

TECHNICAL NOTE:

15 SERIES COMMUNICATION INTERFACE

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1. INTRODUCTION

1.1 Purpose

This document describes the hardware and communication interface for the Discover AES 15-24-1000 battery. The primary purpose of the battery interface is to communicate battery status and offer remote on functionality.

1.2 Scope

The document specifies the DE15 connector pinout, RS232 protocol and packet framing, and the functionality of the remote on circuit as implemented on the Discover AES 15-24-1000 battery.

The RS232 communication protocol is in active development and information is subject to change.

1.3 Audience

The intended audience of this document is for developers who are familiar with 3-wire implementation of RS232, electrical circuits, and embedded systems.

2. DE15 PIN ASSIGNMENT

The RS232 signal and ground lines are an isolated circuit. Care should be taken not to create ground loops between the isolated RS232 and battery terminal ground.

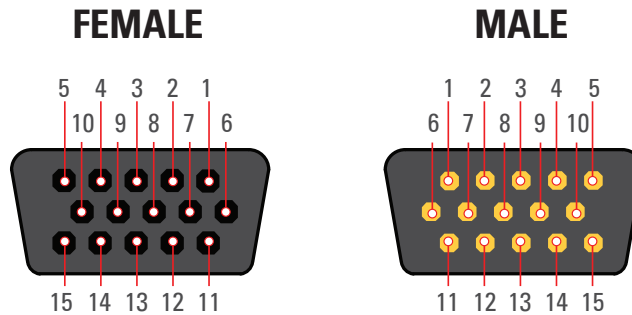


Figure 1. DE15 Pin Assignment

The 15-24-1000 has a DE15 female connector on the top of the battery.

Table 1. DE15 Pin Assignment Table.

| PIN | Name | Description | Level |
|-------|-----------------------|-------------------------|---------------|
| Pin 1 | Battery on Signal Bus | | Digital Logic |
| Pin 2 | Battery on Signal GND | | GND |
| Pin 3 | RS232 GND | Isolated RS232 Ground | RS232 |
| Pin 4 | RS232 TX | Isolated RS232 Transmit | RS232 |

| PIN | Name | Description | Level |
|--------|------------|---------------------------|------------|
| Pin 5 | RS232 RX | Isolated RS232 Receive | RS232 |
| Pin 6 | No Connect | No Connect | No Connect |
| Pin 7 | GND | | GND |
| Pin 8 | GND | | GND |
| Pin 9 | GND | | GND |
| Pin 10 | GND | | GND |
| Pin 11 | EEPROMC | Internal Factory Use Only | No Connect |
| Pin 12 | EEPROMD | Internal Factory Use Only | No Connect |
| Pin 13 | FIRMWARE1 | Internal Factory Use Only | No Connect |
| Pin 14 | FIRMWARE2 | Internal Factory Use Only | No Connect |
| Pin 15 | FIRMWARE3 | Internal Factory Use Only | No Connect |

3. RS232 PROTOCOL

3.1 Communication Settings

Table 2. Default RS232 Settings.

| | |
|---------------------|---------|
| Baud Rate | 115,200 |
| Data Bits | 8 |
| Parity | None |
| Stop Bits | 1 |
| Flow Control | None |

3.2 Packet Format

The RS232 data is framed using HDLC like framing. It consists of a start byte at the beginning and a CRC and end byte at the end. Any time the start or end byte occurs in the data it is escaped by placing 0x7D and inverting the 5th bit. For example sending 0x7E would look like 0x7D 0x5E. Likewise sending 0x7D would look like 0x7D 0x5D. The CRC is calculated over the “real” data rather than the escaped data transmitted on the network. The CRC may have escape bytes in it as well.



Figure 2. RS232 Packet Framing.

3.3 Data Frame

Table 3. RS232 Packet Data Fields.

| Field | Description | Width | Unit |
|--------------|---|--------|-------|
| High Voltage | The highest cell module voltage | 16 bit | 1 mV |
| Avg Voltage | The average cell voltage. Multiply this value by 8 for battery voltage | 16 bit | 1 mV |
| Low Voltage | The lowest cell module voltage | 16 bit | 1 mV |
| Current | The charge or discharge current of the battery. Negative numbers are charge | 16 bit | 10 mA |
| SOC | The state of charge of the battery | 8 bit | 1 % |
| rsvd | Rsvd for future use | 8 bit | 0 |
| rsvd | Rsvd for future use | 32 bit | 0 |
| Charge Ah | Total lifetime charge Ah of the battery | 32 bit | 1 mAh |
| Discharge Ah | Total lifetime discharge Ah of the battery | 32 bit | 1 mAh |
| rsvd | Rsvd for future use | 32 bit | 0 |

3.4 CRC

The CRC is calculated using the polynomial: $x^{16}+x^{12}+x^5+1$

4. REMOTE ON

The 15-24-1000 can be turned on remotely by a momentary dry contact. The battery cannot be remotely turned off.

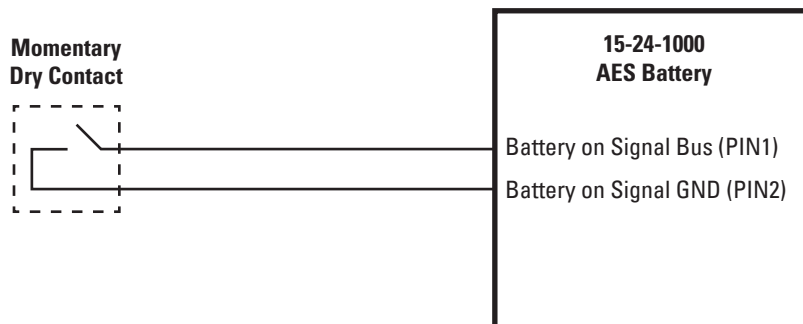


Figure 3. RS232 Packet Framing