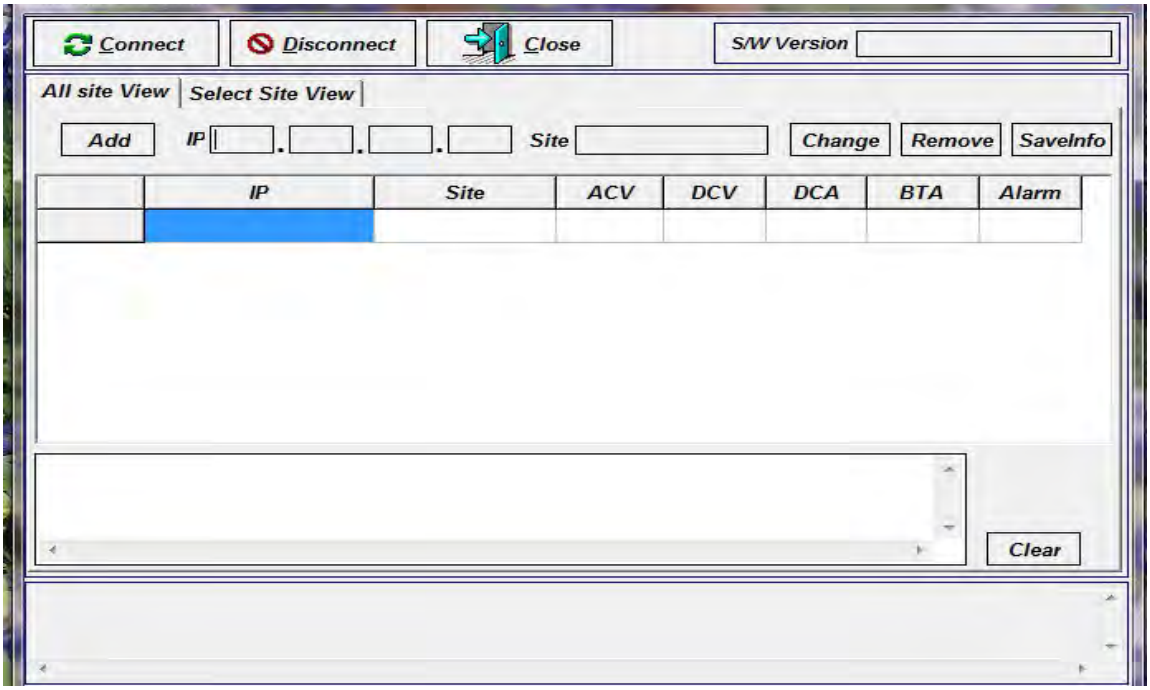
6.3.3.5.1 Enter the address in the Server1 **IP Address** boxes of the PC that is running the TCP_IP program. Select the check box Server 1 **IP Address**. If there will be more than one PC running the TCP/IP program, enter the IP addresses of these PCs into Server 2 through 4 **IP Address** boxes and then select the check box associated with the IP address.

Caution: If the check box next to the item being changed is not selected, that item will not be changed.

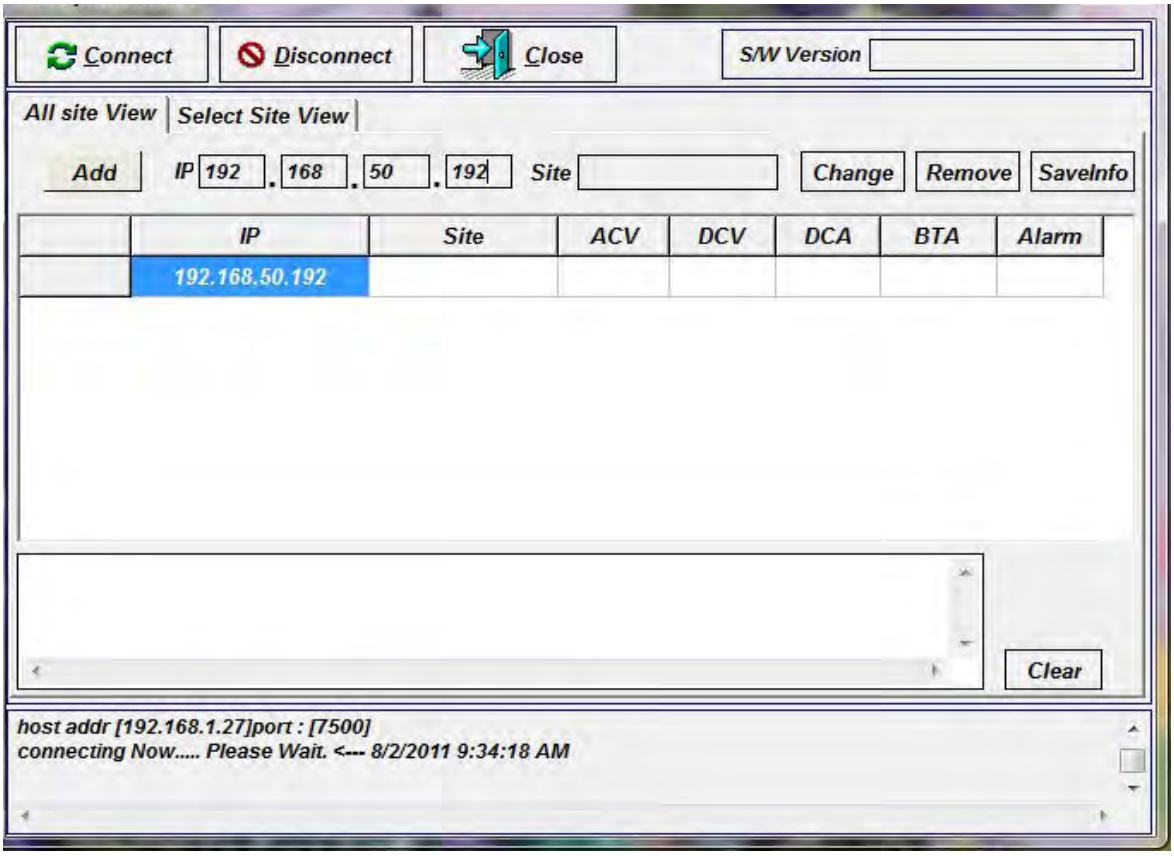
6.3.3.6 Select the setting box. Once the changes are made, the check boxes will clear.

6.3.3.7 Close the Debug Program.

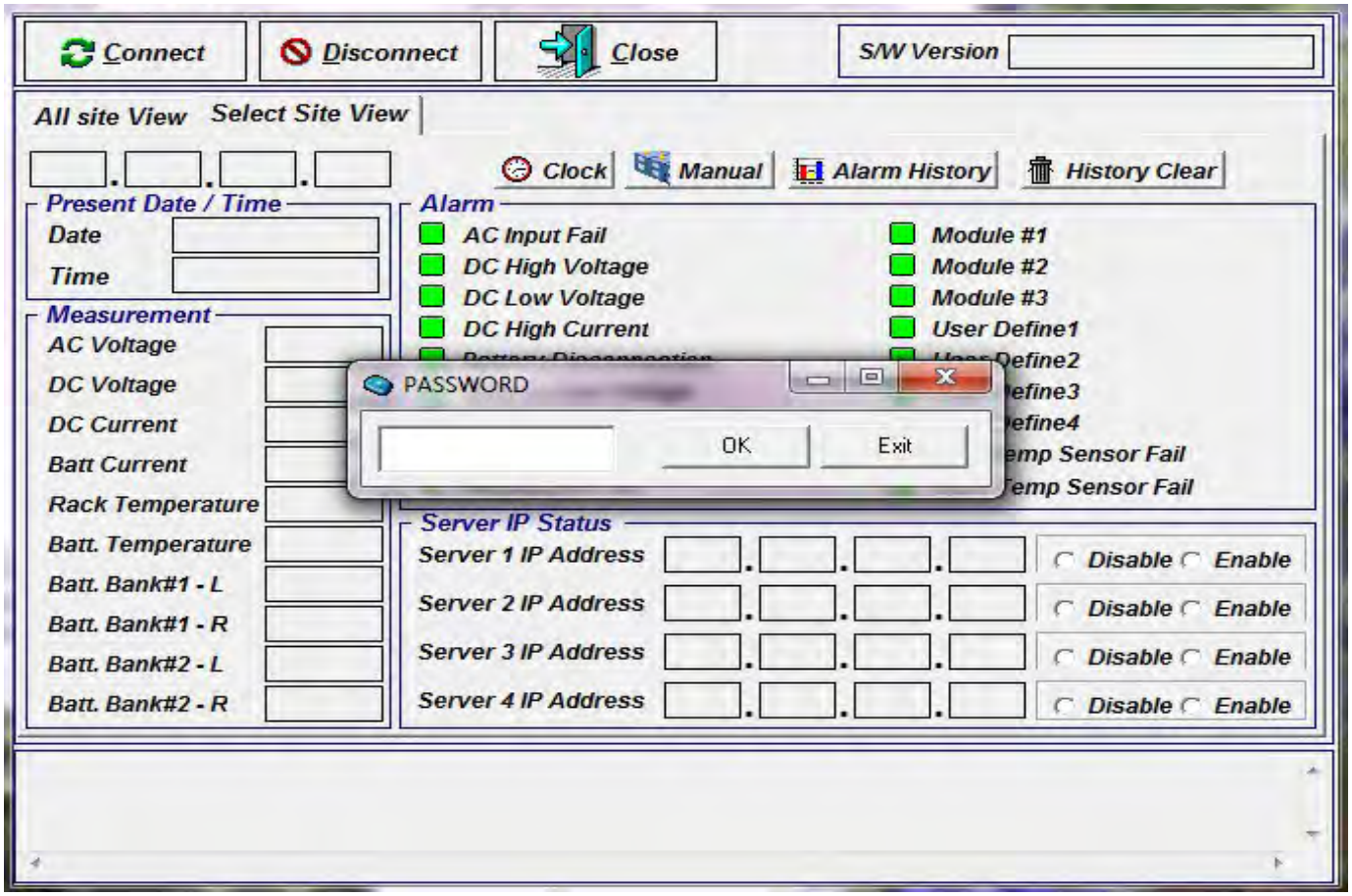
6.3.3.8 Open the TCP/IP Program. The following Screen will appear.



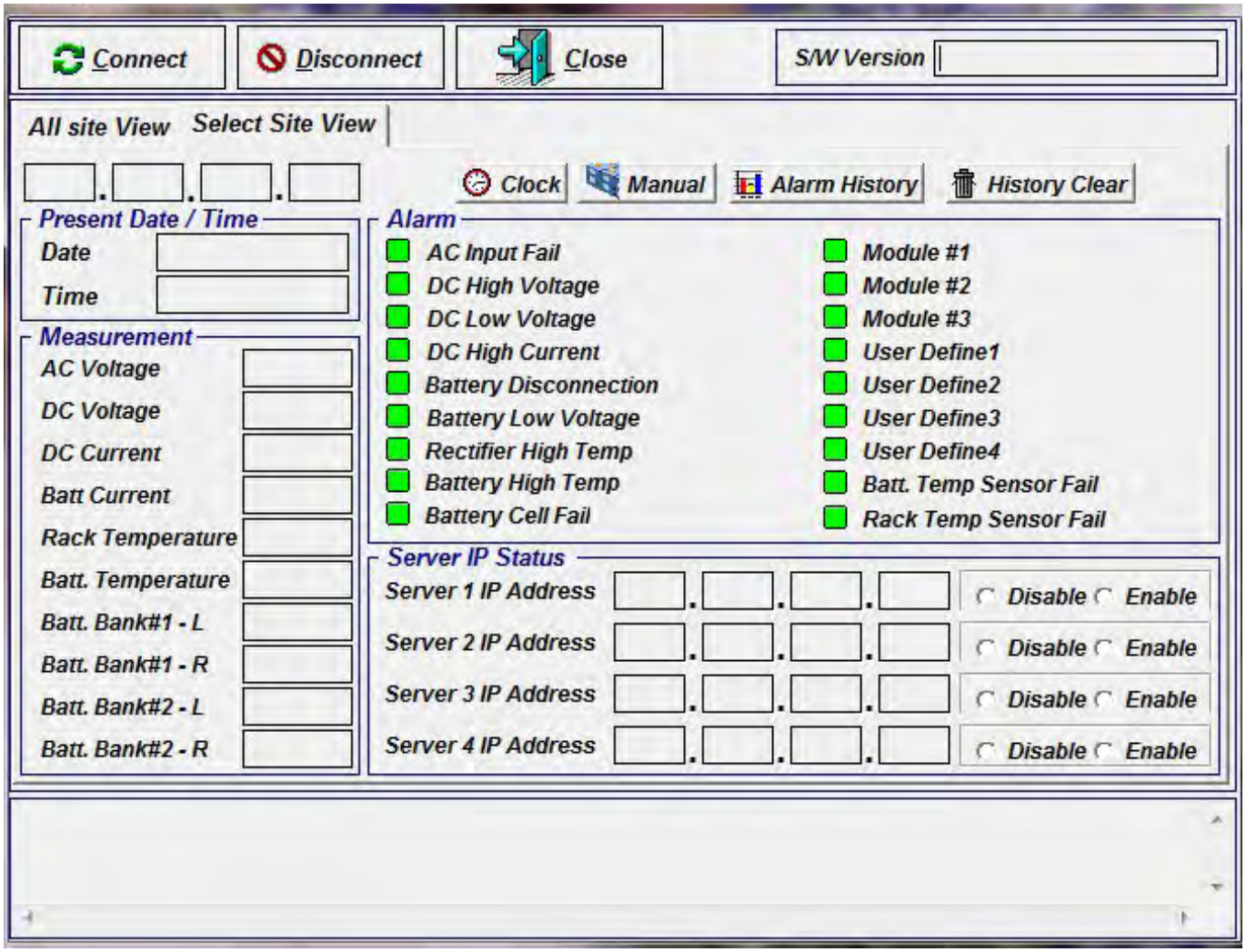
6.3.3.8 Enter the IP address of the system in the **IP Address** box. Select **Add**. The following screen will appear. ***Caution: If this address does not match one of the server addresses from 6.3.3.5.1 above, the power system will not communicate with the TCP/IP Program. Caution: Ensure the firewall of the PC running the TCP/IP program allows the program to communicate over the intranet.***



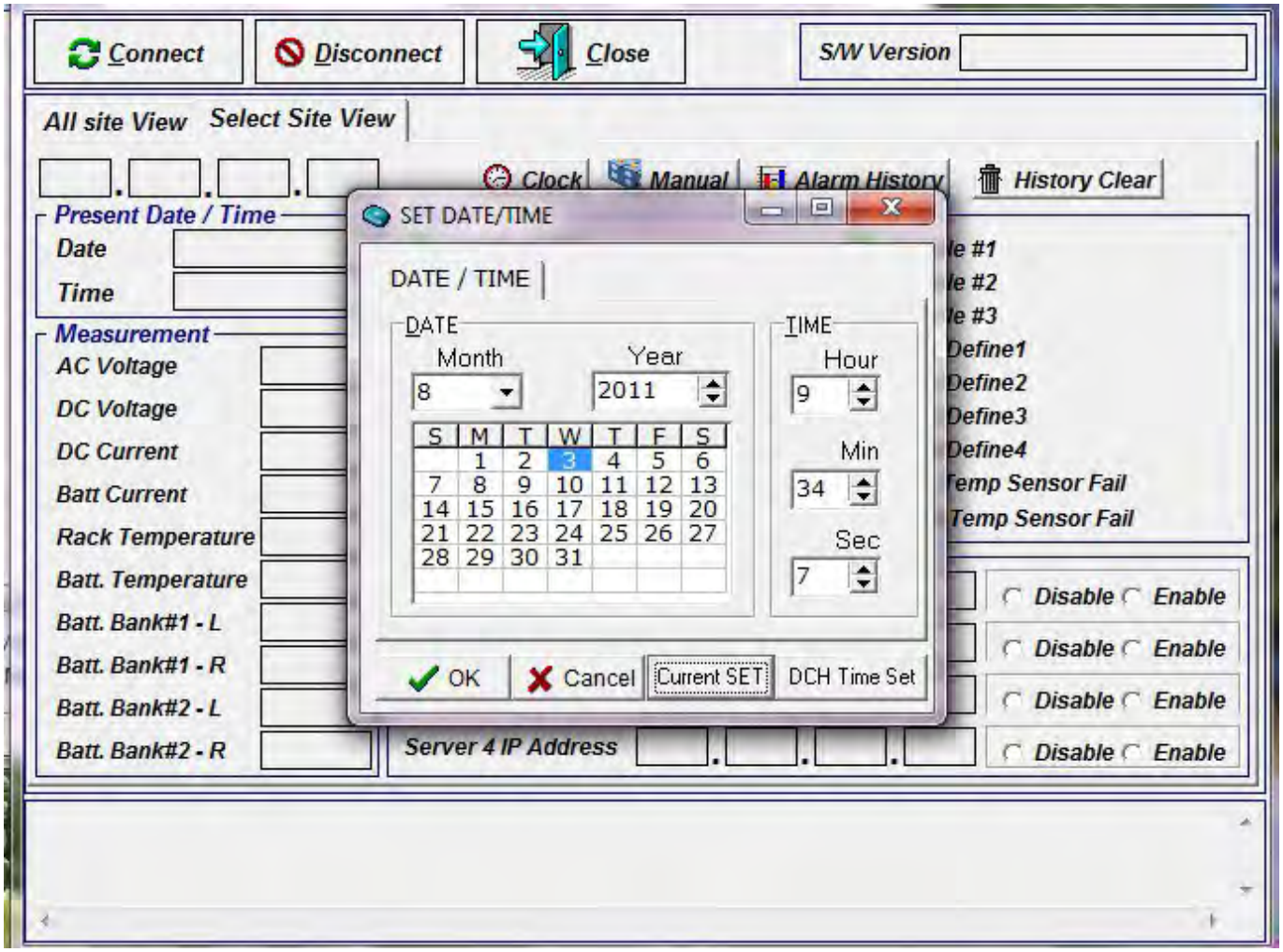
6.3.3.9 Select the **Connect** button. The host IP Address of the PC running the program will be shown in the window beneath the main window. When the unit connects to the program, the Incoming AC Voltage (ACV), Output Voltage (DCV), Output Current in Amps (DCA) and Battery Current in Amps, (BTA) will be displayed. If the system has any alarms, both these displays and the alarm box will be in red. Double click on the IP address of the system, and the **Select Site View** will appear as below.



6.3.3.10 By default there is no password; hit **OK** to continue. The **Select Site View** menu will appear as below.

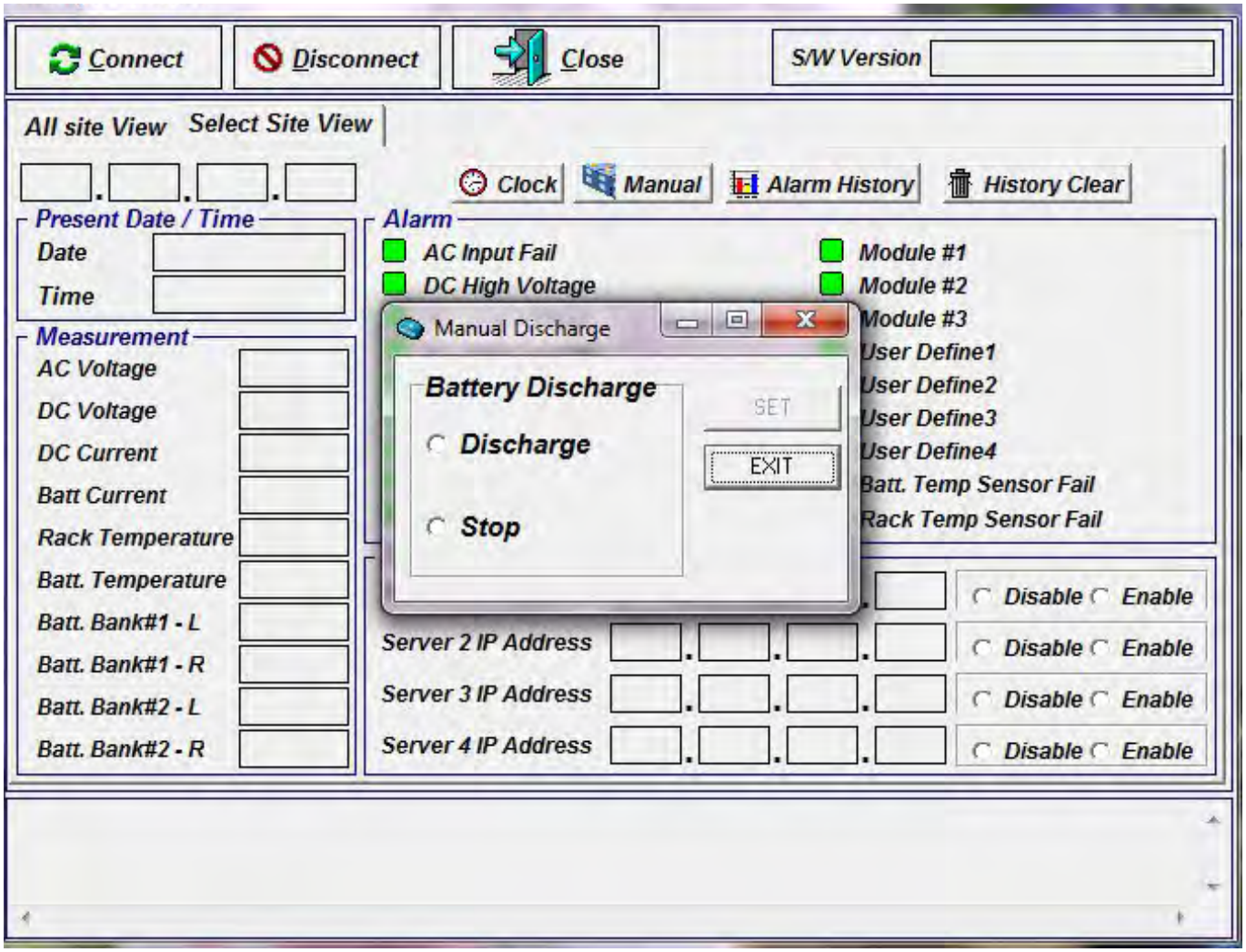


6.3.3.11 Date and Time: The present date and time will appear in the **Date/Time** boxes. If the date or time is incorrect, select the **Clock** button; the following menu will appear.



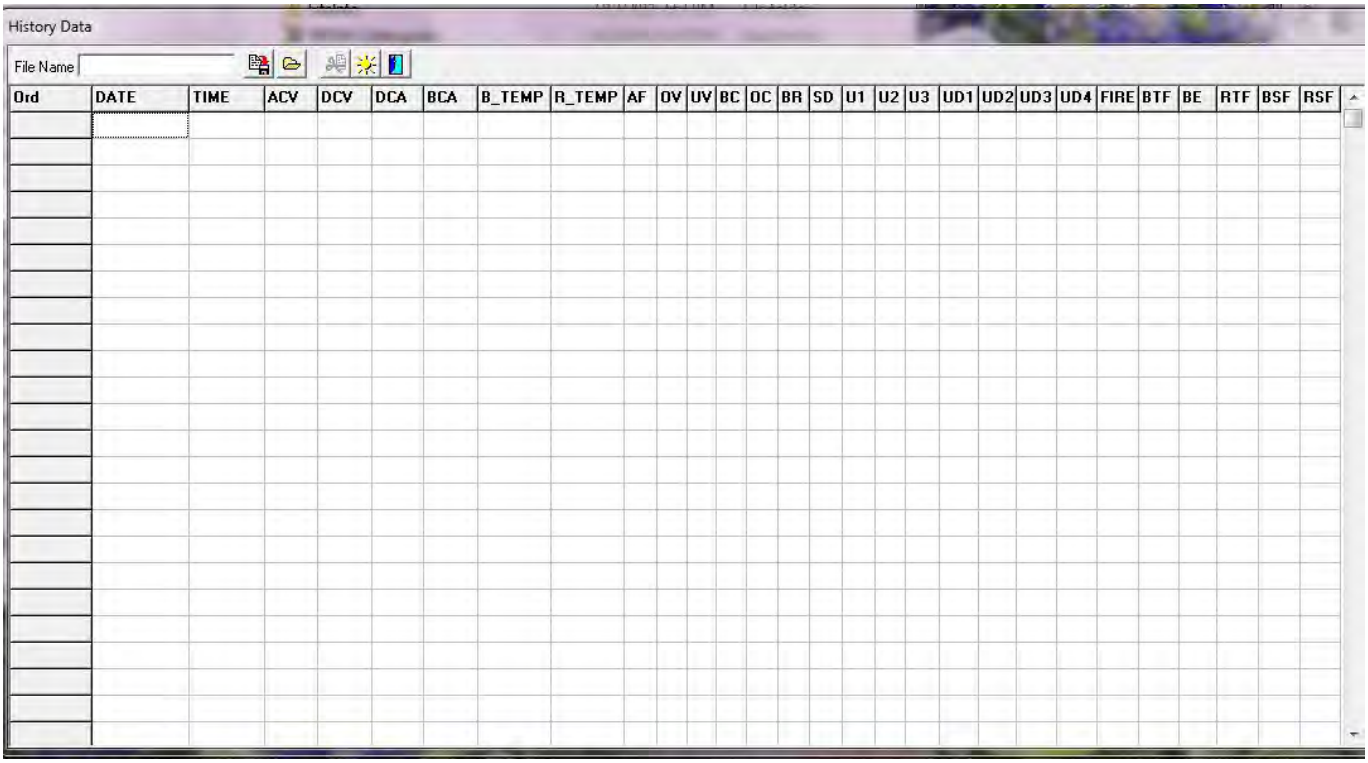
6.3.3.11.1 To correct the date: Enter the month and year in their associated fileds and select the day from the calendar. To correct the time, enter the hour, minute and second in their fields. Select **OK** to go back to the main menu.

6.3.3.12 The **Manual** button starts a battery discharge test. The following menu will appear:

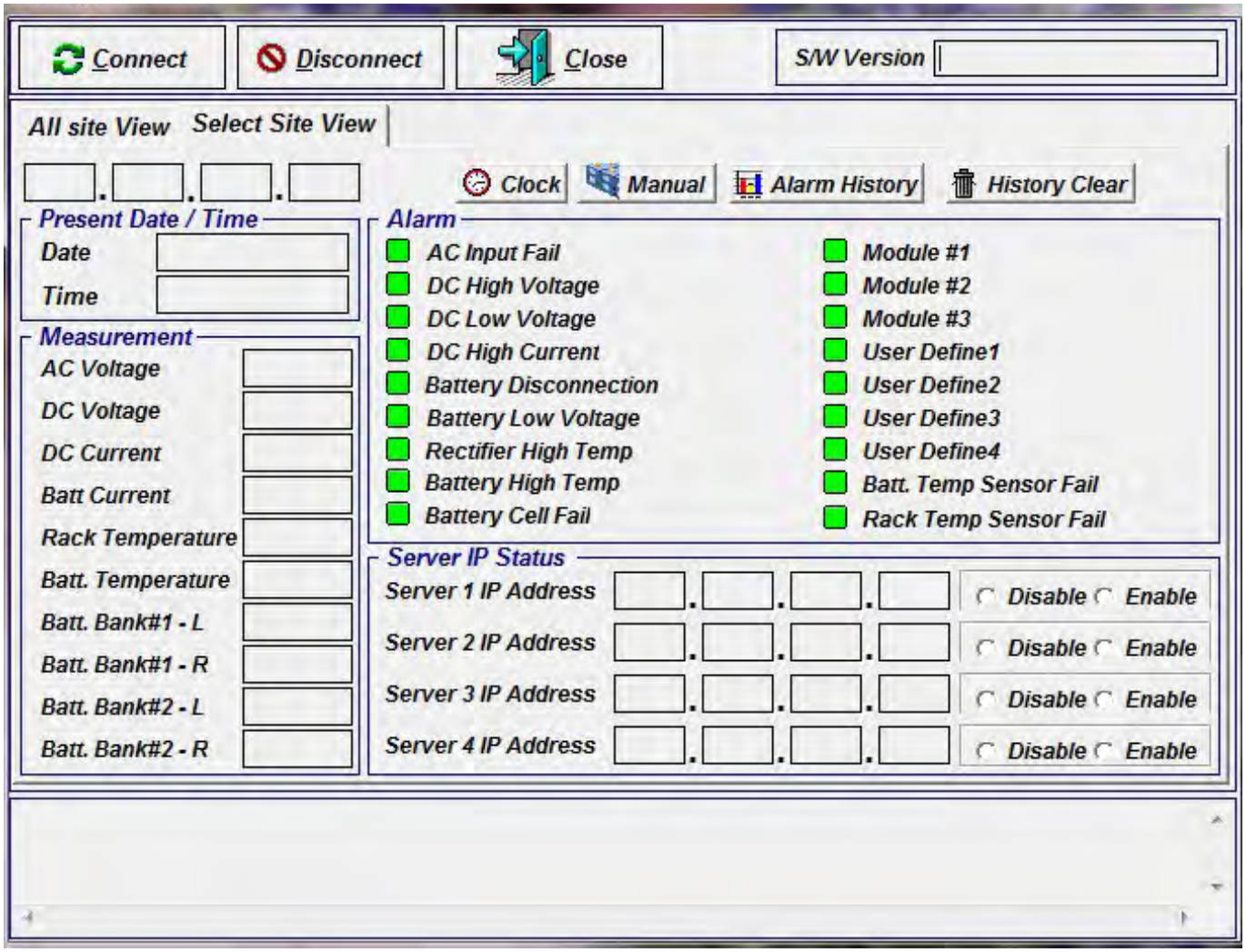


6.3.3.12.1 To start the battery discharge test, select **Discharge** and **Set**. To stop a battery discharge test, select **Stop** and **Set**. Select **Exit** to go back to the main menu.

6.3.3.13 The **Alarm History** button will bring up the following screen.



6.3.3.13.1 The alarms will continue to fill the page and scroll through until the **Stop Request** button is selected (third button from left). To write the results to the PC, select the **Write** button, (first button from left). To retrieve an alarm file from your PC, select the **Open File** button. To start collecting alarm data select the new request button, (fourth button from left).



6.3.3.14 The **History Clear** button will clear out all previous alarm history that has not been saved to disk.

6.3.3.15 Alarms: If there is an alarm, the check box associated with the alarm will turn red.

6.3.3.16 Measurements: Each text box in the **Measurement** section will display the current value of that measurement.

6.3.3.17 **S/W Version** refers to the software version of the TCP/IP program being run.

6.3.3.18 The **Server IP Address** section shows the Server 1 ~ 4 IP address that was assigned in step 6.3.3.1.