# How To Check and Replace the Battery in the MS1™

This task topic discusses how to check the voltage of the IPS Group, Inc. **MS1™** batteries, followed by a procedure to replace a dead battery. A dead battery can cause a number of faults / error preventing normal operation.

IPS MS1™ use two different batteries:

- Main Controller Battery = Recharged by the Solar Panel and Peripheral Power Battery, this lithium battery located on the Main **PCBA** serves as the primary power source for all meter operations.
- Peripheral Power Battery = Rechargeable (single or dual) battery pack that powers the MS1™ printer, Shutter, and optional escrow. It also supplements and recharges the Main Controller Battery when its voltage drops below acceptable levels.

The following table lists the minimum and maximum voltage for each power source.

| Part name | Display name | Minimum voltage | Maximum voltage |
|---|---|---|---|
| **Solar Panel** | Solar Panel | 0 mV | 20,000 mV |
| **Main Controller Battery** | Main Ctrlr Bat: | 3,000 mV | 4,100 mV |
| **Peripheral Power Battery** | Periph Pwr Bat: | 12,500 mV | 14,500 mV |

## Checking battery voltages

To check the battery voltages:

1. On the **MSPM** , quickly insert and remove a Diagnostics card from the **EMV card reader** to enter *Diagnostics* mode.
2. Press **+** (more time) / **— Time** (less time) to scroll to *Voltages*.


3. Check the voltage of the Periph Pwr Bat.
   If the Periph Pwr Bat measures < 12,500 mV, replace the it with a new battery.
4. Check the voltage of the rechargeable Main Controller Battery.
   If the rechargeable Main Ctrlr Bat measures < 3,000 mV, the Periph Pwr Bat should recharge it after a few hours.
   If after a few hours, the Main Ctrlr Bat still measures < 3,000 mV, investigate to find and resolve one of the following issues:
   - There is a fault with the Periph Pwr Bat, and it must be replaced.
   - There is a fault with the Main Controller Battery, and it must be replaced.
   - There is a problem with the power wiring, and it must be investigated further for repair.
5. Press **✕** (Cancel) repeatedly until the meter returns to normal operating mode.

## Peripheral Power Battery terminals

Historically the IPS MS1™ used different types of Peripheral Power Batteries:

| Terminal and connector type | Picture |
|---|---|
| Post / eyelet | |

| | |
|---|---|
| |  |
| Spade / quick connect |  |
| 4-pin connector |  |

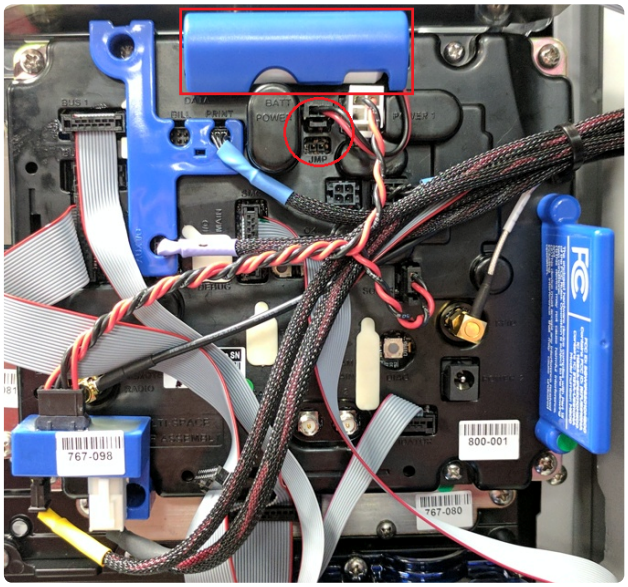
# Replacing an MS1™ battery

## Main controller battery

If the rechargeable Main Ctrlr Bat measures < 3,000 mV, the Periph Pwr Bat should recharge it after a few hours. If the Main Ctrlr Bat voltage does not increase, given an otherwise operational Periph Pwr Bat, the Main Ctrlr Bat must be replaced.

To replace the Main Ctrlr Bat:

1. Quickly insert and remove a Diagnostic card into the MS1™ **card reader** to enter Diagnostics mode.
2. From the Diagnostics menu, put the meter into SLEEP mode.
3. Use the key (manual or electronic) to unlock and open the meter **cabinet** / door.
4. Remove the power **jumper** (JMP) to power OFF the MS1™, and disconnect the Main Ctrlr Bat's connector from the Main PCBA. (Both the jumper and the connector are circled in the following figure.)
5. Lift the Main Ctrlr Bat cover (squared in the following figure) to expose the Main Ctrlr Bat.




6. Replace the Main Ctrlr Bat, plug it's connector into the Main PCBA, and replace the jumper (JMP) on the Main PCBA.
7. Insert a card into the card reader until an audible notification (beep) indicates the meter is turned ON.
8. Close and lock the MS1™ cabinet / door to return it to normal operation.

## Peripheral power battery

The Periph Pwr Bat provides power for the MS1™ printer, escrow (optional), Shutter, etc., and also recharges the Main Controller Battery. When the Periph Pwr Bat measures < 12,500 mV, it may not adequately function in the MS1™ and must be replaced.

To replace the Peripheral Power Battery:

1. Quickly insert and remove a Diagnostic card into the MS1™ card reader to enter Diagnostics mode.
2. From the Diagnostics menu, put the meter into SLEEP mode.
3. Use the key (manual or electronic) to unlock and open the meter cabinet / door.
4. Remove the power jumper (JMP) to power OFF the MS1™.
5. Disconnect the battery connector from the Main PCBA.


6. Remove the Periph Pwr Battery, and replace it with a fully charged battery.
7. Re-connect the battery connector from the Main PCBA, to the fully charged battery.
8. Insert a card into the card reader until an audible notification (beep) indicates the meter is turned ON.
9. Close and lock the MS1™ cabinet / door to return it to normal operation