



EnCell™ Battery Cell Monitor

Instruction Manual

Model RCC15S02 & RCC15S12



NERC Compliant

YOUR PATH TO ZERO DOWNTIME

enchargepowersystems.com
sales@enchargepowersystems.com
(888) 407.5040

Contents

1	Warnings, Cautions, and Notes	1
2	Description	1
3	Features	1
3.1	STANDARD FEATURES.....	1
3.2	FRONT PANEL FEATURES.....	2
3.2.1	Display.....	2
3.2.2	OK LED	2
3.2.3	FAULT LED	2
3.2.4	Push Button Controls	3
3.2.5	15 Cell Voltage Sense.....	3
3.2.6	DC Input	3
3.2.7	Output Relay	3
3.2.8	Bottom Panel Features.....	4
3.2.9	RS485 Port.....	4
3.2.10	Temp Sense	4
3.2.11	Ethernet.....	4
3.2.12	Negative Voltage Sense.....	4
3.2.13	Side Panel Features.....	4
3.2.14	Current Sense	5
3.2.15	Ground Fault	5
4	Operation.....	5
4.1	FRONT PANEL DISPLAY AND PUSH BUTTON CONTROLS	5
5	Installation	6
5.1	MOUNTING	6
5.1.1	Wall Mount.....	6
5.2	EXTERNAL WIRING CONNECTIONS TO BATTERY CELLS	6
5.2.1	For an installation that has 15 battery cells:.....	6
5.3	INPUT POWER CONNECTIONS	14
5.4	TEMPERATURE SENSOR INPUT	14
5.5	VOLTAGE MONITOR RELAY.....	14
6	Basic Setup Procedure	15
7	MENU CONTROL AND ADJUSTMENTS:	15
7.1	STATUS	15
7.1.1	BASIC.....	15
7.1.2	Additional information under ADVANCED mode	16
7.2	FAULT HISTORY MENU	16
7.2.1	BASIC.....	16
7.2.2	Additional options under ADVANCED Mode.....	16
7.3	SETPOINTS MENU.....	17
7.3.1	BASIC SET POINTS	17
7.3.2	Additional options under ADVANCED SETPOINTS	17
7.4	FACTORY DEFAULTS.....	18
7.5	CELL MONITOR.....	18
8	Hosted web page.....	18
8.1	LOGIN	18
8.2	STATUS PAGE	19
8.3	SETTINGS.....	19
9	Specifications	20

List of Tables

Table 1. Warnings, Cautions, and Notes..... 1
Table 2. FAULT LED States 2
Table 3. General Specifications 20
Table 4. Model Specifications 20



List of Figures

Figure 1. Front of Multiple Cell Monitor 2
Figure 2. Bottom of Multiple Cell Monitor 4
Figure 3. Side of Multiple Cell Monitor 4
Figure 4. Push Button Controls 5
Figure 5. System Status 19
Figure 6. Monitor Settings..... 19
Figure 7. Wiring Diagram for Voltage Sense, 21

1 WARNINGS, CAUTIONS, AND NOTES

Please read the entire instruction manual before using the battery cell monitor. Also, read the warnings, cautions, and notes in Table 1. Failure to observe the warnings and cautions can lead to equipment damage or personal injury. If you have any questions concerning the manufacture, design, function, installation, operation or maintenance, contact EnCharge Power Systems before proceeding.

Table 1. Warnings, Cautions, and Notes

Symbol	Description
	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate personal injury. It may also be used to alert against unsafe practices.
NOTE	NOTE indicates explanatory information that applies to the next step in the procedure. It is used to clarify and expand upon the importance of the procedural step when needed.

2 DESCRIPTION

The Multiple Cell Monitor is capable of monitoring 15 battery voltages at one time with a maximum string voltage of 45VDC (RSS15S02) or 203VDC (RCC15S12).

The Multiple Cell Monitor has an input voltage range of **10-30VDC** to power it. It has an operating temperature range of -40°F to +158°F (-40°C to 70°C) allowing it to work effectively in a wide temperature range.

A set of contacts are provided for monitoring the High and Low Battery Voltage, Current, Ground Fault and Temperature alarms, which have user defined settings.

3 FEATURES

3.1 Standard Features

- Monitors & records voltage and optional temperature of each individual battery cell
- Monitors & records optional current levels
- If voltage, temperature, or current is outside a predetermined level an alarm will be sent to alert appropriate railroad personnel
- Draws minimal power from the battery bank
- Ethernet, relay output and RS485 to accommodate a variety of inputs and outputs
- Easy to read 15 line display
- Cell balancing
- Impedance measurement on demand or scheduled
- Inter cell resistance reading
- Ethernet Port for Monitoring and Configuration.
- Form C Dry Contact fused 2 Amp Relay Output
- Local Battery Voltage and Current Sensing
- AC & DC Circuit Transient Protection
- Meets or Exceeds AAR/AREMA Specifications

3.2 Front Panel Features

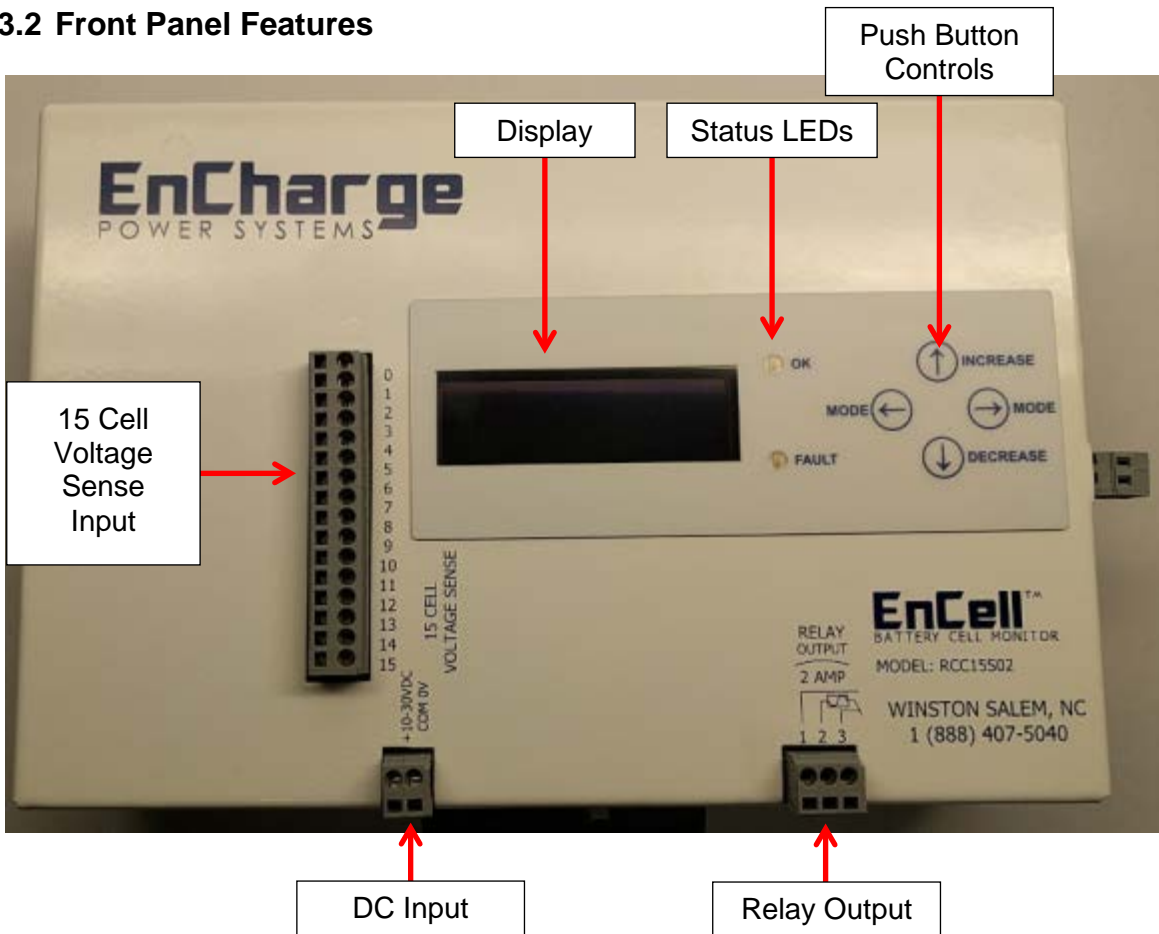


Figure 1. Front of Multiple Cell Monitor

3.2.1 Display

The display is a 4 x 20 Character OLED display. It enters “sleep mode” after inactivity to extend the life of the display. To “wake” the display, press any control button.

3.2.2 OK LED

The OK LED is on when the DC Output Voltage is between the **HIGH VOLTAGE FAULT** and **LOW VOLTAGE FAULT** settings.

3.2.3 FAULT LED

The FAULT LED has three different states, OFF, ON and BLINKING. In addition to the FAULT LED, the display will show fault description. The fault conditions are described in the table below.

Table 2. FAULT LED States

Description	FAULT LED (Red)
No Fault	OFF
Battery Temperature Fault	ON
Battery Current Fault	ON
Battery Voltage Fault	ON

3.2.4 Push Button Controls

The push button controls have mode left / mode right / increase / decrease. See section 4 and section 7 for operations and menu options.

3.2.5 15 Cell Voltage Sense

The Multiple Cell Monitor's (16) position WAGO terminal connector is used to connect the red voltage sense wires from the monitor to the battery bank.

3.2.6 DC Input

The Multiple Cell Monitor is powered by a 10-30VDC source. Connect the negative wire to the (2) position WAGO terminal labeled "Com 0V." Connect the positive wire to the (2) position WAGO terminal connector labeled "+10-30VDC."

3.2.7 Output Relay

The voltage monitor provides a Form C dry contact relay which can be used to indicate when the battery voltage, current and temperature are either above or below the parameter settings.

The voltage monitor circuit is independent from the battery charger system and the AC power. Voltage monitor can operate from the battery voltage.

The "normally open" contact is closed when the battery voltage, current and temperature is between the high and low settings.

The relay is rated for 2 Amps at 60 VDC, or 2 Amps at resistive loads. The mechanical contact life is 5,000,000 operations. Minimum inductive life @ .5 Amps, 12vdc is 50,000 times.

The voltage monitor can be used for an alarm by connecting the coil of an indication relay to the normally open relay contact terminals on the battery charger, with power for the relay supplied by others.

The voltage monitor relay is protected with a 2 Amp, 32 VDC, fast acting mini fuse (use Littelfuse® part number 0297002 or equivalent).

3.2.8 Bottom Panel Features

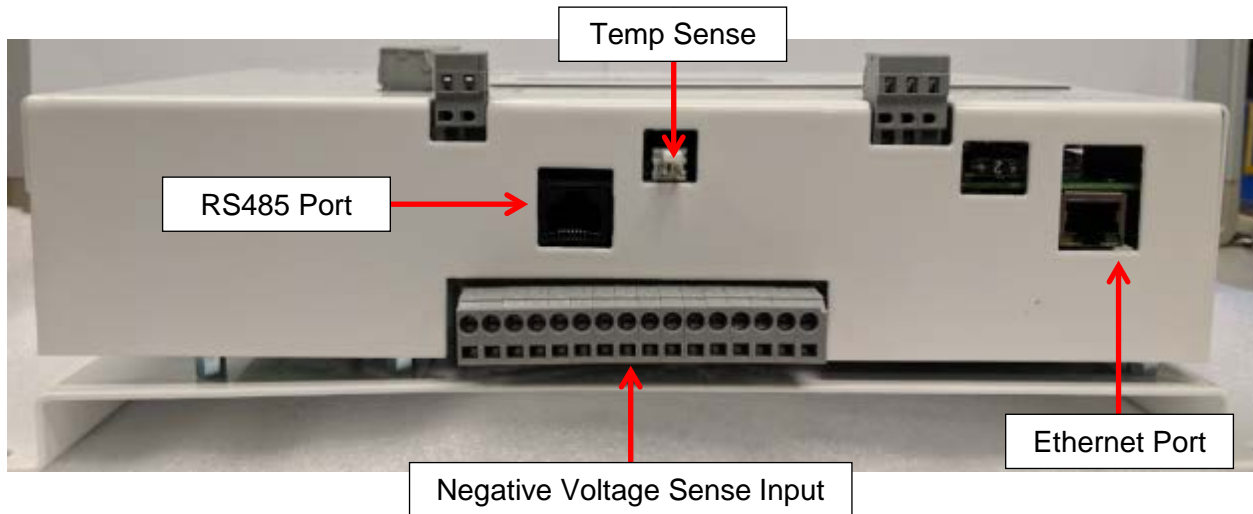


Figure 2. Bottom of Multiple Cell Monitor

3.2.9 RS485 Port

The RS485 is connected to current coils for current sensing capability.

3.2.10 Temp Sense

The RTD Temperature Sensor is used to monitor the cell temperature. The probe end can be placed between battery cells to accurately monitor battery temperature.

3.2.11 Ethernet

This RJ45 Ethernet connection is used for accessing the monitor, either via its internal webpage or via the Remote Monitoring Server.

3.2.12 Negative Voltage Sense

The Multiple Cell Monitor's (16) position WAGO terminal connector is used to connect the brown negative voltage wires from the monitor to the battery bank.

3.2.13 Side Panel Features



Figure 3. Side of Multiple Cell Monitor

3.2.14 Current Sense

The Multiple Cell Monitor's (12) position WAGO terminal connector is used to connect the blue current sense wires from the monitor to the battery bank.

3.2.15 Ground Fault

The Ground Fault input is a (2) position WAGO terminal block. This is used to detect a ground fault.

4 OPERATION

4.1 Front Panel Display and Push Button Controls

The front panel has the (4) line display, status LED display and four control buttons. The display will auto dim after several minutes of inactivity. Once a button is pressed the display will return to full brightness.

SET-UP AND ADJUSTMENTS: To change settings do the following:



Figure 4. Push Button Controls

MODE LEFT/MODE RIGHT

Pushing the **MODE UP** or **MODE DOWN** push button will cycle up or down through the menus. Each time you press one of the **MODE** buttons, you will advance one menu selection.

VALUE INCREASE/VALUE DECREASE

The **VALUES INCREASE** and **DECREASE** push button allows you to change the displayed values. **NOTE:** Values that are changed will be saved after 15 minutes, or when you return to the status screen.

5 INSTALLATION



WARNING: It is advised to take extreme caution when dealing with high DC voltages. If precautions are not taken, injury or even death can result.

NOTE: The term “Highest” refers to the battery cell with the highest potential. The term “Lowest” refers to the battery cell with the lowest potential.

NOTE: The Voltage Sense and Negative Voltage Sense Wires should be connected closest to the battery terminals.

5.1 Mounting

5.1.1 Wall Mount

Use the two-four keyed slots on the back of the monitor for mounting to a wall.

5.2 External Wiring Connections to Battery Cells

5.2.1 For an installation that has 15 battery cells:

For an installation that has 15 battery cells:

Voltage Sense (Red Wire)

1. Connect the red “1” wire to the positive terminal of the highest battery cell
2. Connect the red “2” wire to the positive terminal of the second battery cell
3. Connect the red “3” wire to the positive terminal of the third battery cell
4. Connect the red “4” wire to the positive terminal of the fourth battery cell
5. Connect the red “5” wire to the positive terminal of the fifth battery cell
6. Connect the red “6” wire to the positive terminal of the sixth battery cell
7. Connect the red “7” wire to the positive terminal of the seventh battery cell
8. Connect the red “8” wire to the positive terminal of the eighth battery cell
9. Connect the red “9” wire to the positive terminal of the ninth battery cell
10. Connect the red “10” wire to the positive terminal of the tenth battery cell
11. Connect the red “11” wire to the positive terminal of the eleventh battery cell
12. Connect the red “12” wire to the positive terminal of the twelfth battery cell
13. Connect the red “13” wire to the positive terminal of the thirteenth battery cell
14. Connect the red “14” wire to the positive terminal of the fourteenth battery cell
15. Connect the red “15” wire to the positive terminal of the lowest battery cell
16. Connect the black “0” wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown “1” wire to the negative terminal of the highest battery cell
2. Connect the brown “2” wire to the negative terminal of the second battery cell
3. Connect the brown “3” wire to the negative terminal of the third battery cell
4. Connect the brown “4” wire to the negative terminal of the fourth battery cell
5. Connect the brown “5” wire to the negative terminal of the fifth battery cell
6. Connect the brown “6” wire to the negative terminal of the sixth battery cell
7. Connect the brown “7” wire to the negative terminal of the seventh battery cell
8. Connect the brown “8” wire to the negative terminal of the eighth battery cell
9. Connect the brown “9” wire to the negative terminal of the ninth battery cell

10. Connect the brown "10" wire to the negative terminal of the tenth battery cell
11. Connect the brown "11" wire to the negative terminal of the eleventh battery cell
12. Connect the brown "12" wire to the negative terminal of the twelfth battery cell
13. Connect the brown "13" wire to the negative terminal of the thirteenth battery cell
14. Connect the brown "14" wire to the negative terminal of the fourteenth battery cell
15. Connect the brown "15" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the tenth battery cell
7. Connect the blue "7" wire to the negative terminal of the twelfth battery cell
8. Connect the blue "8" wire to the negative terminal of the fourteenth battery cell
9. Connect the blue "9" wire to the negative terminal of the lowest battery cell

For an installation that has 14 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the eighth battery cell
9. Connect the red "9" wire to the positive terminal of the ninth battery cell
10. Connect the red "10" wire to the positive terminal of the tenth battery cell
11. Connect the red "11" wire to the positive terminal of the eleventh battery cell
12. Connect the red "12" wire to the positive terminal of the twelfth battery cell
13. Connect the red "13" wire to the positive terminal of the thirteenth battery cell
14. Connect the red "14" wire to the positive terminal of the lowest battery cell
15. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the eighth battery cell
9. Connect the brown "9" wire to the negative terminal of the ninth battery cell
10. Connect the brown "10" wire to the negative terminal of the tenth battery cell
11. Connect the brown "11" wire to the negative terminal of the eleventh battery cell
12. Connect the brown "12" wire to the negative terminal of the twelfth battery cell

13. Connect the brown "13" wire to the negative terminal of the thirteenth battery cell
14. Connect the brown "14" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the tenth battery cell
7. Connect the blue "7" wire to the negative terminal of the twelfth battery cell
8. Connect the blue "8" wire to the negative terminal of the lowest battery cell

For an installation that has 13 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the eighth battery cell
9. Connect the red "9" wire to the positive terminal of the ninth battery cell
10. Connect the red "10" wire to the positive terminal of the tenth battery cell
11. Connect the red "11" wire to the positive terminal of the eleventh battery cell
12. Connect the red "12" wire to the positive terminal of the twelfth battery cell
13. Connect the red "13" wire to the positive terminal of the lowest battery cell
14. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the eighth battery cell
9. Connect the brown "9" wire to the negative terminal of the ninth battery cell
10. Connect the brown "10" wire to the negative terminal of the tenth battery cell
11. Connect the brown "11" wire to the negative terminal of the eleventh battery cell
12. Connect the brown "12" wire to the negative terminal of the twelfth battery cell
13. Connect the brown "13" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell

5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the tenth battery cell
7. Connect the blue "7" wire to the negative terminal of the twelfth battery cell
8. Connect the blue "8" wire to the negative terminal of the lowest battery cell

For an installation that has 12 battery cells

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the eighth battery cell
9. Connect the red "9" wire to the positive terminal of the ninth battery cell
10. Connect the red "10" wire to the positive terminal of the tenth battery cell
11. Connect the red "11" wire to the positive terminal of the eleventh battery cell
12. Connect the red "12" wire to the positive terminal of the lowest battery cell
13. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the eighth battery cell
9. Connect the brown "9" wire to the negative terminal of the ninth battery cell
10. Connect the brown "10" wire to the negative terminal of the tenth battery cell
11. Connect the brown "11" wire to the negative terminal of the eleventh battery cell
12. Connect the brown "12" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the tenth battery cell
7. Connect the blue "7" wire to the negative terminal of the lowest battery cell

For an installation that has 11 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell

4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the eighth battery cell
9. Connect the red "9" wire to the positive terminal of the ninth battery cell
10. Connect the red "10" wire to the positive terminal of the tenth battery cell
11. Connect the red "11" wire to the positive terminal of the lowest battery cell
12. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the eighth battery cell
9. Connect the brown "9" wire to the negative terminal of the ninth battery cell
10. Connect the brown "10" wire to the negative terminal of the tenth battery cell
11. Connect the brown "11" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the tenth battery cell
7. Connect the blue "7" wire to the negative terminal of the lowest battery cell

For an installation that has 10 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the eighth battery cell
9. Connect the red "9" wire to the positive terminal of the ninth battery cell
10. Connect the red "10" wire to the positive terminal of the lowest battery cell
11. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell

4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the eighth battery cell
9. Connect the brown "9" wire to the negative terminal of the ninth battery cell
10. Connect the brown "10" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the lowest battery cell

For an installation that has 9 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the eighth battery cell
9. Connect the red "9" wire to the positive terminal of the lowest battery cell
10. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the eighth battery cell
9. Connect the brown "9" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the eighth battery cell
6. Connect the blue "6" wire to the negative terminal of the lowest battery cell

For an installation that has 8 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the seventh battery cell
8. Connect the red "8" wire to the positive terminal of the lowest battery cell
9. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the seventh battery cell
8. Connect the brown "8" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the lowest battery cell

For an installation that has 7 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the sixth battery cell
7. Connect the red "7" wire to the positive terminal of the lowest battery cell
8. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the sixth battery cell
7. Connect the brown "7" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell

4. Connect the blue "4" wire to the negative terminal of the sixth battery cell
5. Connect the blue "5" wire to the negative terminal of the lowest battery cell

For an installation that has 6 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the red "6" wire to the positive terminal of the lowest battery cell
7. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the fifth battery cell
6. Connect the brown "6" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the lowest battery cell

For an installation that has 5 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the fourth battery cell
5. Connect the red "5" wire to the positive terminal of the fifth battery cell
6. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the fourth battery cell
5. Connect the brown "5" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the lowest battery cell

For an installation that has 4 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the third battery cell
4. Connect the red "4" wire to the positive terminal of the lowest battery cell
5. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the third battery cell
4. Connect the brown "4" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the fourth battery cell
4. Connect the blue "4" wire to the negative terminal of the lowest battery cell

For an installation that has 3 battery cells:

Voltage Sense (Red Wire)

1. Connect the red "1" wire to the positive terminal of the highest battery cell
2. Connect the red "2" wire to the positive terminal of the second battery cell
3. Connect the red "3" wire to the positive terminal of the lowest battery cell
4. Connect the black "0" wire to the negative terminal of the lowest battery cell

Negative Voltage Sense (Brown Wire)

1. Connect the brown "1" wire to the negative terminal of the highest battery cell
2. Connect the brown "2" wire to the negative terminal of the second battery cell
3. Connect the brown "3" wire to the negative terminal of the lowest battery cell

Current Sense (Blue Wire)

1. Connect the blue "1" wire to the positive terminal of the highest battery cell
2. Connect the blue "2" wire to the negative terminal of the second battery cell
3. Connect the blue "3" wire to the negative terminal of the lowest battery cell

5.3 Input Power Connections

The Multiple Cell Monitor is powered by a 10-30VDC source. Connect the negative wire to the (2) position WAGO terminal labeled "Com 0V." Connect the positive wire to the (2) position WAGO terminal connector labeled "+10-30VDC."

5.4 Temperature Sensor Input

The Temperature Sensor is an RTD temperature sensor. Connect the (2) pin header to the Temp Sense input on the monitor and place the other end between the two middle cells.

5.5 Voltage Monitor Relay

Wire size should be minimum 18GA, maximum 16GA. This is a Form C dry contact relay with a Normally Open and Normally Closed set of contact.

6 BASIC SETUP PROCEDURE

To initially set up the charger, use the **INCREASE/DECREASE** buttons to move between **MENUS**, the **MODE** buttons to navigate between screens, and **INCREASE/DECREASE** buttons to change parameter values.

Go to the **SET POINTS** menu.
Set the **PASSWORD** to **5**.
Leave **USER LEVEL** at **BASIC**.
Select **BATTERY TYPE (LEAD ACID or NI-CAD)**
Set **NUMBER OF CELLS** per your battery bank.
Set **VOLTS PER CELL** to battery manufacturers specs.

The battery cell monitor should be ready to operate.

7 MENU CONTROL AND ADJUSTMENTS:

Controller Menu

The controller has 4 Menu Screens:

1. **STATUS**
2. **FAULT HISTORY**
3. **SET POINTS**
4. **FACTORY DEFAULTS**

Menu Screen Selection:

To select the desired Menu Screen, press the **MODE LEFT** or **RIGHT** button until ****** MENU SELECT ****** is displayed, on line 1, and then use the **INCREASE** or **DECREASE** Value button to select the appropriate menu. Once the appropriate menu is selected, use the **MODE LEFT** or **RIGHT** buttons to view the contents of the menu.

NOTE: Use the Increase or Decrease buttons to change set point values.

7.1 STATUS

The STATUS Screen can display **BASIC** or **ADVANCED** information based on what the **USER LEVEL** is set to.

7.1.1 BASIC

BATTERY CELL VOLTAGE – Displays the voltage of each cell.

TEMP SENSE – Displays the temperature measured by the temperature sensor, if a temperature probe is installed. If there isn't a temperature probe installed, this field will be blank.

TOTAL VOLTAGE – Displays the total voltage of the battery string.

CONDUNCTANCE – Displays the measured conductance of the battery string.

START CONDUCTANCE TEST – This will start the test that measures the conductance of the battery string.

7.1.2 Additional information under ADVANCED mode

TOTAL OUTPUT POWER – This displays the total output power utilized over time.

RESETTABLE OUTPUT POWER – This is a resettable display of output power utilized over time. To reset this meter to zero, press the **DECREASE** button.

TOTAL HOUR METER – This displays the total hours this battery monitor has been operating.

RESETTABLE HOUR METER – This displays the total hours this battery monitor has been operating since this counter has been reset. To reset this counter to zero, press the **DECREASE** button.

CIRCUIT BOARD TEMP – This displays the temperature of internal circuit board.

7.2 FAULT HISTORY MENU

NOTE: Some faults may not show in Fault History until there is an actual fault. Press the decrease or increase button to reset the fault count.

7.2.1 BASIC

HIGH VOLTAGE FAULT COUNTER – Shows the number of times the battery monitor relay has cycled due to a high voltage fault.

LOW VOLTAGE FAULT COUNTER – Shows the number of times the battery monitor relay has cycled due to a low voltage fault.

HIGH CURRENT FAULT COUNTER – Shows the number of times the battery monitor relay has cycled due to a high current fault.

LOW CURRENT FAULT COUNTER – Shows the number of times the battery monitor relay has cycled due to a low current fault.

BATTERY OVER TEMP WARNING COUNTER – Shows the number of instances a battery over temperature warning has occurred.

BATTERY OVER TEMP FAULT COUNTER – Shows the number of times that a battery over temperature fault has occurred.

7.2.2 Additional options under ADVANCED Mode

OUTPUT RELAY/EQ RELAY – Shows the number of times the battery monitor's relay has cycled, and the number of times entering equalization.

POWER UP COUNTER – Shows the number of times the battery monitor input power was turned on.

DAYS COUNTER – Shows the total number of days the battery monitor has been operating.

TOTAL SECOND COUNTER – Shows the total number of seconds the battery monitor has been operating.

7.3 SETPOINTS MENU

Under the **SET POINTS** menu, the user defined variables are entered. The parameter screens are:

PASSWORD – To change any user defined parameter, use the increase button to enter the password of **5**. To prevent others from changing parameters, return the password to **0** after making changes. **Note:** If the password is left at **5**, it will automatically reset to **0** after ten minutes.

USER LEVEL (Requires password)

The options are **BASIC** and **ADVANCED**.

BASIC - Access to the basic menu options

ADVANCED – Access to the advanced menu options

7.3.1 BASIC SET POINTS

BATTERY TYPE – The options are **GENERIC LEAD ACID**, **GENERIC NI-CAD**.

GENERIC LEAD ACID – The type of battery being used is Lead Acid.

GENERIC NI-CAD –The type of battery being used is Ni-Cad.

NUMBER OF CELLS –

LEAD ACID - 1-15 cells are useable.

VOLTS PER CELL\TOTAL VOLTS –

HIGH VOLTAGE FAULT – This adjustment is for setting the voltage level when the voltage monitor relay toggles for an over voltage fault.

LOW VOLTAGE FAULT – This is used to set the voltage below which the voltage monitor relay changes state. As an example, it could be set for 10% below the normal battery output voltage, to trigger an alert before the voltage dropped to a point where it would no longer operate the equipment it was attached to.

7.3.2 Additional options under ADVANCED SETPOINTS

HIGH CURRENT FAULT – The parameter is the high amperage setting. The voltage monitor relay will toggle if the current is higher than the selected current.

LOW CURRENT FAULT – The voltage monitor relay will toggle if the current is lower than the selected current. This should be set lower than the expected lowest current output, as when the batteries are fully charged and no equipment is running.

HIGH BATTERY TEMP – This setting allows the user to set the temperature that will trigger a high battery temperature fault. If a high battery temperature fault occurs, the voltage monitor relay will toggle.

LOW BATTERY TEMP – This setting allows the user to set the temperature that will trigger a low battery temperature fault. If a low battery temperature fault occurs, the voltage monitor relay will toggle.

SELECT F OR C – This is used to choose the temperature units of measure. The choices are F for Fahrenheit and C for Celsius.

MY IP ADDRESS – Shows the chargers IP address. (DHCP is enabled by default)

PROG REV & DATE – This displays the firmware revision level and the date that revision was released.

7.4 FACTORY DEFAULTS

FOR FACTORY DEFULTS PRESS DECREASE – This is to allow the user to return most settings to the original factory settings by pressing the **DECREASE** button. A password of **5** is required to change this setting.

7.5 CELL MONITOR

BATTERY AMP HOURS SIZE – Shows the amount of maximum power stored in the battery in terms of current fully supplied in an hour.

8 HOSTED WEB PAGE

Settings can be changed from the hosted web page as well as from the push buttons and display on the front of the charger.

8.1 Login

To login, look up the IP address under the **SET POINTS - MY IP ADDRESS (SECTION 7.3.1 of this manual)**, and enter it in to your browser. The format should look like this <http://192.168.4.99:50000>. Make sure to add the port number of **:xxxxxx** after the IP address.

NOTE: If connecting directly to the monitor from a computer, the computer and monitor need to be on the same subnet. If the computer doesn't support Ethernet crossover detection, a crossover Ethernet cable would be required.

8.2 Status page

Show the status of the battery cell monitor.

RECo

Copyright © 2016 Railway Equipment Co.

Figure 5. System Status

8.3 Settings

Settings tab allow you to change the settings. The **username** is **admin**, and the **password** is **5**.

Monitor Settings

This page allows the configuration of the board's internal settings.

Enter the new settings for the board below:

Figure 6. Monitor Settings

9 SPECIFICATIONS

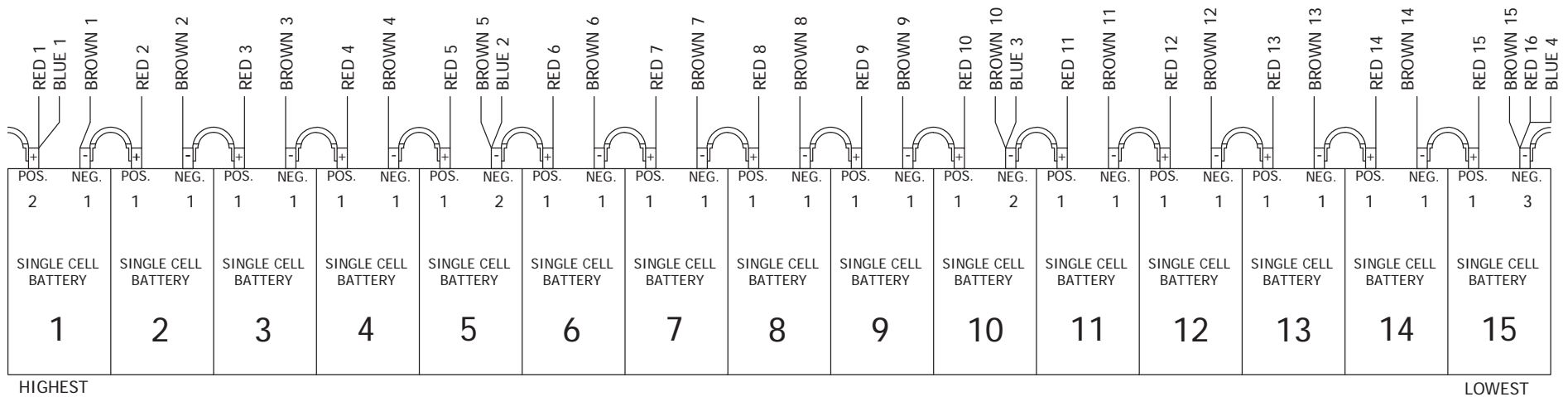
Table 3. General Specifications

Description	Specification	
Input Voltage	+10 to 30VDC	
Warranty	2 Years	
Impedance Range	100 to 5,000 μ Ohm's	
Strap Resistance	Down to 5 μ Ohm's	
Operating Temperature (0-95% non-condensing humidity)	-40°F to +158°F	-40°C to +70°C

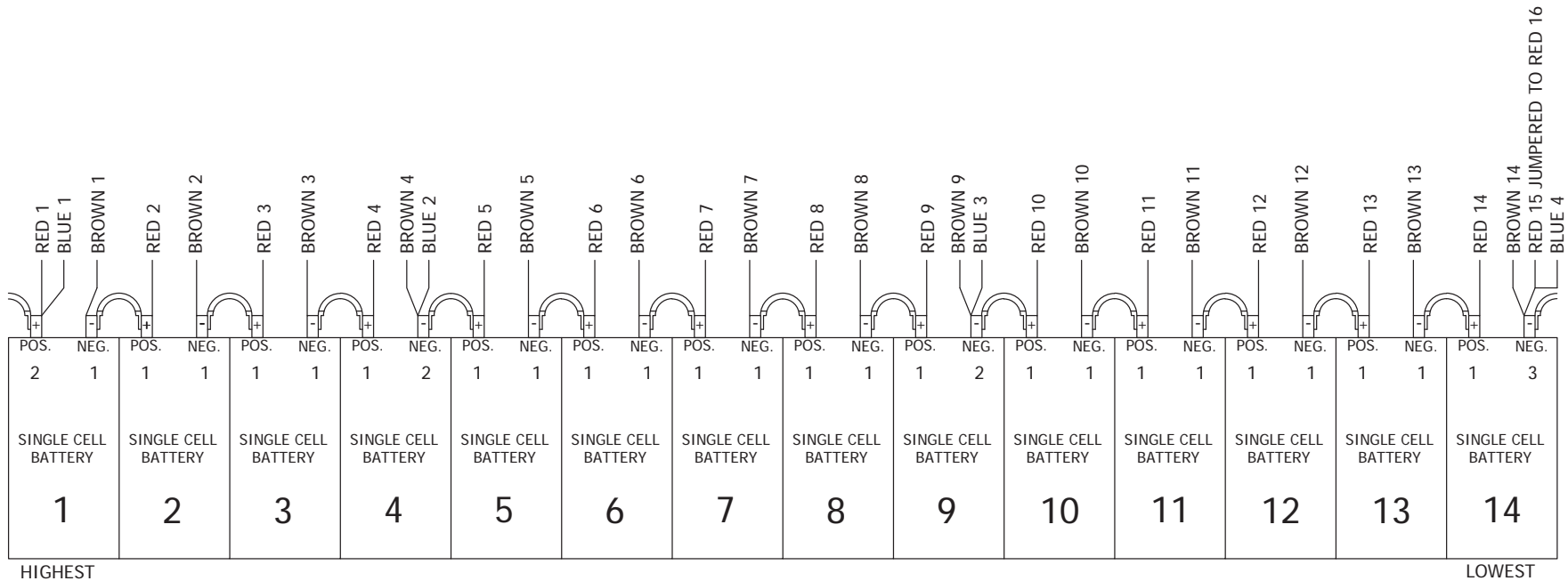
Table 4. Model Specifications

Model	Cell Voltage	No. of Cells	Monitoring Accuracy (per battery cell)	Impedance Test Current Approx.	Physical Dimensions WxHxD (in inches)
RCCS15S02	1-3VDC	1-15 Ni-Cad or Lead Acid	\pm 5mV	5 amps	13.50 x 7.50 x 4.00
RCCS15S12	5-15VDC	1-15 Ni-Cad or Lead Acid	\pm 10mV	10 amps	13.50 x 7.50 x 4.00

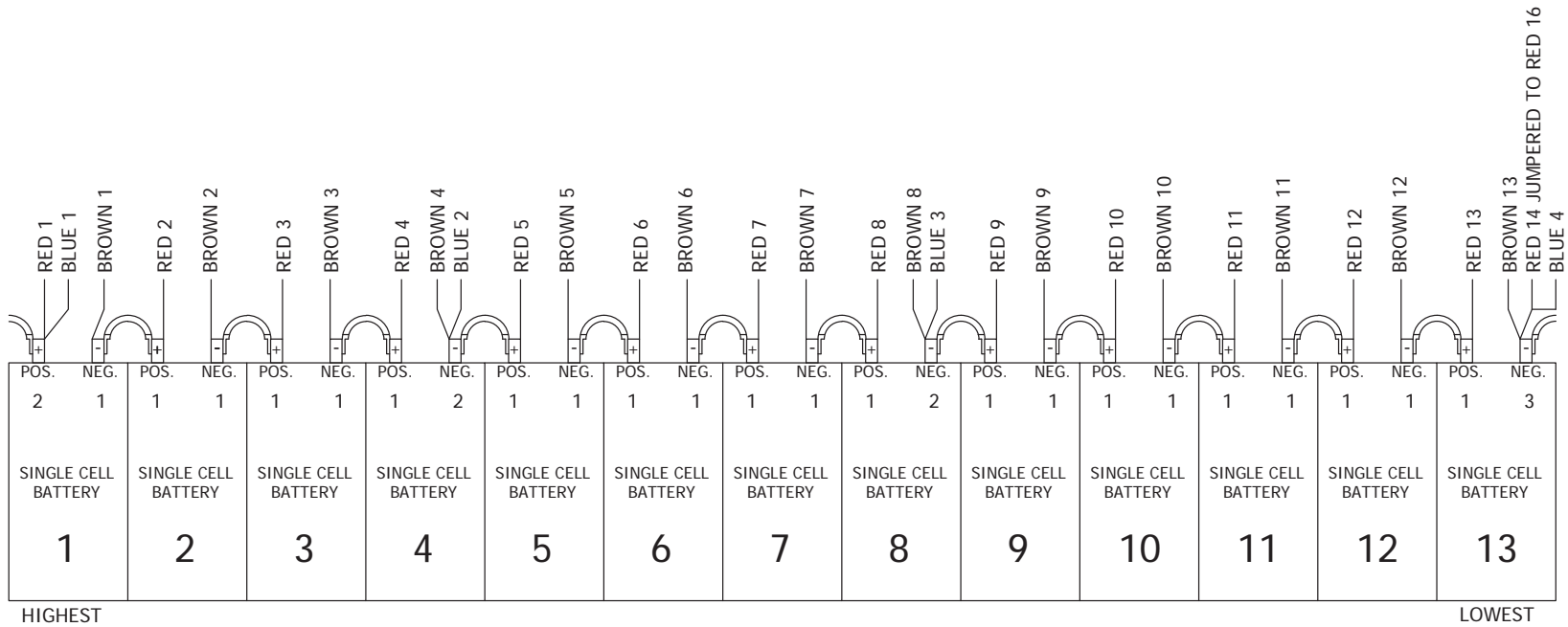
CONFIGURATION FOR (15) 1-4 VDC CELLS



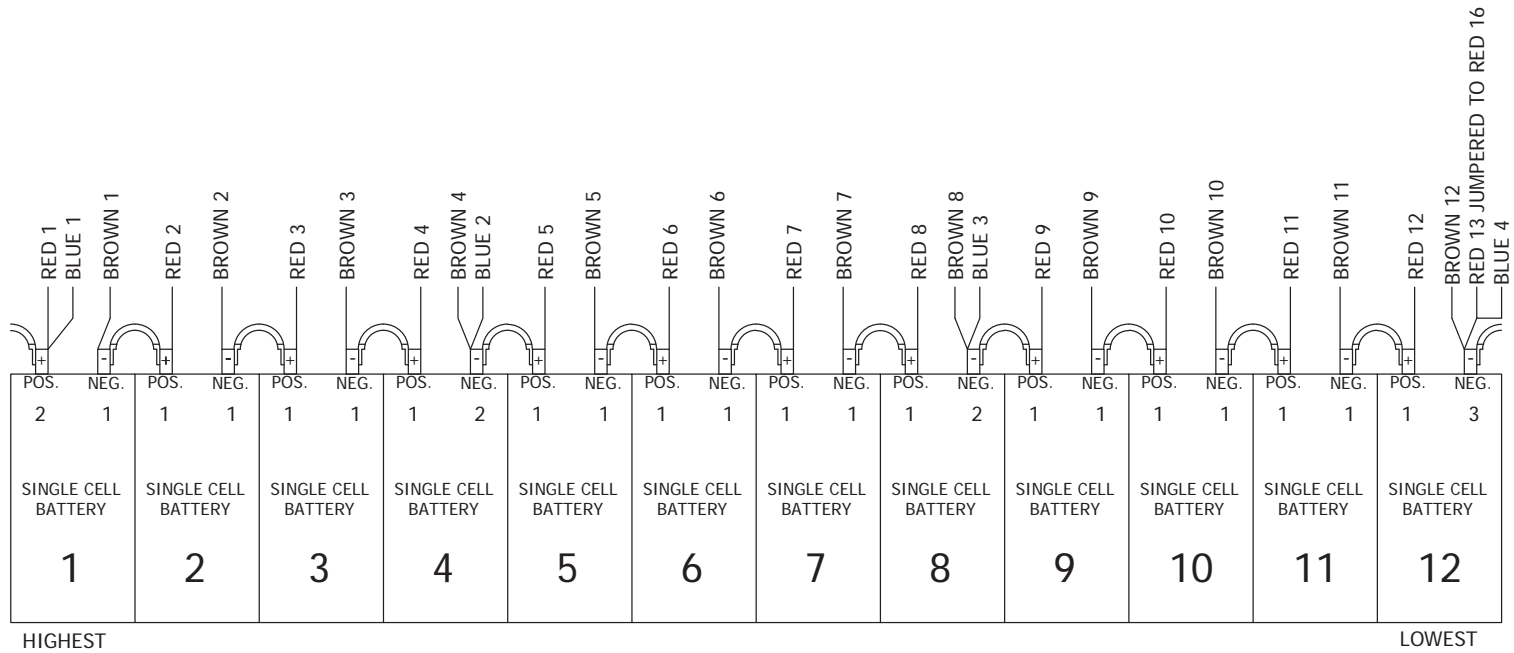
CONFIGURATION FOR (14) 1-4 VDC CELLS



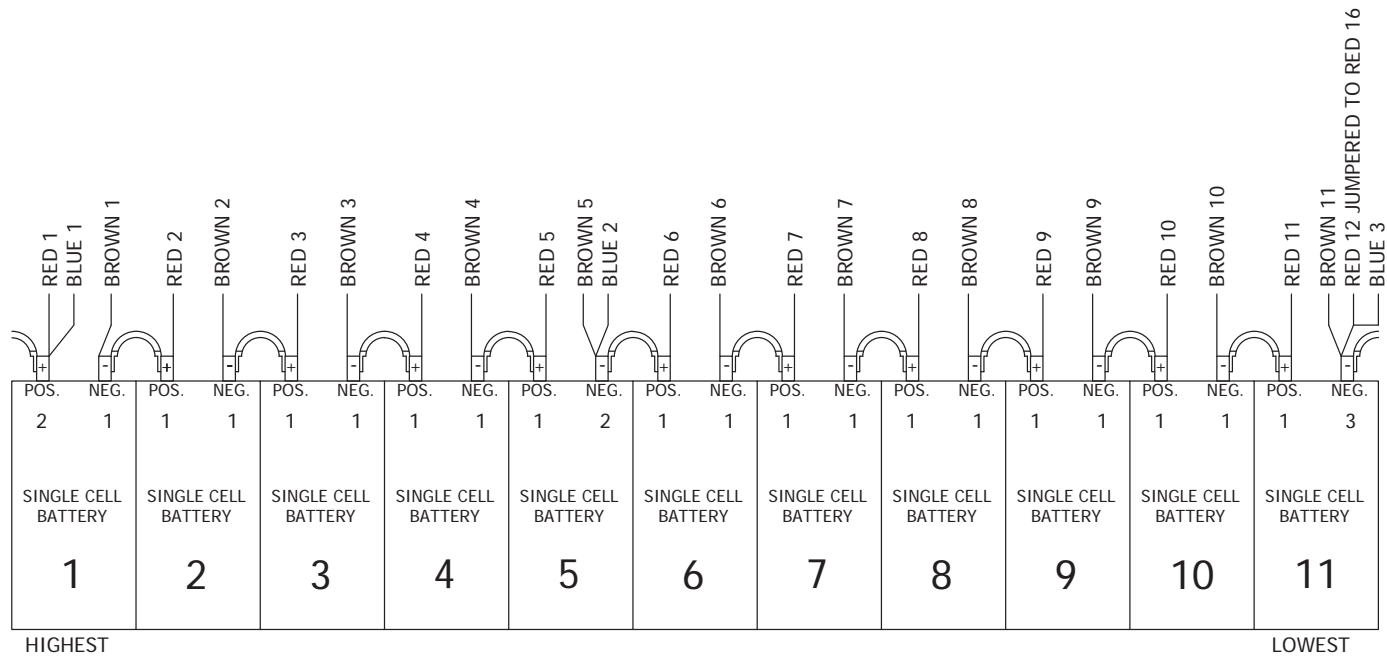
CONFIGURATION FOR (13) 1-4 VDC CELLS



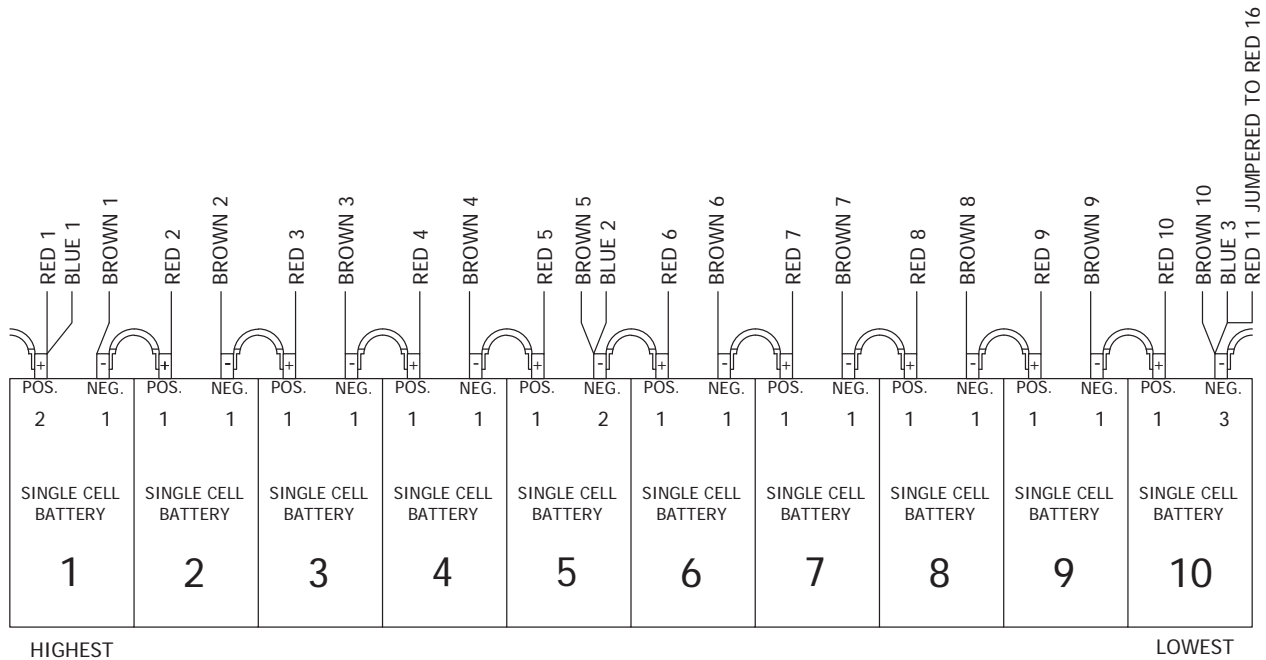
CONFIGURATION FOR (12) 1-4 VDC CELLS



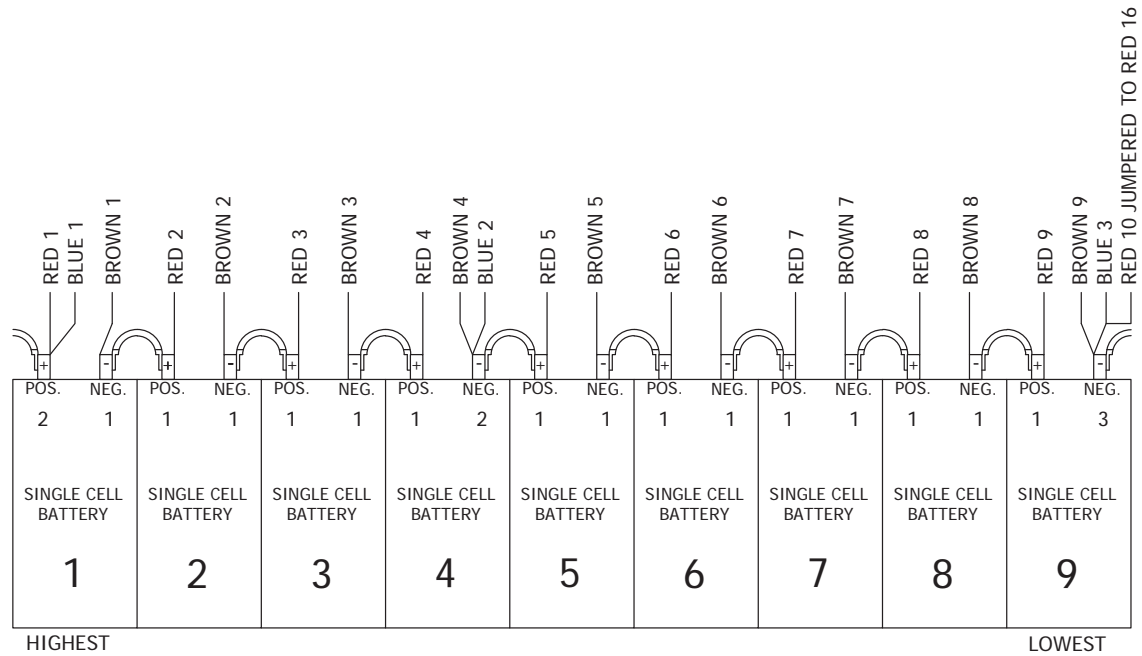
CONFIGURATION FOR (11) 1-4 VDC CELLS



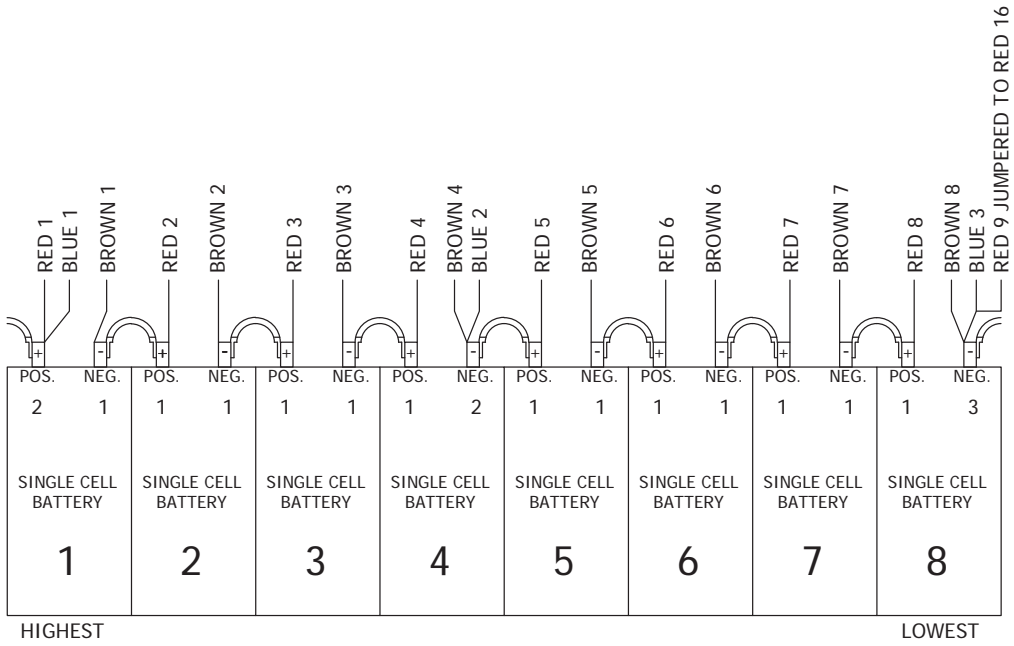
CONFIGURATION FOR (10) 1-4 VDC CELLS



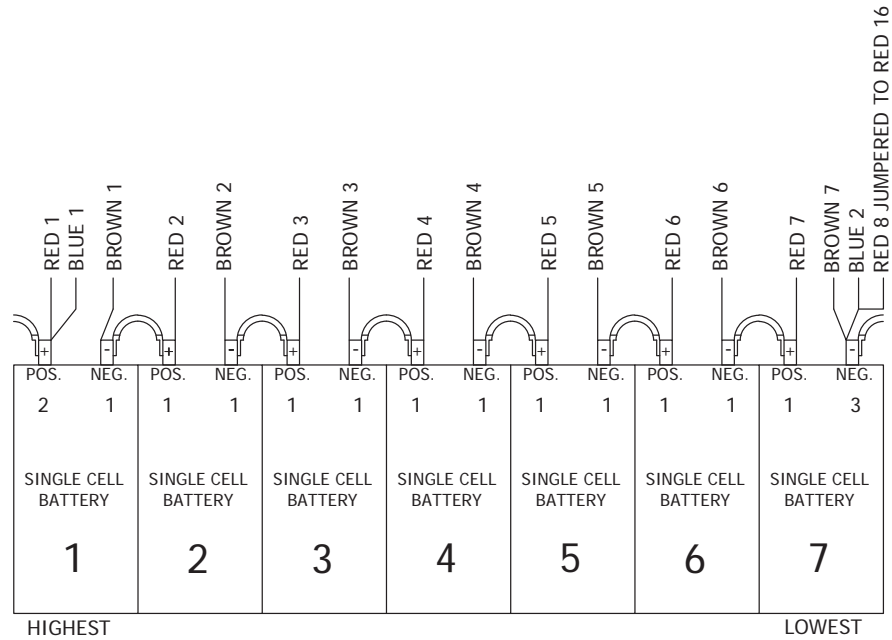
CONFIGURATION FOR (9) 1-4 VDC CELLS



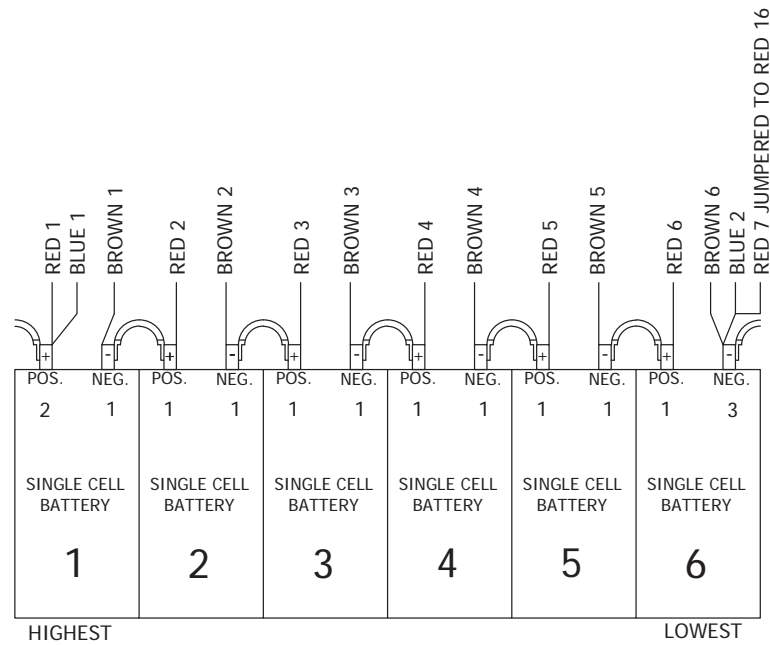
CONFIGURATION FOR (8) 1-4 VDC CELLS



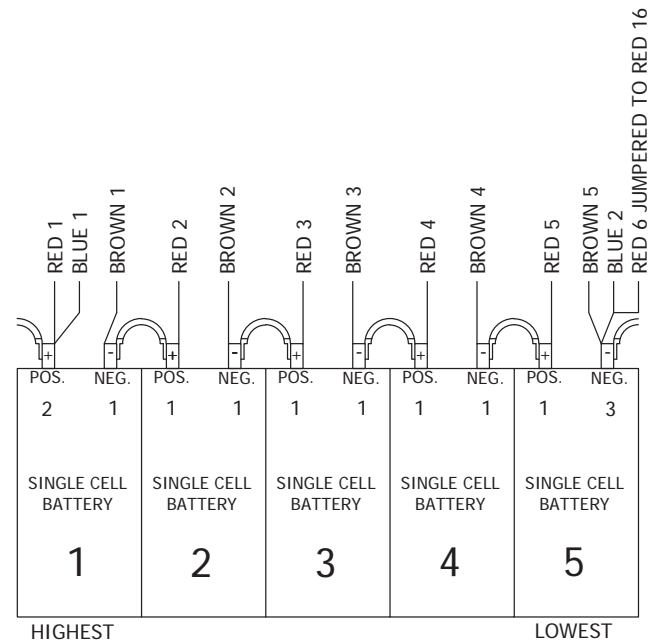
CONFIGURATION FOR (7) 1-4 VDC CELLS



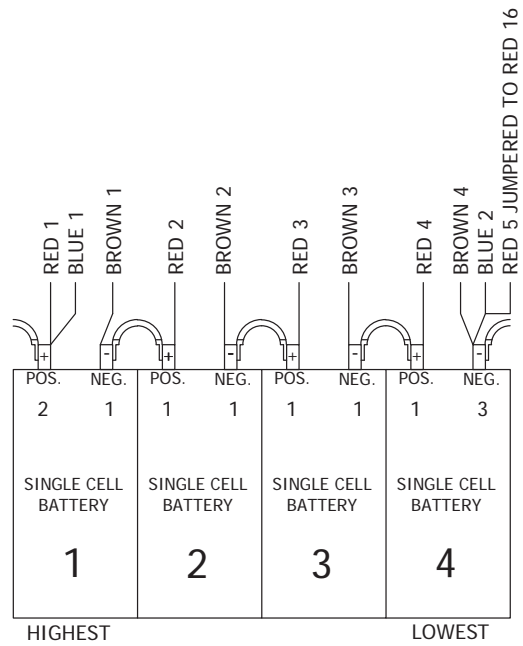
CONFIGURATION FOR (6) 1-4 VDC CELLS



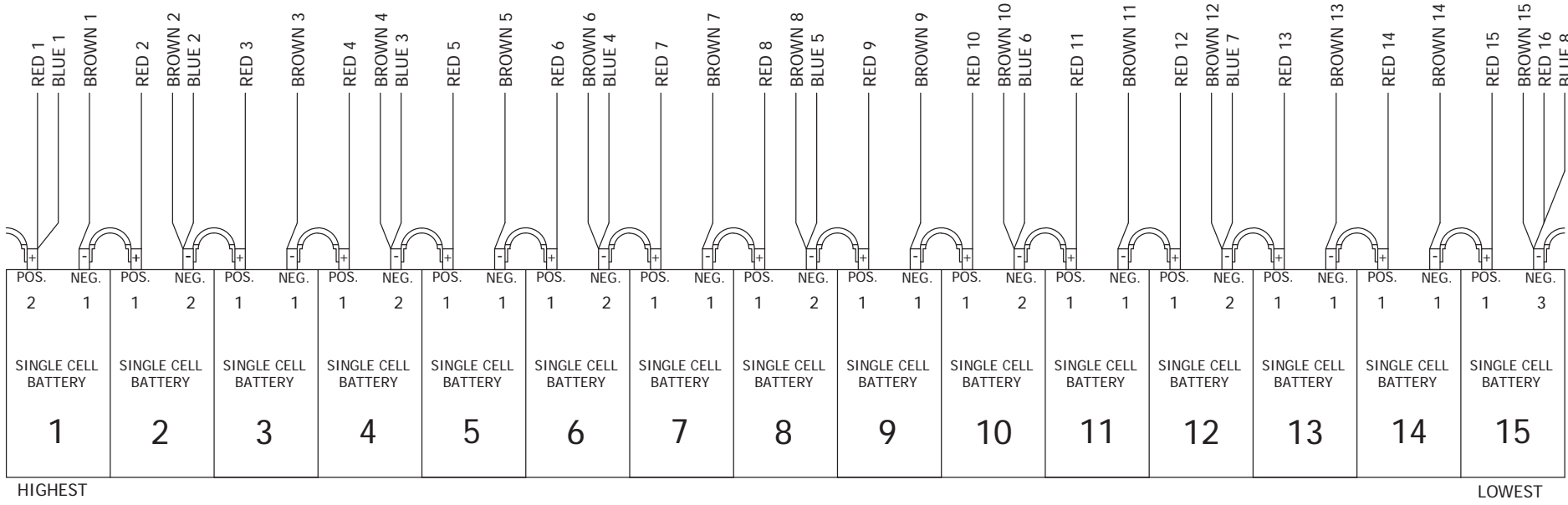
CONFIGURATION FOR (5) 1-4 VDC CELLS



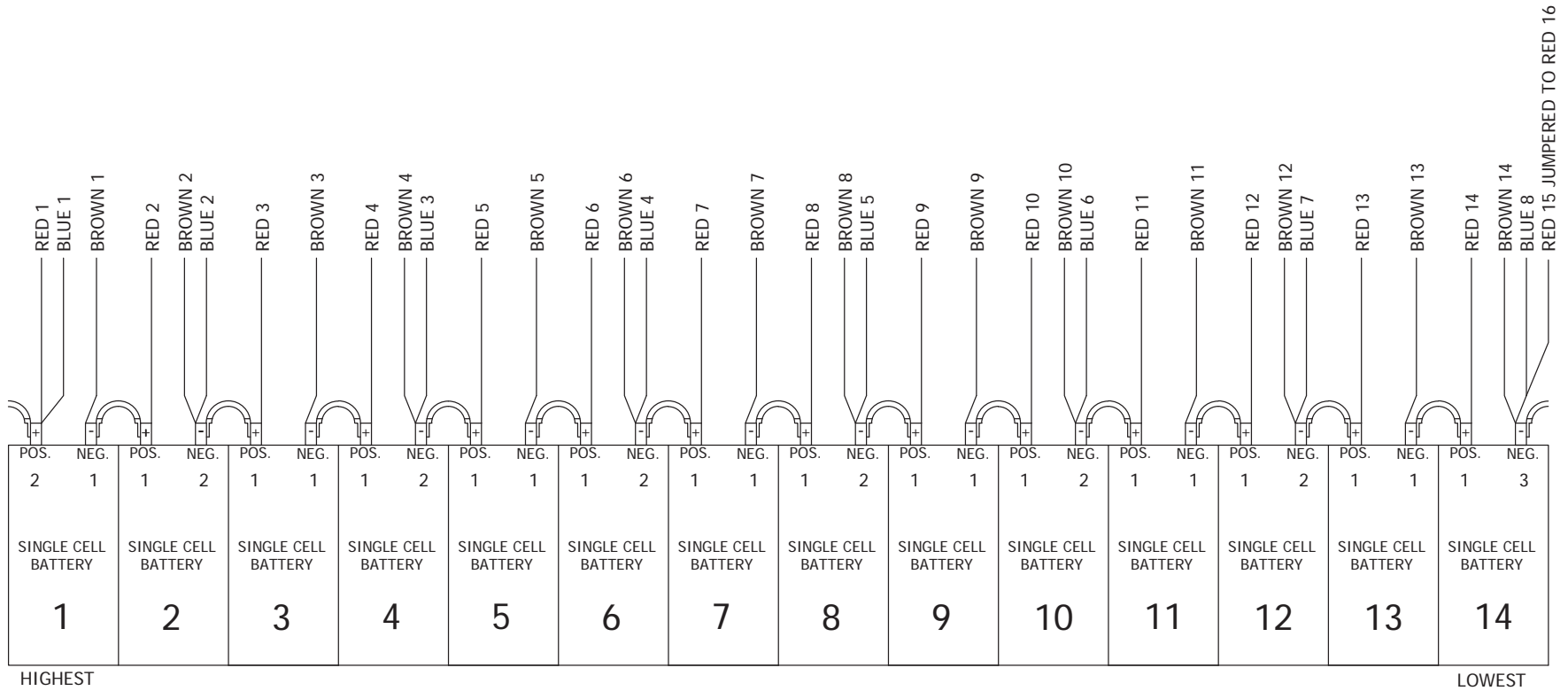
CONFIGURATION FOR (4) 1-4 VDC CELLS



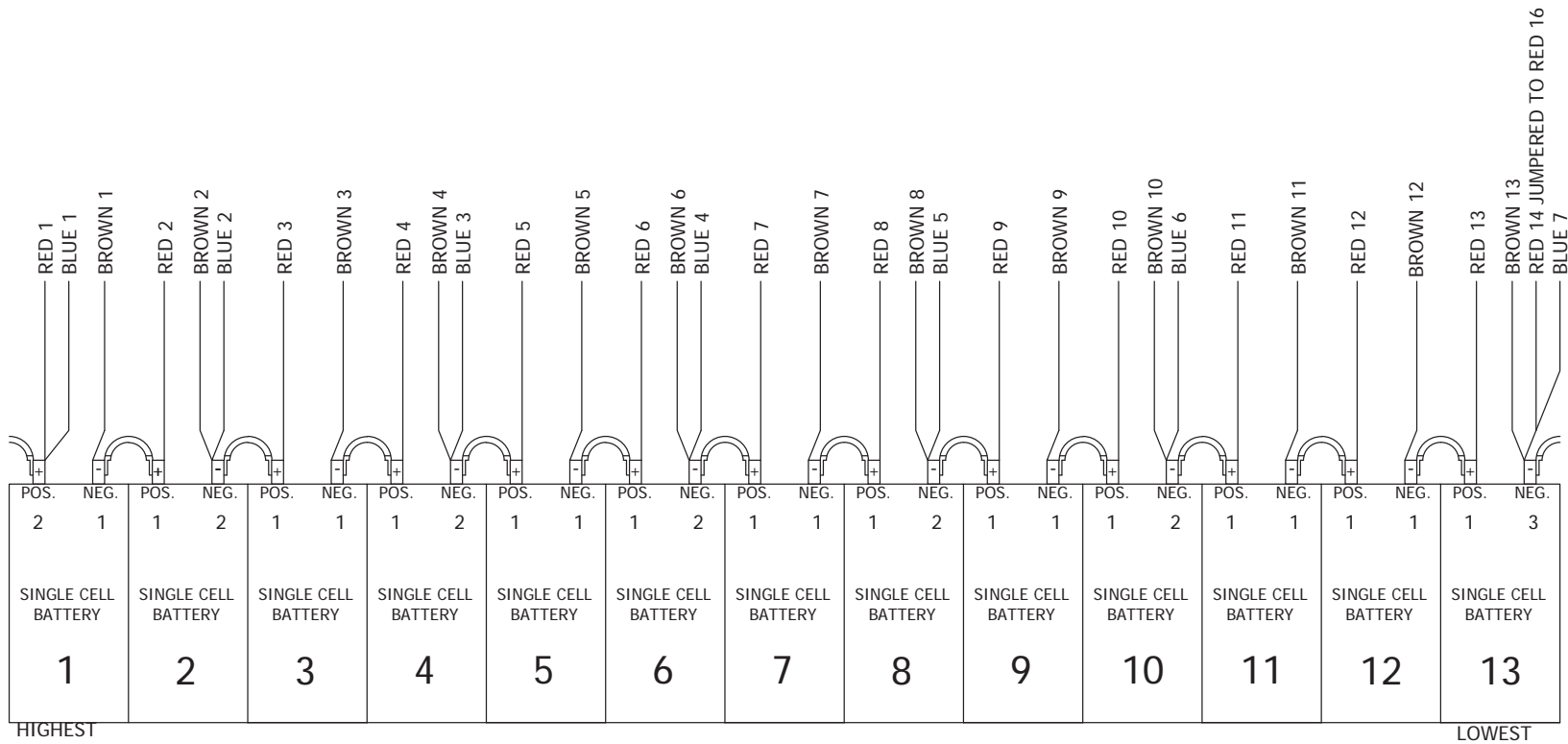
CONFIGURATION FOR (15) 4-9 VDC CELLS



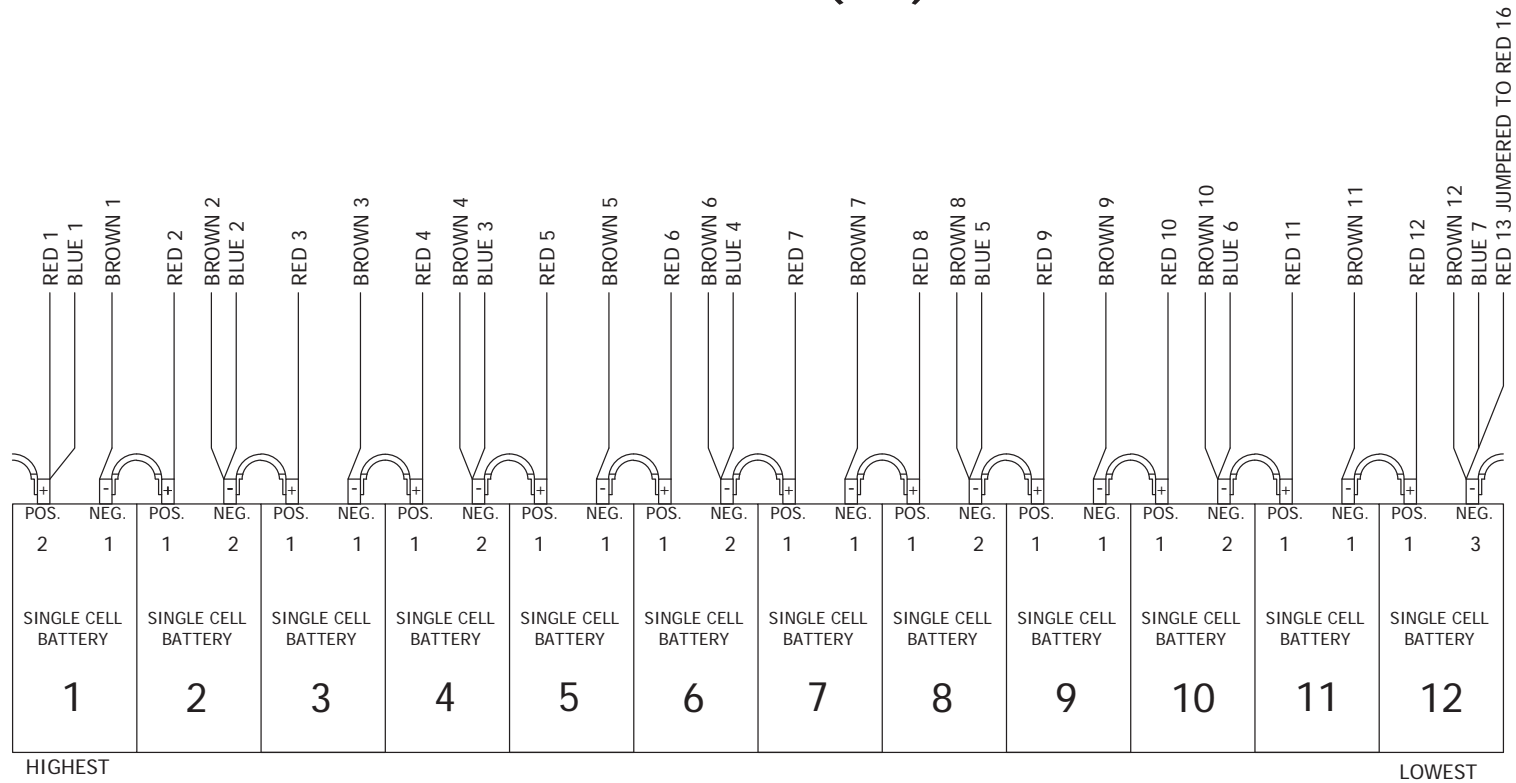
CONFIGURATION FOR (14) 4-9 VDC CELLS



CONFIGURATION FOR (13) 4-9 VDC CELLS

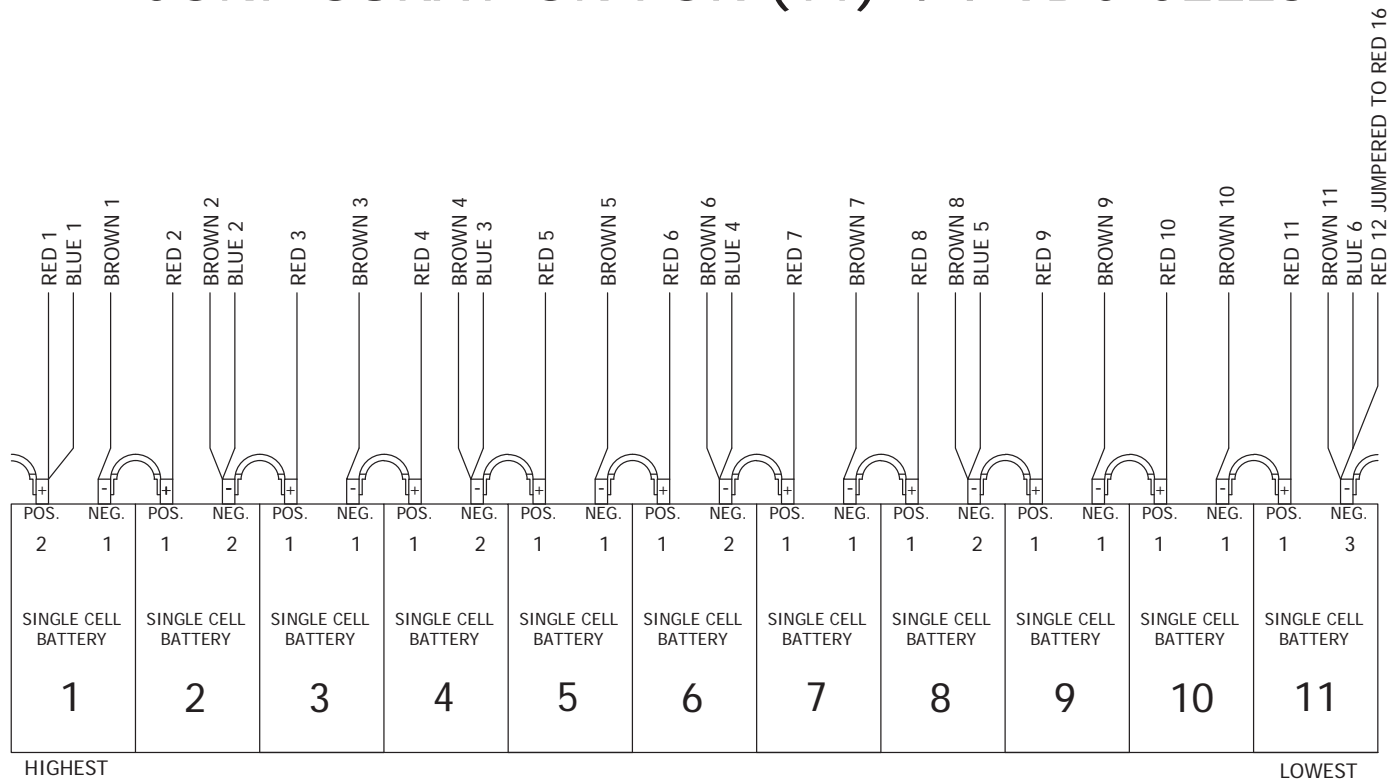


CONFIGURATION FOR (12) 4-9 VDC CELLS

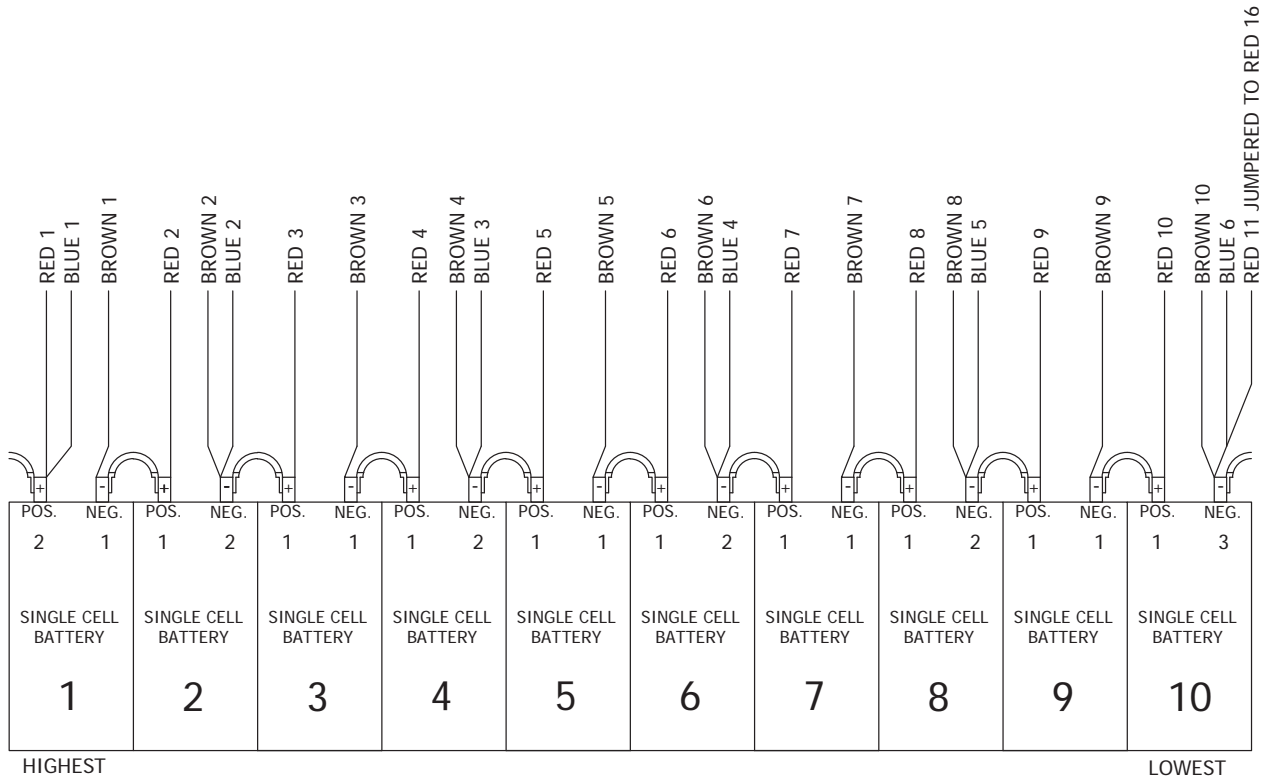


RED 13 JUMPERED TO RED 16

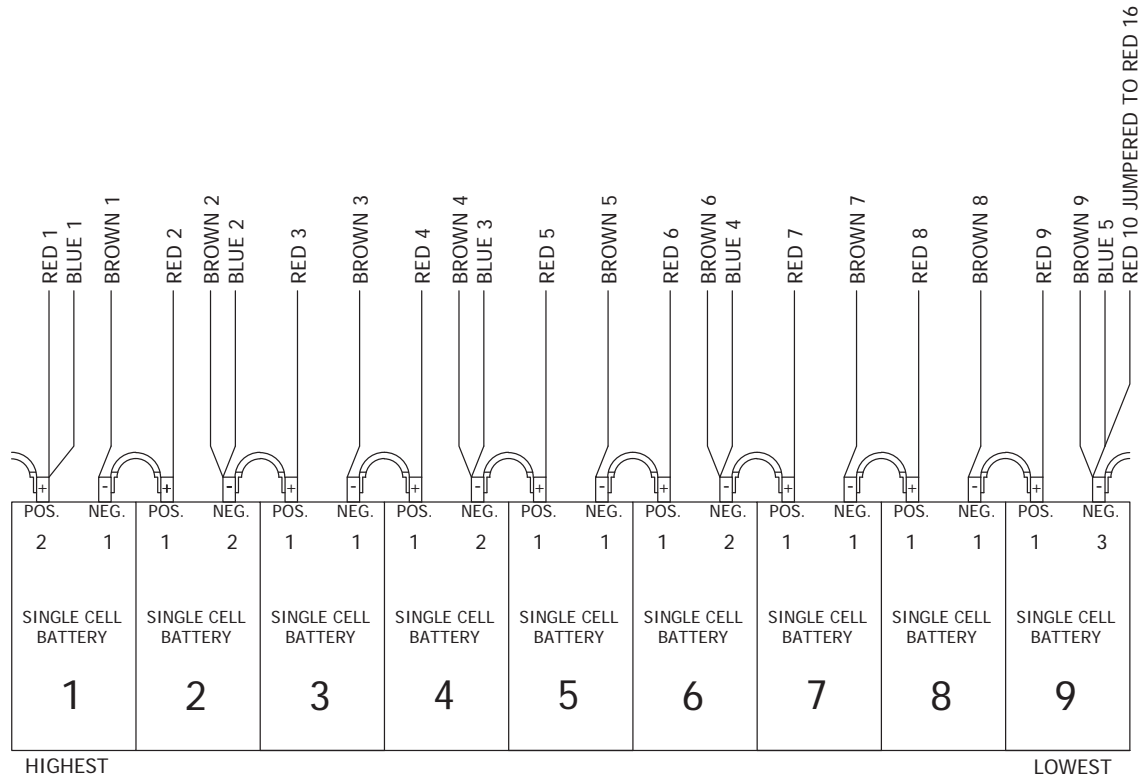
CONFIGURATION FOR (11) 4-9 VDC CELLS



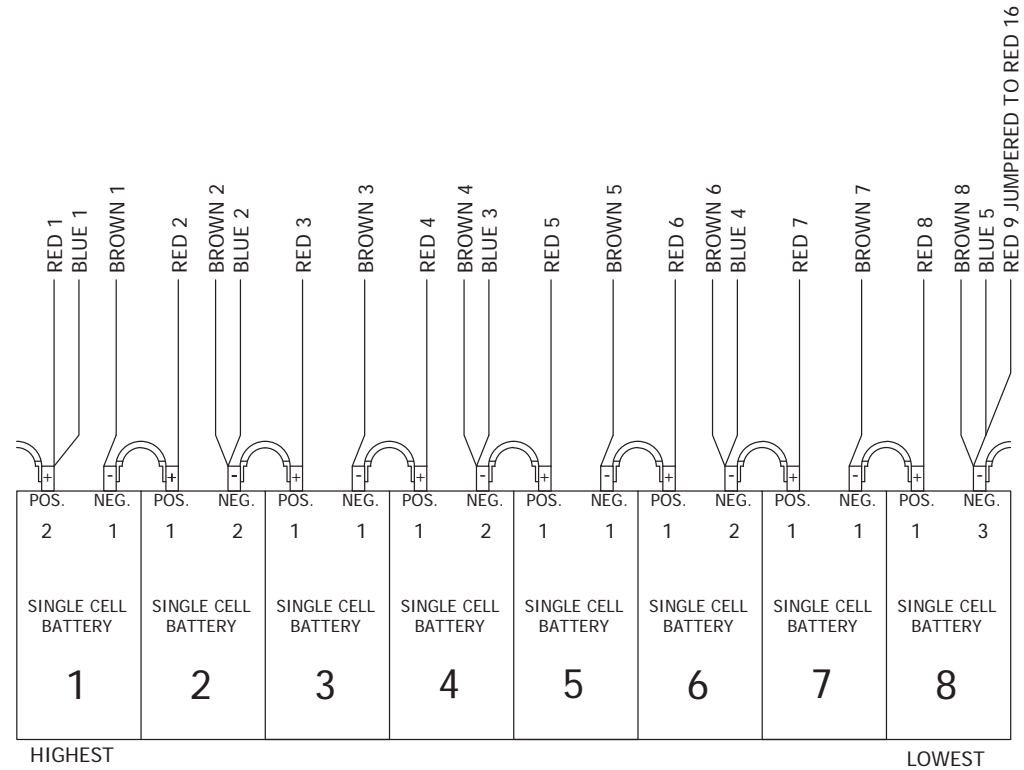
CONFIGURATION FOR (10) 4-9 VDC CELLS



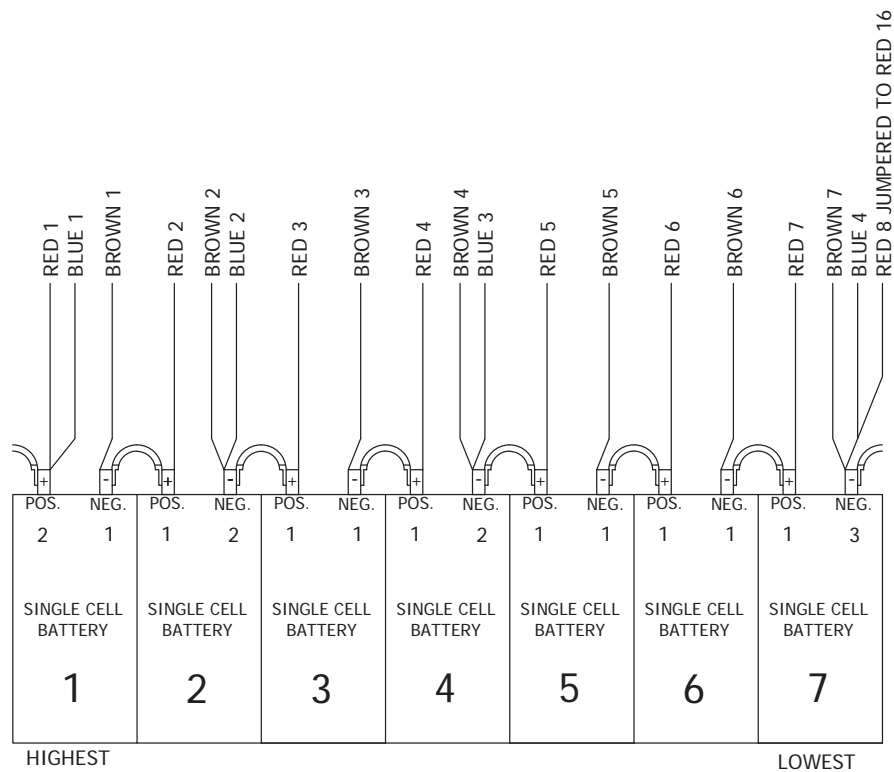
CONFIGURATION FOR (9) 4-9 VDC CELLS



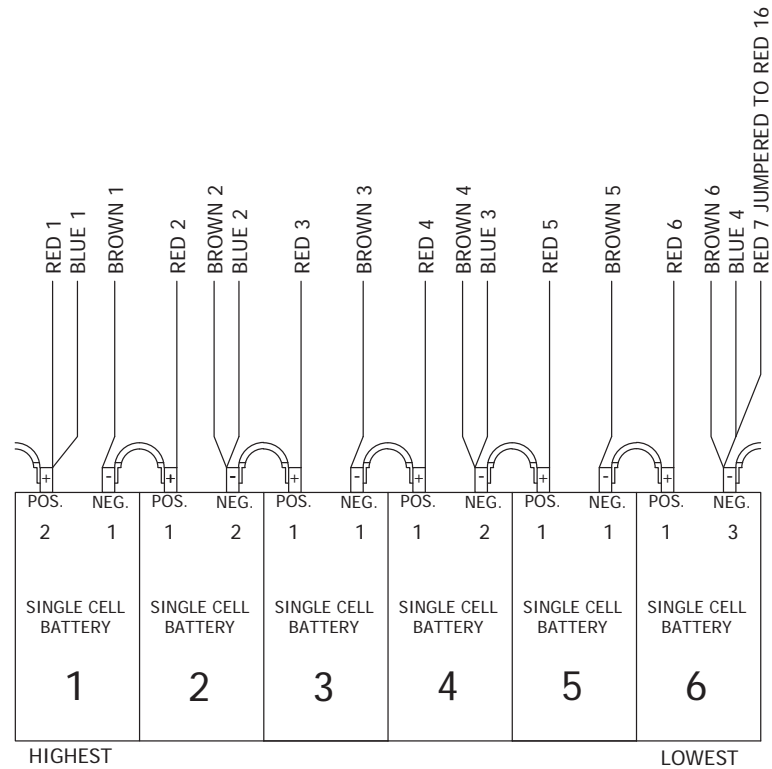
CONFIGURATION FOR (8) 4-9 VDC CELLS



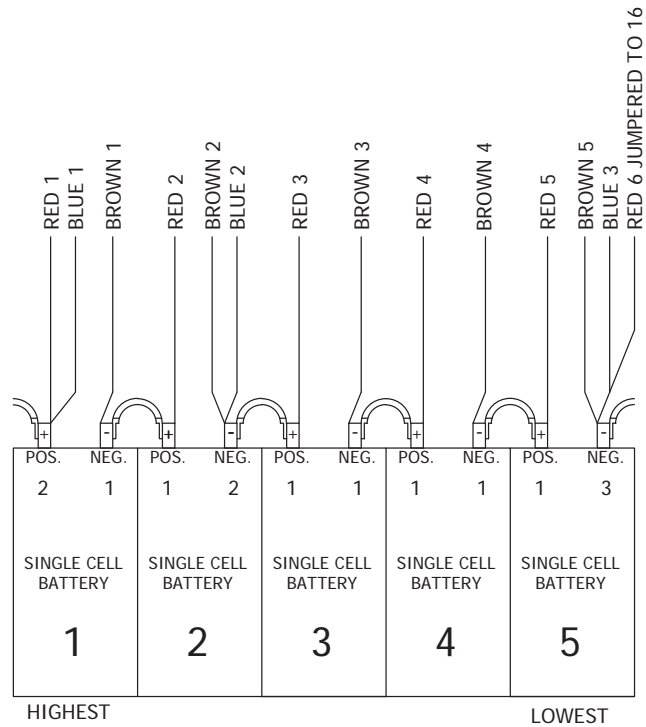
CONFIGURATION FOR (7) 4-9 VDC CELLS



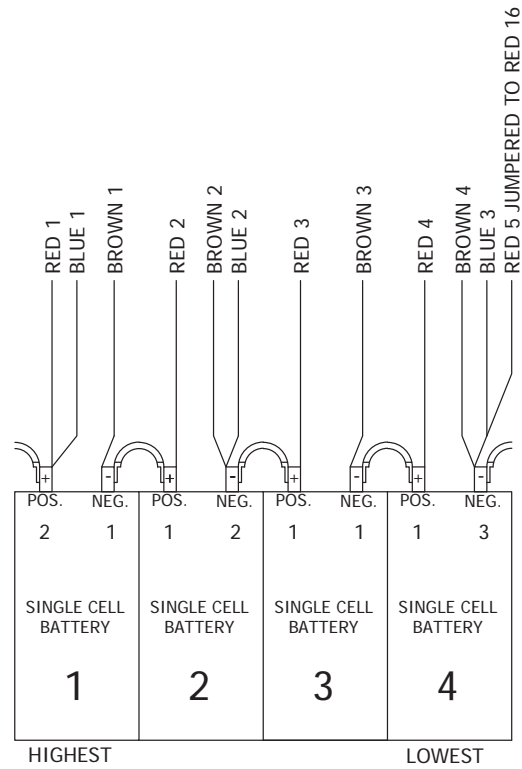
CONFIGURATION FOR (6) 4-9 VDC CELLS



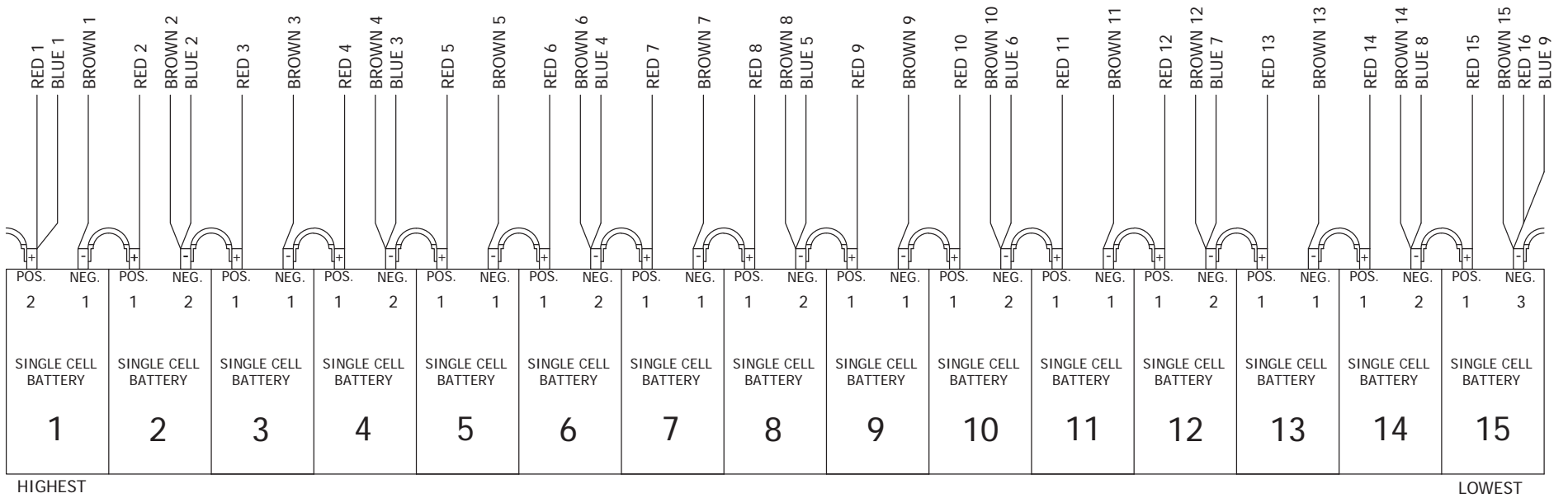
CONFIGURATION FOR (5) 4-9 VDC CELLS



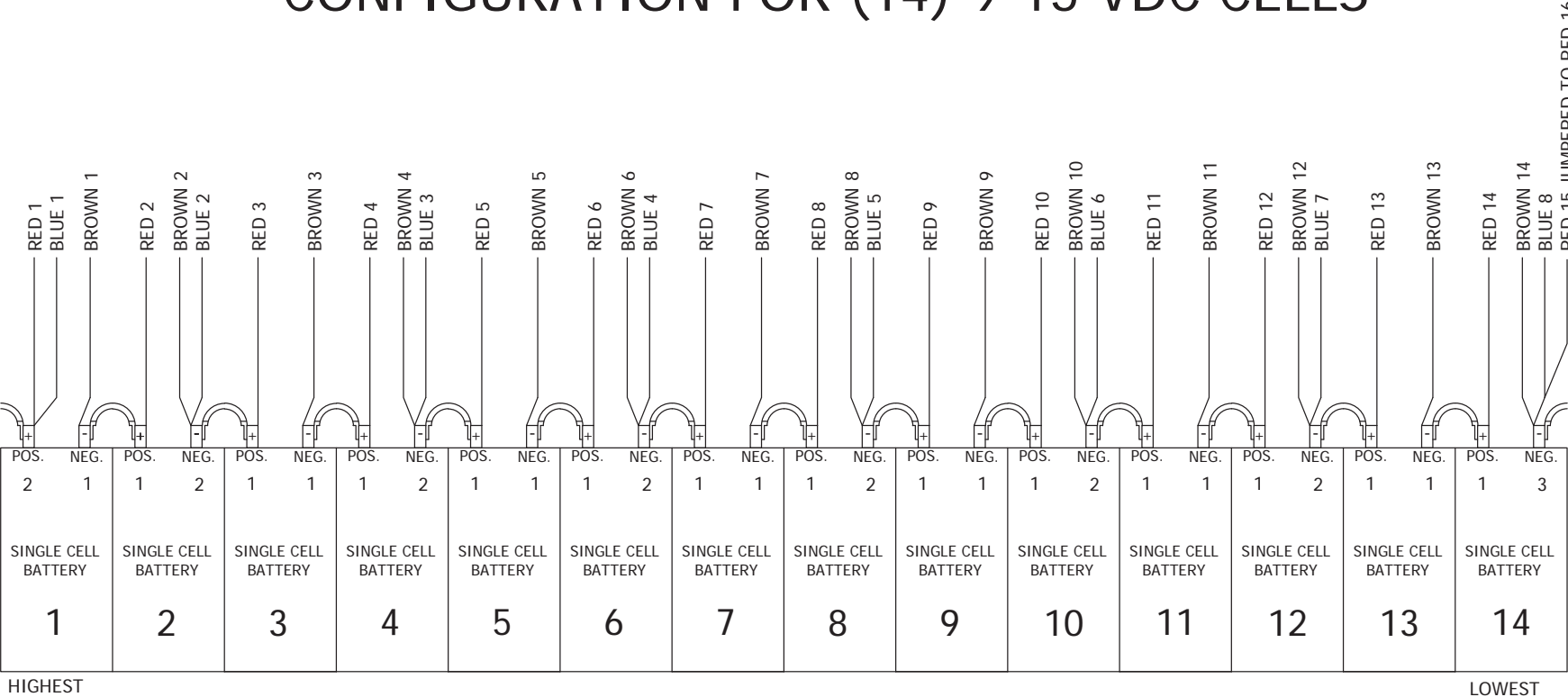
CONFIGURATION FOR (4) 4-9 VDC CELLS



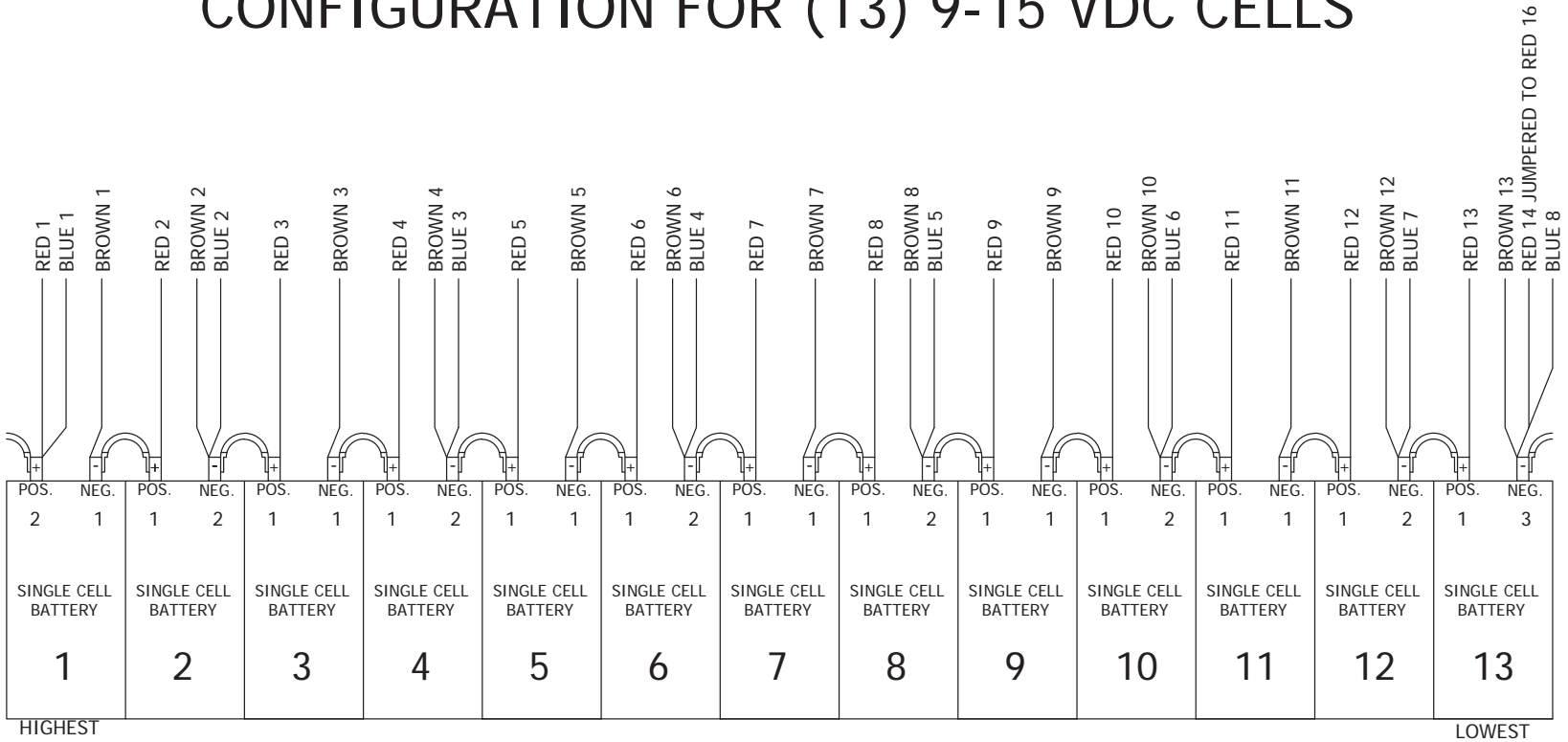
CONFIGURATION FOR (15) 9-15 VDC CELLS



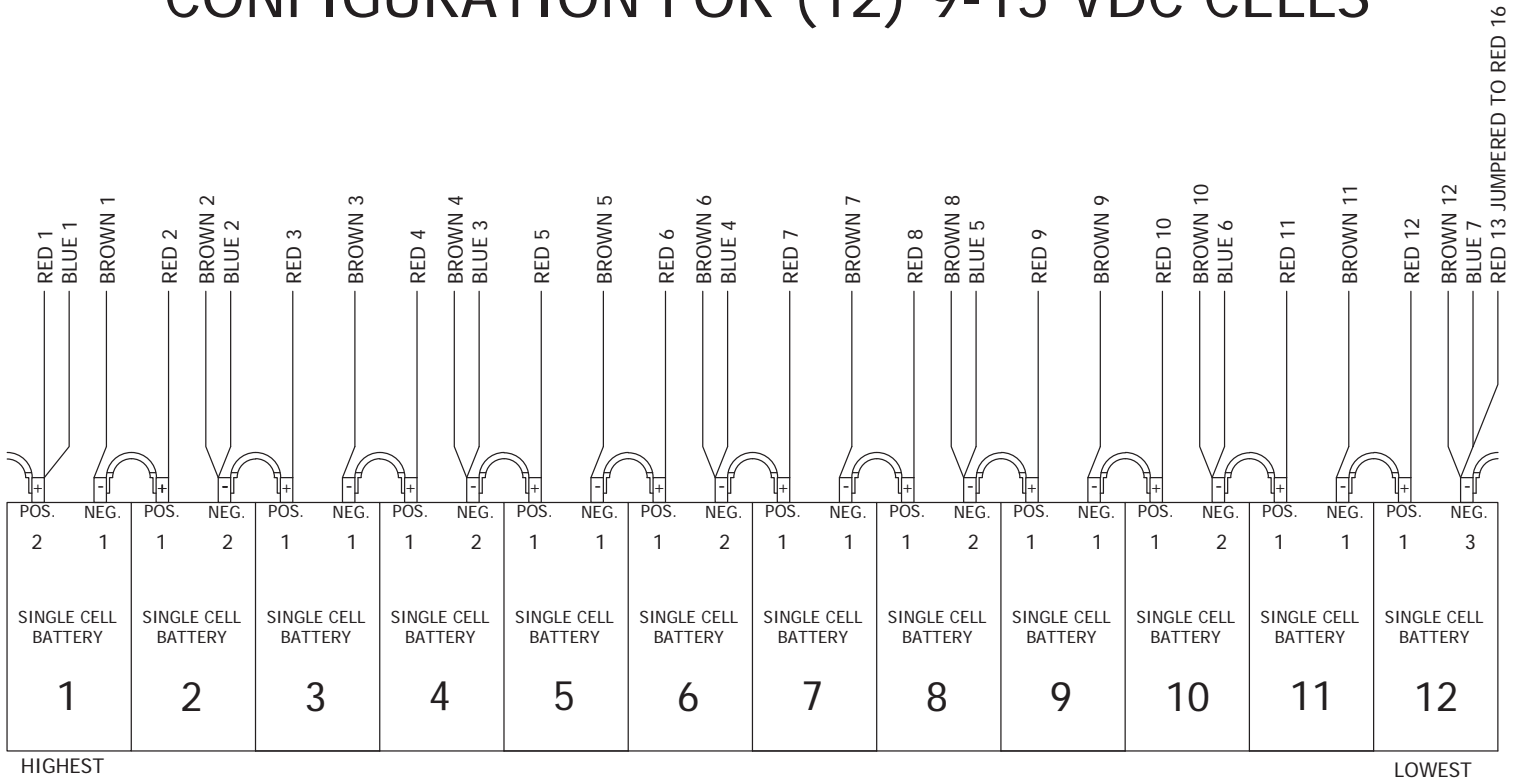
CONFIGURATION FOR (14) 9-15 VDC CELLS



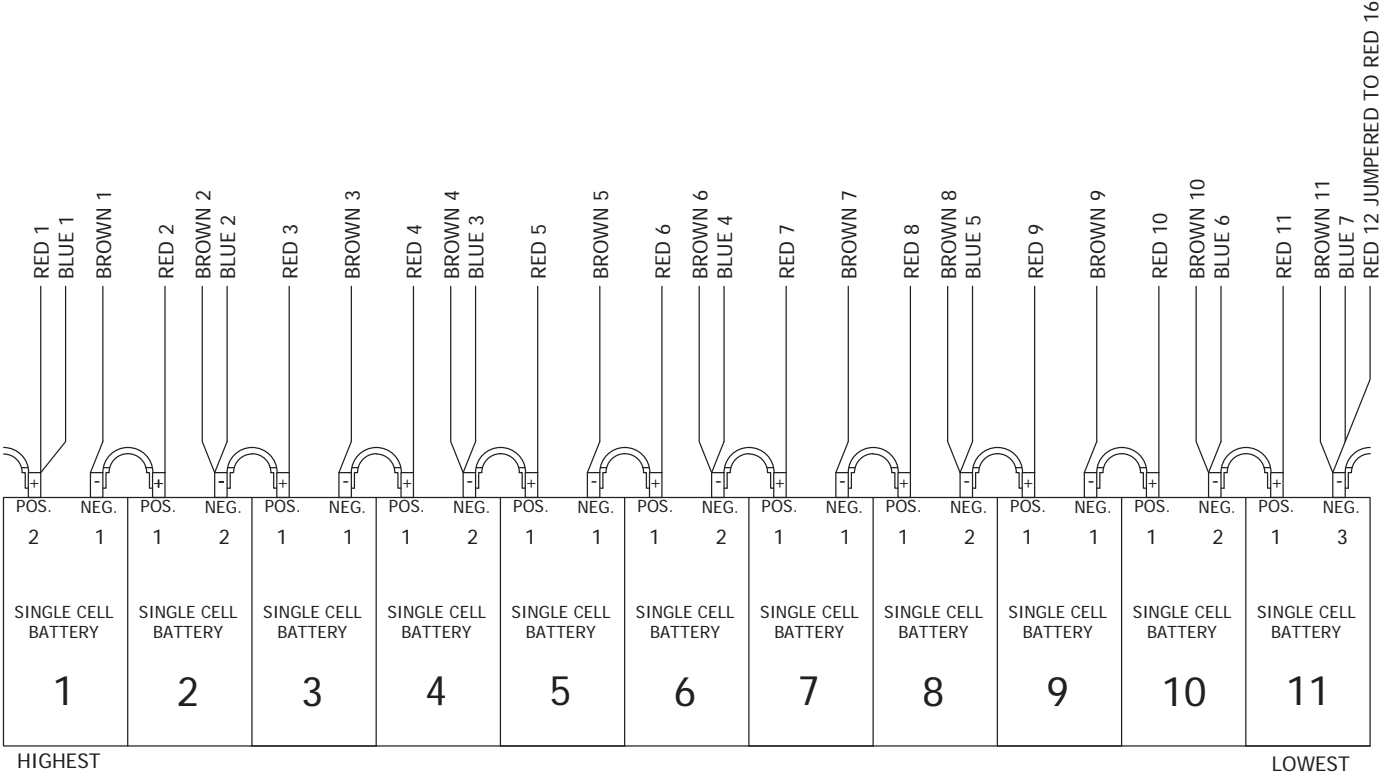
CONFIGURATION FOR (13) 9-15 VDC CELLS



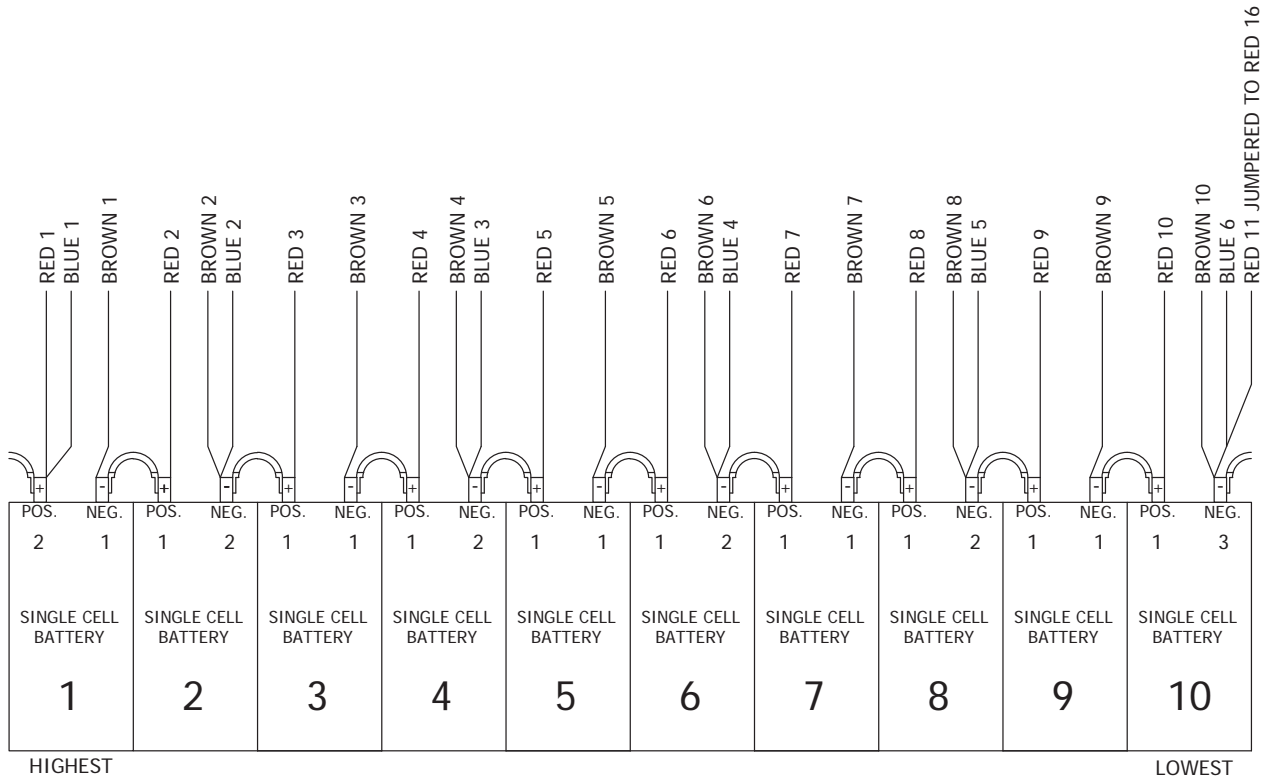
CONFIGURATION FOR (12) 9-15 VDC CELLS



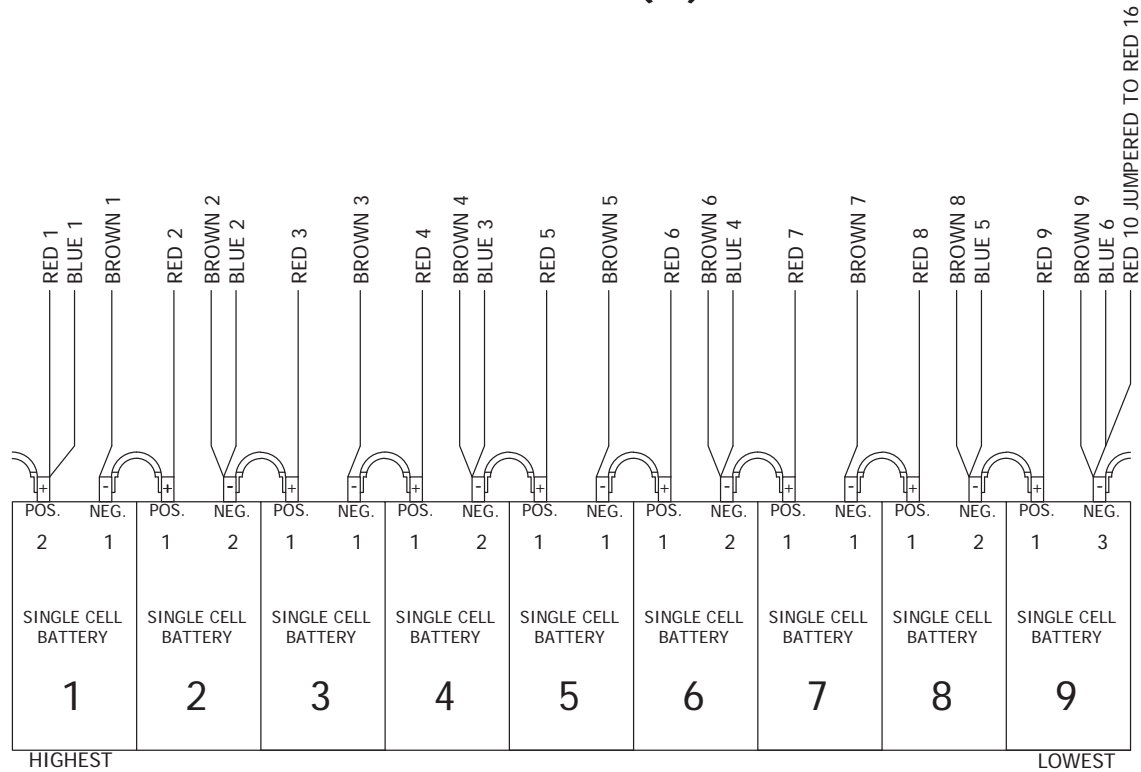
CONFIGURATION FOR (11) 9-15 VDC CELLS



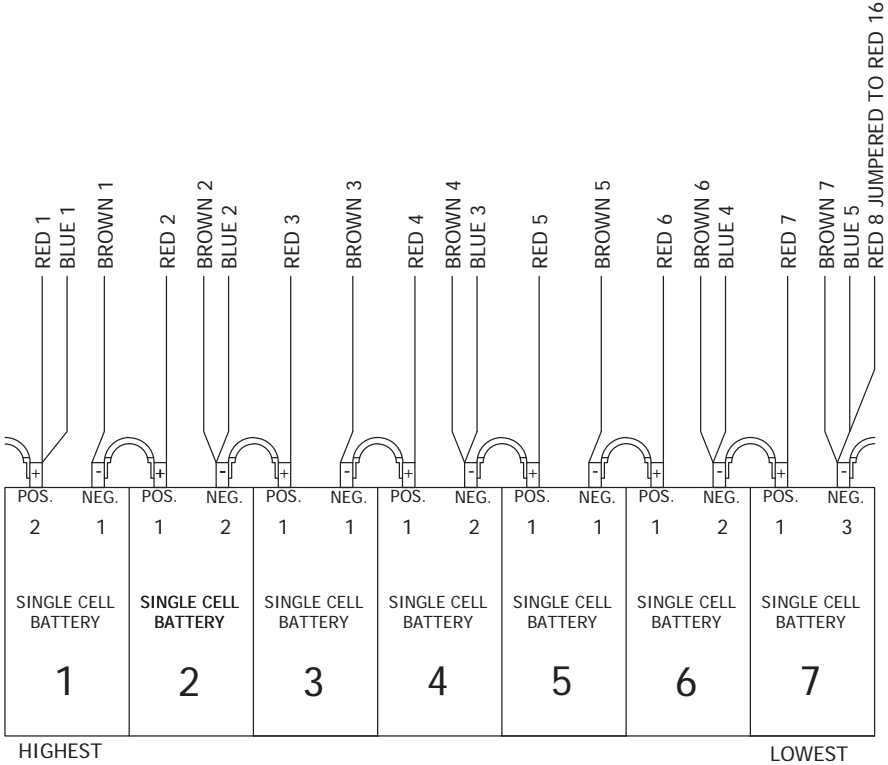
CONFIGURATION FOR (10) 9-15 VDC CELLS



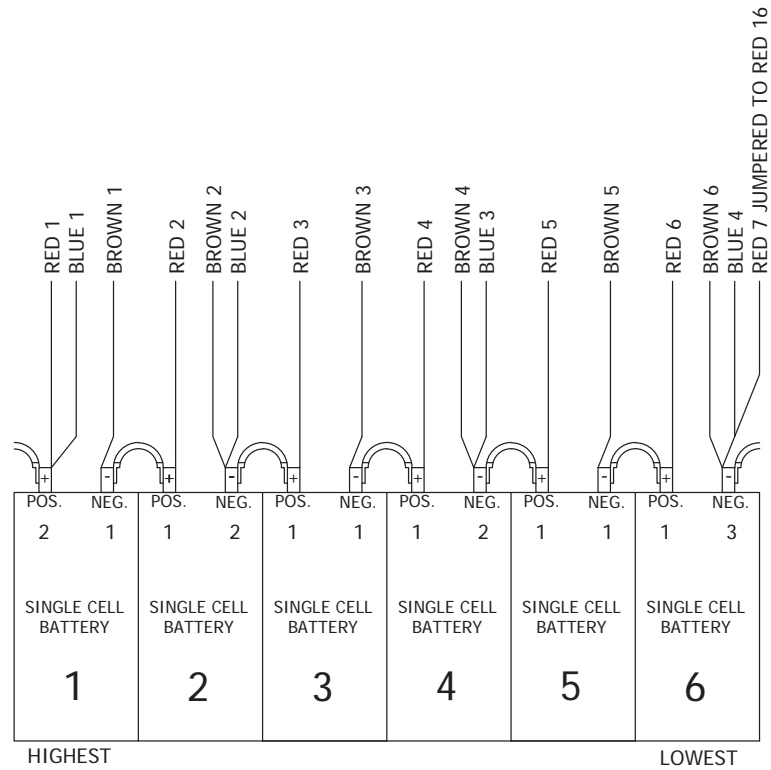
CONFIGURATION FOR (9) 9-15 VDC CELLS



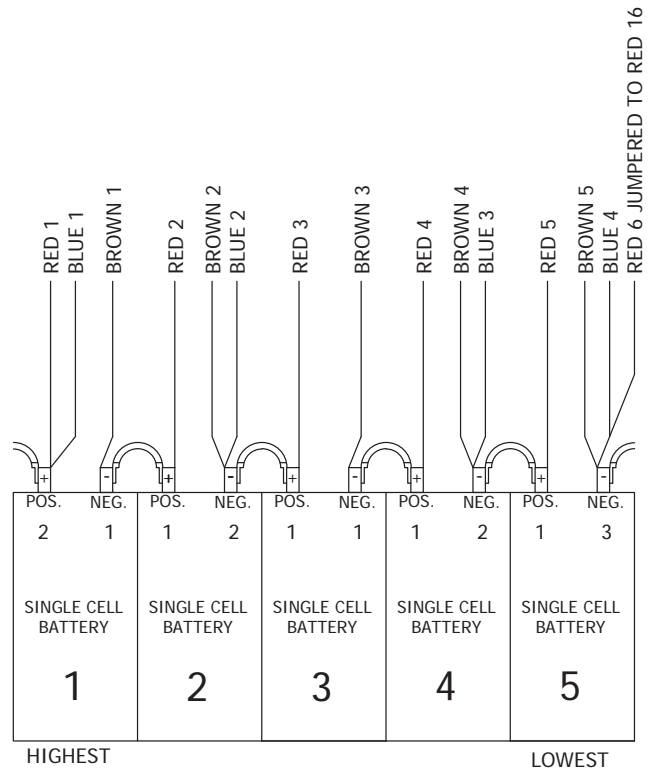
CONFIGURATION FOR (7) 9-15 VDC CELLS



CONFIGURATION FOR (6) 9-15 VDC CELLS



CONFIGURATION FOR (5) 9-15 VDC CELLS



CONFIGURATION FOR (4) 9-15 VDC CELLS

