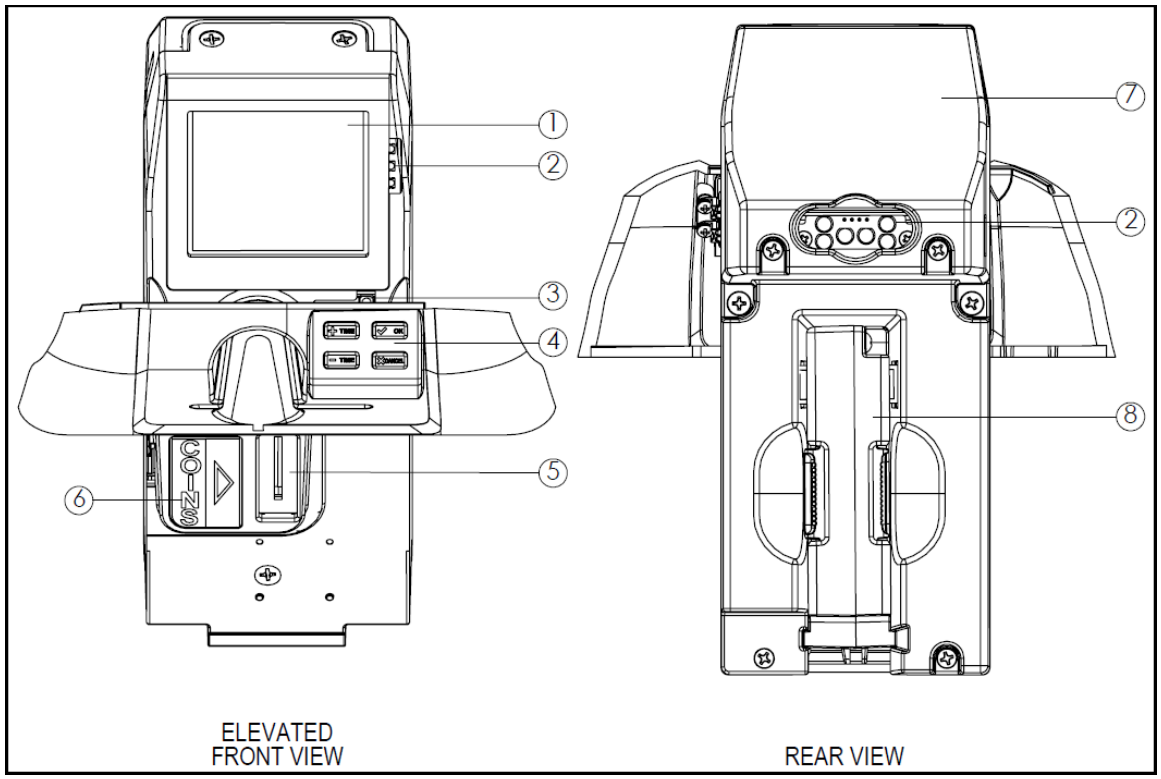
References and Specifications

The chapters listed below provide reference information and specifications for SSPMs.

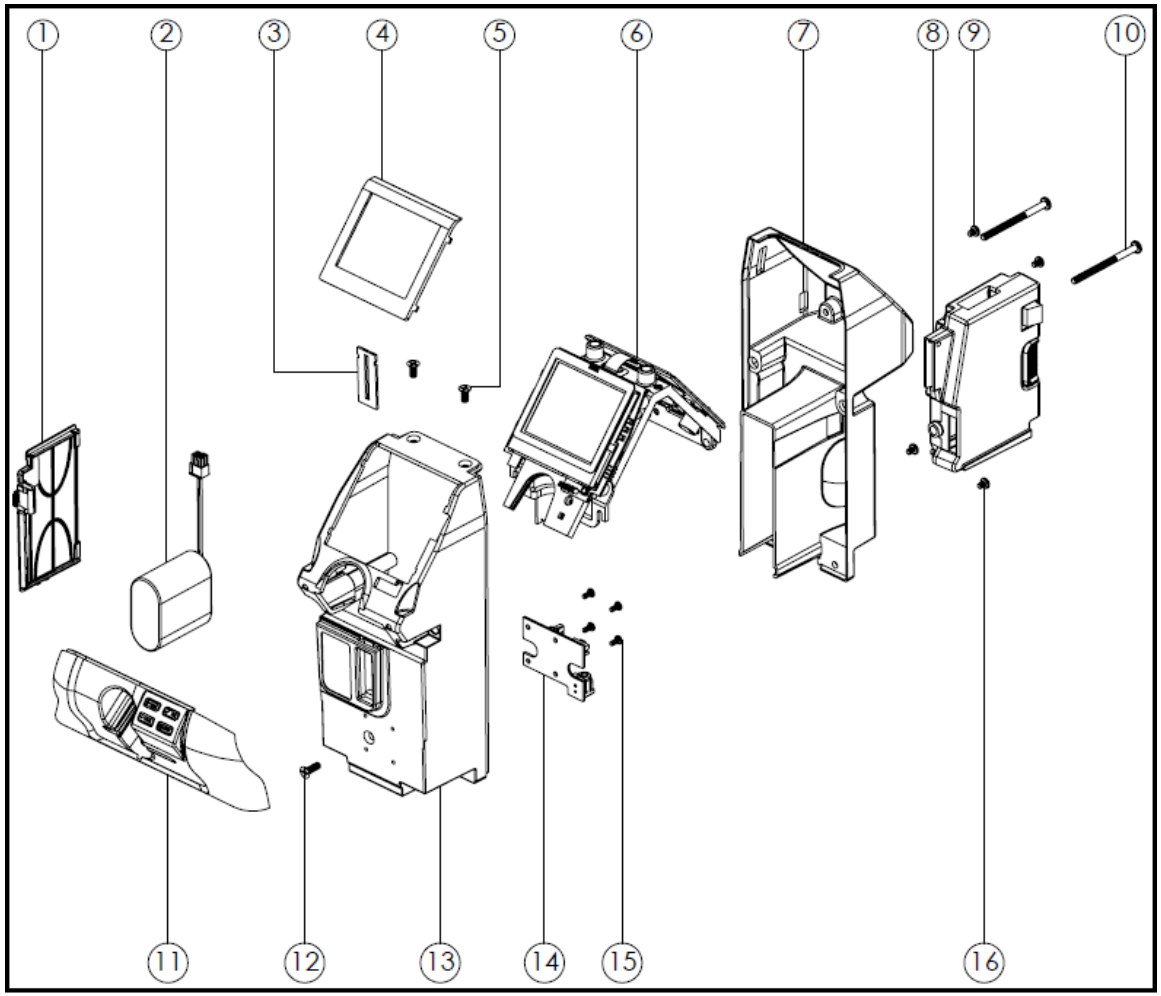
M5™ Features, Functions, and Parts

This reference topic discusses the features and parts available on the IPS Group, Inc. M5™ SSPM.



Item	Description
1	Display
2	LEDs
3	Diagnostics Button
4	Card entry slot and Keypad
5	Coin entry slot
6	Coin decal
7	Solar panel
8	Coin validator with ant-fishing

M5™ parts with NFC



Item	Description
1	Battery cover
2	Battery

3	Coin entry slot plate
4	NFC bezel
5	UNC 8-32 x 3/8" C'sunk Phillips screw, qty 2
6	Chassis and PCBA with NFC antenna
7	Module case, Rear
8	Validator with anti-fishing
9	UNC 6-32 x 3/16" Pan head Phillips screw, qty 2
10	UNC 8-32 x 2" Pan Phillips screw, qty 2
11	Card reader entry face plate / keypad
12	UNC 8-32 x 1/2" C'sink Phillips screw
13	Module case, Front
14	Validator connector PCBA
15	UNC 4-40 x 1/4" Pan Phillips screw, qty 2
16	UNC 6-32 x 5/16" Pan Phillips screw, qty 2

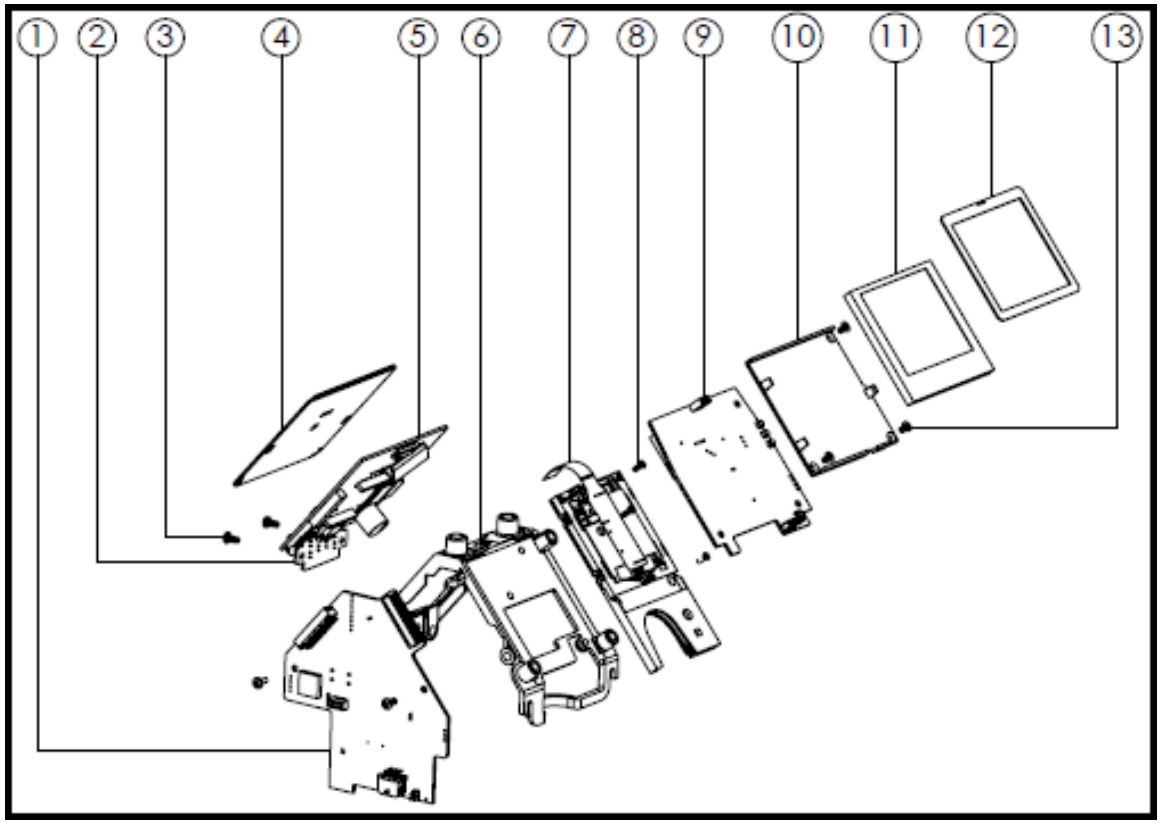
M5™ functions

The M5™ SSPM uses PCBAs and electronic sub-assemblies to process data from cards / coins, and communicates a variety of information to the motorists, parking operations staff, and the DMS.

The function of these boards is as follows:

- Rear expiry LEDs – Provides convenient visual queues to enforcement officials.
- Solar assembly – Primarily charges the battery, and powers rear-facing expiry LEDs.
- PCBA chassis – Holds all boards in place.
- Card reader sub-assembly – Houses the card reader for magnetic strip and smart card applications.
- Display PCBA – Incorporates the LCD and front facing expiry indicator.
- Main PCBA – Handles all core processing and memory functions. The circuit boards are conformally coated to prevent fault due to exposure to moisture and dust. Depending on the level of user knowledge and training, these boards can be replaced as needed by the customer, or returned to IPS for repair / replacement.

M5™ circuit boards and internal electronics

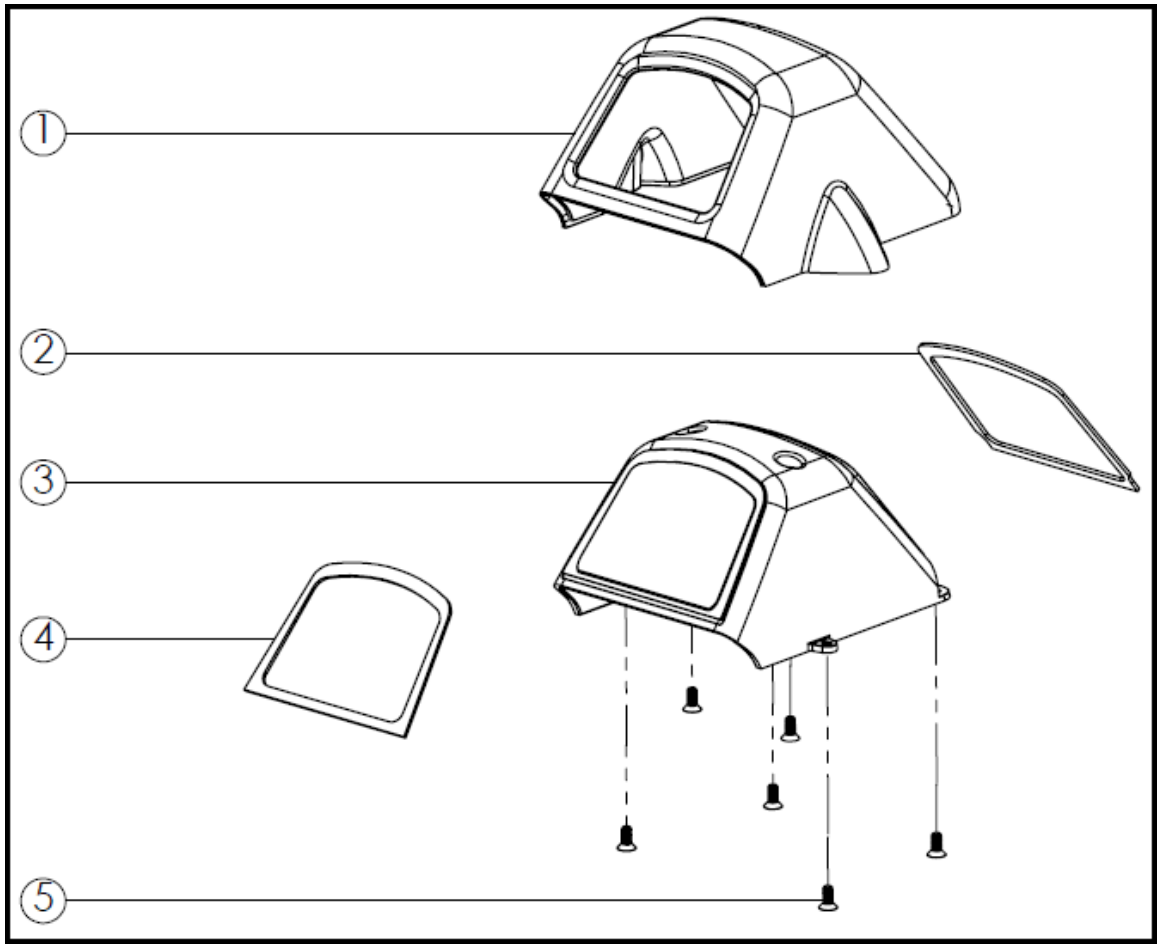


Item	Description
1	Main PCBA
2	Expiry indicator
3	UNC 4-40 x 1/4" Pan Phillips screw, qty 5
4	Solar panel
5	Solar PCBA
6	Chassis frame and plate

7	Card reader
8	UNC 2-56 x 1/4" C'sunk Phillips screw, qty 4
9	Display PCBA
10	LCD spacer
11	LCD
12	NFC antenna
13	UNC 4-40 x 1/4" C'sunk Phillips screw, qty 3

M5™ top covers

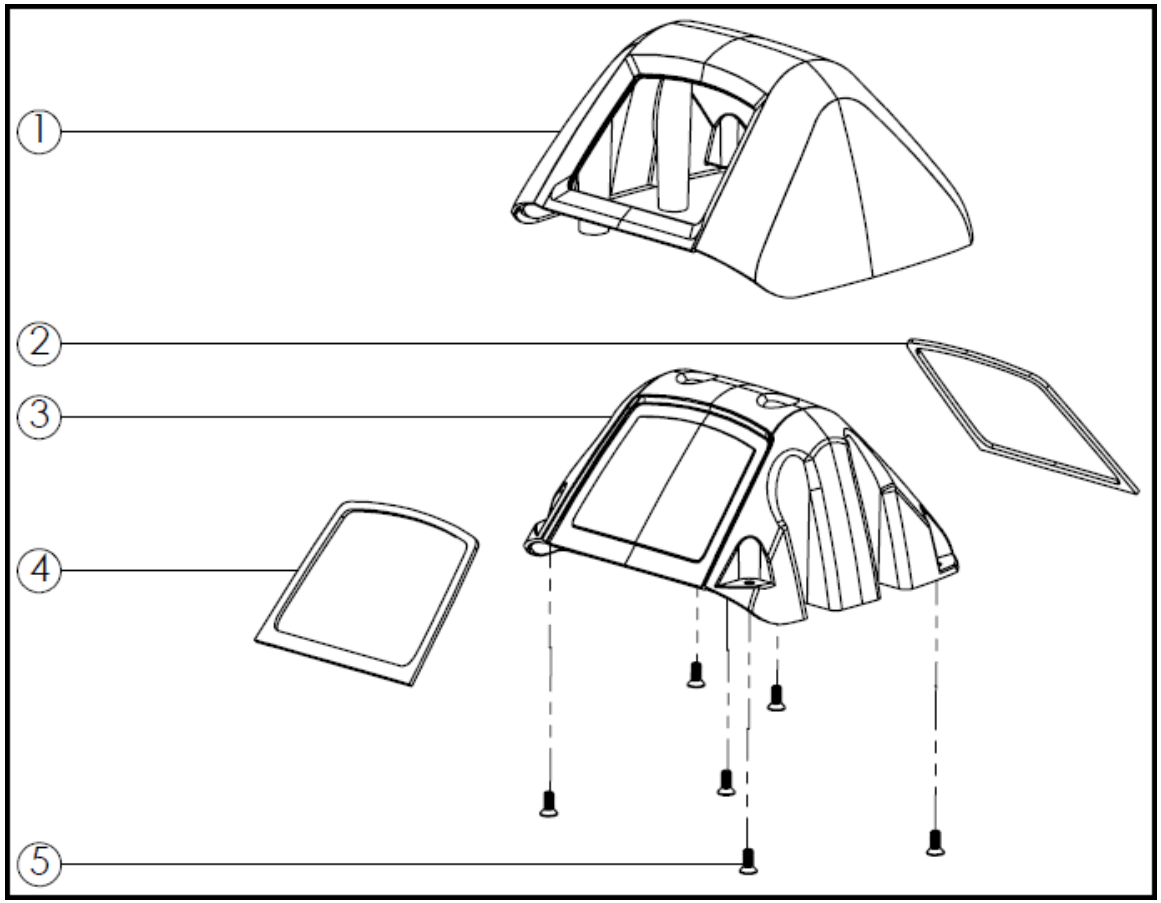
Model 795



Item	Description
1	Head upper casting
2	Solar gasket

3	Head lens
4	Interface gasket
5	UNC 8-32 x 3/8" C'sunk Phillips screw, qty 6

Model 132 / Model 147



Item	Description
1	Head upper casting

2	Solar gasket
3	Head lens
4	Interface gasket
5	UNC 8-32 x 3/8" C'sunk Phillips screw, qty 6

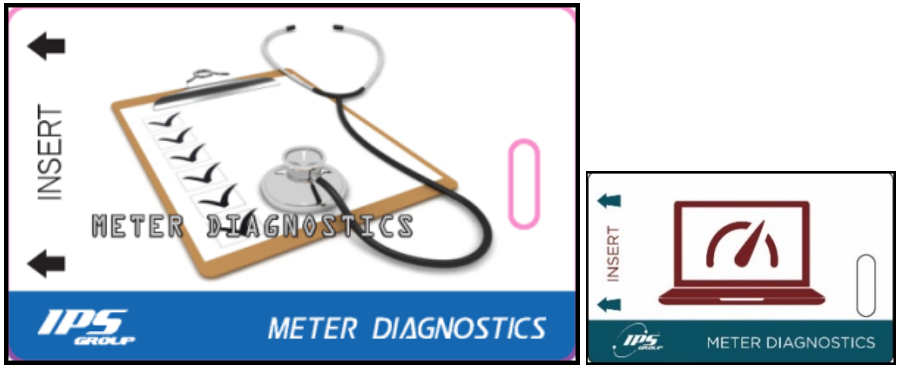
Access Cards

This reference topic discusses the IPS Group, Inc. access cards.

IPS can issue a number of different access cards. They replicate the size of standard credit cards and are individually coded with: a unique 16-digit number, card holder name, and expiration date. This coding allows the use of each card to be tracked, as well as blocked when lost / stolen.

Meter Diagnostics card

The Meter Diagnostics card is used to enter the Diagnostics mode. Using this card to access Diagnostics mode is most convenient when the meter is in the field, where accessing the meter's Diagnostics button is not simple / desirable. Because each Meter Diagnostics card is individually coded, it's use (card holder, date/time, location, etc.), can be tracked through the DMS. For this reason, IPS strongly recommends accessing the Diagnostics mode using this card, rather than pressing the meter's Diagnostics button. (The individual user of the Diagnostics button can not be tracked through the DMS.)



Coin Collection card

The IPS Coin Collection is used during the collection of physical currency. IPS recommends the use of this card with every collection event to provide an accurate report of the amount of currency collected (which can be compared to the amount reported through the DMS), as well as establishing a baseline event for real-time measurements of the cashbox. When the card is inserted / removed, the LCD shows a message confirming the collection is complete. The collected amount of currency is reported to the DMS, and all totals / value are reset to zero with a date / time stamp.

Maintenance Credit card

The IPS Maintenance Credit card is used to add time to the meter without using currency. It is the fastest way to add time to a meter, and more convenient than inserting coins into the meter. (Using coins to add time to a meter corrupts the true revenue-metric, whereas the use of the Maintenance Credit card does not alter the coin / currency count.) To provide accountability, every individual card use is tracked in the DMS.

RFID Tag and Reader

This reference topic discusses the IPS Group, Inc. RFID tag and reader.

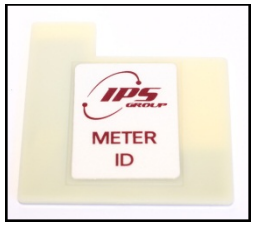
IPS meters use RFID technology to identify and report their exact locations to customers, through the DMS.

RFID tag

Each customer / city owned "pole" (geographic location), contains one RFID tag. Each RFID tag contains a unique serial number.

RFID reader

Each IPS parking meter is assigned a unique RFID reader, which is mounted inside the meter assembly. Each RFID reader contains a unique serial number that is assigned to the meter.



RFID communication for identification and location

RFID tags and readers communicate with one another to identify their exact location to the customer, through the DMS. When a meter housing is mounted at a pole, the RFID reader mounted in the housing reads the unique serial number of the RFID tag, and reports that number through the DMS. Using this communication strategy, each meter housing (and its corresponding hardware) can be identified and located, assuming known pole locations. This also allows for simple installation, and configuration of a meter in the DMS.

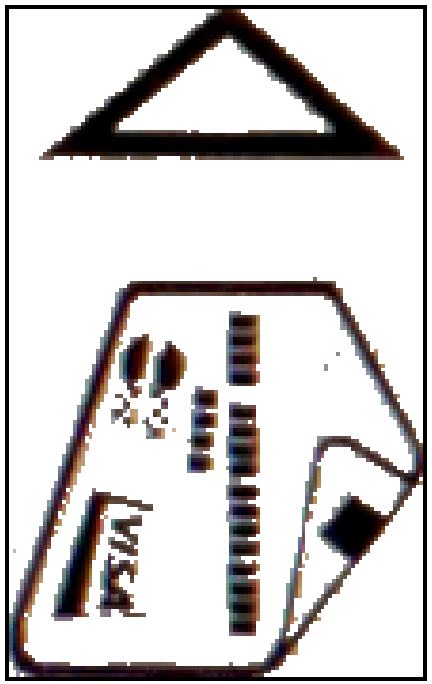
Note: The RFID tag does not store information. It simply acts as a link between the pole in the field and its defined location, in the DMS.

SSPM Card Slot

This reference topic discusses the IPS Group, Inc. SSPM card slot.

To turn the SSPM ON, insert a card into the card slot until the meter makes an audible beep, and text shows on the LCD.

To make a payment with a card, the motorist quickly inserts and removes a standard-sized credit / debit / smart-card, with the magnetic stripe on the right-hand side facing down, (see the following figure).



SSPM Coin Slot

This reference topic discusses the IPS Group, Inc. SSPM coin slot.

The SSPM accepts coins in similar fashion to older coin-only parking meters. When a coin is inserted, the amount of time purchased show on the LCD. Motorists can continue adding coins until the desired amount of time is purchased, or until the maximum amount of time (configured in the DMS) is reached.

The coin slot can easily be changed to accommodate or restrict various coin sizes (diameter and thickness) from being accepted as payment. The two most commonly used coin slot variations in the United States:

- Accept US $1 coins, and all other US coins.
- Reject US $1 coins, but accept all other US coins.

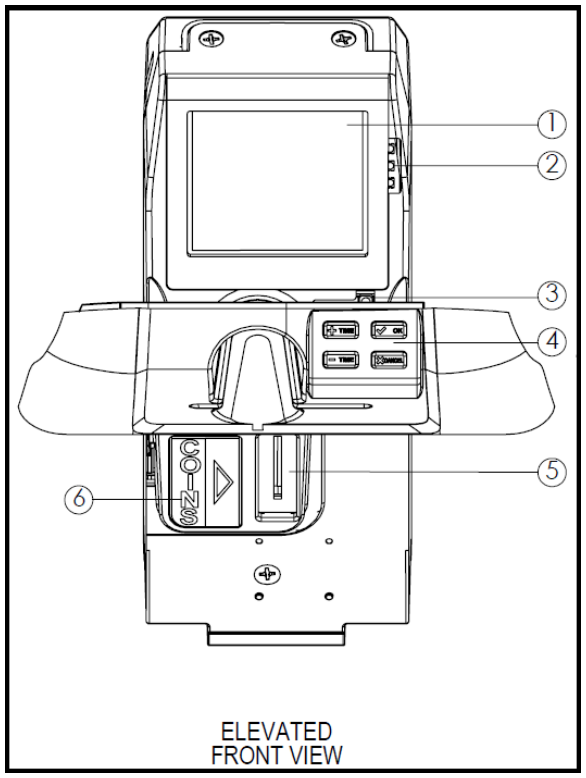
Please contact IPS customer support at support@ipsgroupinc.zohosupport.com to purchase and acquire coin slots to accommodate new coin policies.

SSPM Diagnostics Button

This reference topic discusses the IPS Group, Inc. SSPM Diagnostics button.

The Diagnostics button is located on the right side of the meter, between the LCD and the Keypad (indicated with **3** in the following figure), and has several uses:

- Press the Diagnostics button once to enter *Diagnostics* mode.
- Press the Diagnostics button once, then **X Cancel** to return the meter to zero, and return it to normal operation.
- Press and hold the Diagnostics button for several seconds to turn the meter OFF.

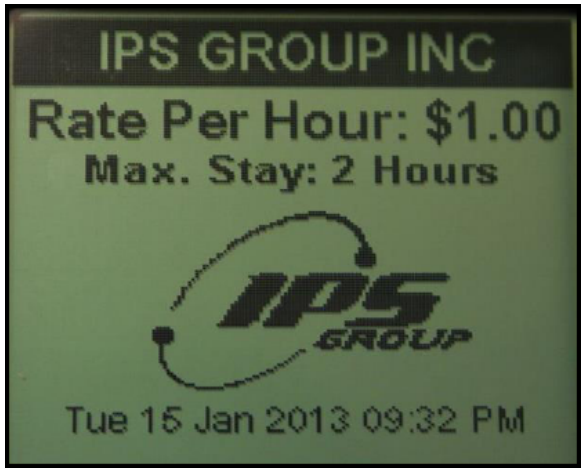


SSPM Display

This reference topic discusses the IPS Group, Inc. SSPM display.

The LCD measures 132 X 64 pixels M5™ LCD measures 160 X 160 pixels, and can display images. It is designed to be simple and user friendly, while providing key information to both the motorist and enforcement officers.

The messages displayed on the back-lit LCD are fully programmable to provide rate information, parking time limits, and time remaining on the meter. Alternating screens allow for a variety of programming options. The displayed messages can be updated remotely at any time via the web-based management system.



SSPM Keypad

This concept topic discusses the IPS Group, Inc. SSPM keypad.

The SSPM keypad has four buttons:

- + Time (more time)
- — Time (less time)
- √ OK
- X Cancel

The M5™ SSPM uses mechanical buttons rated at > 200,000 cycles, that translates to > 10 years of use. The buttons are environmentally sealed to prevent moisture from affecting performance, and are color-coded with symbols / words for the most intuitive user experience possible. Additionally, the symbols / words are cast through the button completely, so wear and tear does not degrade their appearance over time.

Primary functions

The buttons are used for card payment transactions (credit, debit, and smart cards), but are not used during coin transactions.

After a motorist inserts / removes a card, the meter displays a default amount of time to purchase (as defined by its configuration). At that moment, the motorist can add / subtracting time to their transaction by pressing **+ Time** (more time) / **— Time** (less time). Press **X Cancel** to cancel the card transaction, or press √ **OK** to submit the transaction for purchase. (The SSPM does not refund / cancel coin transactions.)

Secondary functions

When the SSPM is in *Diagnostics* mode, the **+ Time** (more time) / **— Time** (less time) buttons are also used to scroll up / down and navigate through the *Diagnostic* mode sub-menus. Press √ **OK** to confirm / enter selections, or press **X Cancel** to cancel / exit out of selections. (Press
X Cancel numerous times to completely exit *Diagnostics* mode, and return the SSPM to normal operation.)

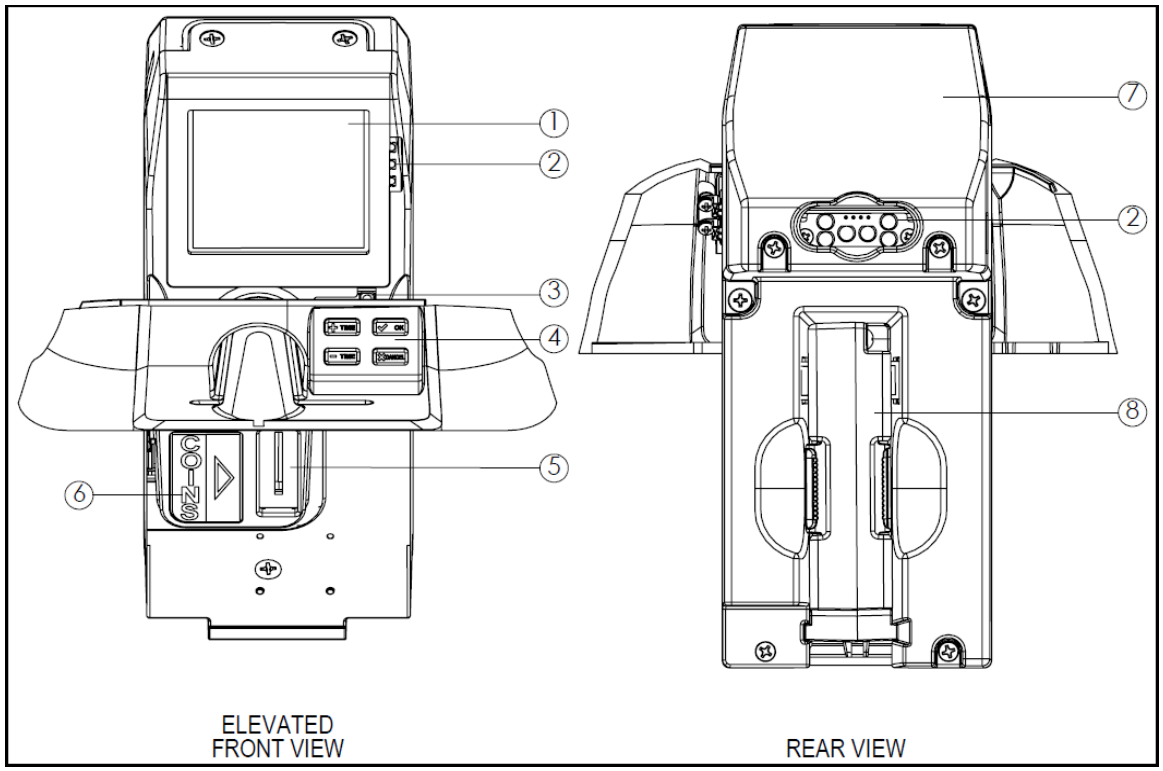
Tertiary functions

The M5™ SSPM can be configured to provide motorists with additional information by pressing √ **OK**.

SSPM LEDs

This concept topic discusses the IPS Group, Inc. SSPM LEDs.

The LEDs on the front and the back of the SSPM operate in the same way, to indicate the state of the meter. The front LEDs are to the right of the LCD, and the rear LEDs are below the solar panel. (The LEDs are indicated with **2** on the following figure.)



The front LEDs indicate status to motorist and on-foot enforcement personnel. The rear Hi-Brite LEDs provide easy, in-car enforcement personnel. To conserve battery power, these lights are usually turned off outside of the hours of enforcement. The following sections describe the LED behavior for the default configuration. (The behavior / configuration can be modified through the DMS.)

No Parking / After Hours

The LEDs are off during non-operational hours.

Idle / Expired

The RED LEDs flash when a meter is expired.

Paid

The GREEN LEDs flash when a meter is paid.

Out of Order

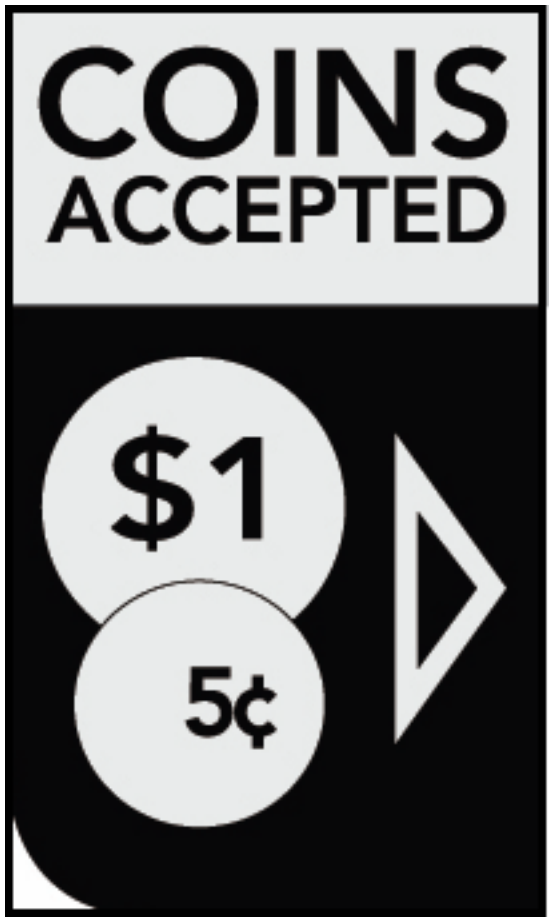
The AMBER LEDs flash when a meter is out of order (i.e. is experiencing a coin and / or card jam).

SSPM Payment Method Decal

This reference topic discusses the IPS Group, Inc. SSPM payment method decal.

Payment method decals can be affixed to the front of the SSPM to inform motorists. The two most commonly used decals are shown here, but custom decals can be purchased from IPS.


COINS



SSPM Solar Panel

This reference topic discusses the IPS Group, Inc. SSPM solar panel.

The solar panel is mounted on the back of the SSPM, and provides continuous power to the meter's rechargeable (main) battery. Although it does not require direct sunlight to operate, the solar panel should be free of obstructions, graffiti, or other types of vandalism to allow maximum light exposure and maximize battery life.

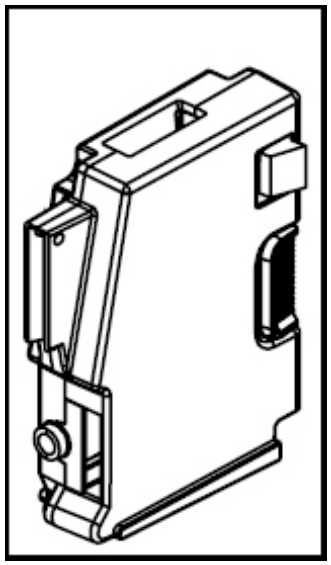
If a SSPM is / must be "bagged" (covered and placed out of service) for > 48 hours, turn the meter OFF to prevent the battery from discharging. The cover obstructs the solar panel preventing it from charging and maintaining the battery's charge.

SSPM Validator

This reference topic discusses the IPS Group, Inc. SSPM coin validator.

The validator is a removable component of the SSPM. It differentiates coins inserted into the meter based on a variety of attributes. Coins that do not satisfy these attributes are not used (counted, included, or refunded) towards purchasing time.

The validator utilizes optical sensors to detect blockages caused by metallic and non-metallic objects, which are then reported wirelessly to a distribution list through the DMS (established by the customer). This allows for minimal downtime, rapid repair response time, and increased revenue. A variety of coins or tokens can be programmed as acceptable forms of payment, into the meter, as required. Inversely, known slugs or counterfeit / coin-like objects (used to defraud the meter) can be specifically programmed as unacceptable.



SSPM Error and Fault Codes

Error messages

This reference topic discusses the IPS Group, Inc. fault / error codes indicated in the Diagnostics > *Faults* sub-menu.

Error message	Description
Battery Low	Indicates the battery's output measurement is < 3,000 mv.
Card Stuck	Indicates a jam in the card reader.
Coin Path Blocked	Indicates a jam in the coin path, or the Validator is not present.
OSC Fault	Indicates a coin is detected, but not validated.
Time or Config error	Indicates the meter configuration, or time is incorrect by ≥ 24 hours (ahead or behind actual time).

Fault codes

The following error codes indicate faults during a communication session in the Diagnostics > *Comms Test* sub-menu.

Error code	Description
GSM Not Found	The meter cannot communicate with the GSM radio.
CME ERROR 10	The SIM card is not inserted.
CME ERROR 107	The meter is unable to connect to the IPS server. Please contact IPS.
CME ERROR 553	The meter is trying to establish a connection.
CME ERROR 555	Activation has failed.
CME ERROR 557	The meter is unable to connect to the IPS server. Please contact IPS.
CME ERROR 559	The wireless connection is timing out.

SSPM Troubleshooting

This reference topic discusses troubleshooting for common issues experienced on the IPS Group, Inc. SSPM.

Power issues

- Problem: The meter display is blank and the LEDs do not flash.
    - Solution: Ensure the battery is connected, and the meter is ON. Insert any card completely into the card slot, and wait for an audible notification (beep).
      If this does not alleviate the issue, ensure the card reader is properly connected to the solar panel, and the solar panel is properly connected to the Main PCBA.

- Problem: The meter display is blank but the LEDs are continuously ON.
    - Solution: Replace the Backup (non-rechargable) battery.

- Problem: The Solar Panel voltage is reported as being extremely low (< 500 mV),
    - Solution: Verify the Solar Panel is properly connected to the Main board and there is nothing obstructing the Solar Panel.

- Problem: The LCD is blank, but the LEDs are flashing.
    - Solution: Press the Diagnostics button. If text appears on the screen, press **Cancel**. If the LCD remains blank, inspect the LCD ribbon cable for damage. Also, verify the Display Board is fully connected to the Main PCBA.

- Problem: The front LEDs flash, but the rear LEDs do not.
    - Solution: Ensure the Solar board is fully connected to the Main PCBA. If the problem persists, it indicates a fault with the Expiry board. Remove the rear plastic housing and unscrew the Expiry board. If the LEDs are working, it indicates a short between the board and the metal chassis. Ensure there are plastic inserts between the board and the chassis, where the screw holes are located. If the LEDs still do not work, the cable that attaches the Expiry board to the Solar board is damaged. Fix the cable if possible, or replace the Solar Panel and / or Expiry boards.

Coin issues

- Problem: The LCD shows *Card Only / No Coins*. In Diagnostics mode the LCD shows *Coin Path Blocked*.
    - Solution: Clear the Validator of any obstructions. If the problem persists, check that the validator is properly plugged in and that the connector cable is not loose. Also check that the validator connector board is intact.

- Problem: The LCD shows *Card Only / No Coins*. In Diagnostics mode the LCD shows *OSC Fault*.
    - Solution: Clear the Validator for any obstructions. Also, one of the coils of the Validator may be damaged, so try replacing the Validator with a new one.

Communication issues

- Problem: During Comms Test, the LCD shows *GSM NOT FOUND*.
    - Solution: Ensure the Solar board is properly attached to the Main PCBA.

- Problem: During Comms Test, the LCD shows *NO SIM*.
    - Ensure the SIM card is correctly inserted into the SIM card reader. If the issues persist, replace the SIM card with a new one, and force the meter to "call-in" to the DMS.

- Problem: During Comms Test, the LCD shows *CSQ 99,99* or *CSQ 0,0*, and never shows *Connected*.
    - Solution: The antenna cable is broken, or not properly attached. Contact IPS concerning replacing the antenna. Also, the pole location might receive poor / no cellular signal.

- Problem: During Comms Test, the LCD shows *CME ERROR: XXX*.
    - Solution: There may be a network issue. Contact IPS to ensure the system is operational.

- Problem: The meter contains the wrong configuration.
    - Solution: If the meter housing / pole is equipped with an RFID tag, enter Diagnostics mode and ensure the LCD shows an RFID #. However, if the RFID # is all zeros, ensure the meter assembly's RFID tag reader is properly connected to the Main PCBA. You can try using a second meter to read the first pole's RFID tag, and if this second meter shows an RFID # then the first meter is faulty. If the second meter does not read the tag, then the RFID tag is faulty, so try another tag. Lastly ensure the meter is properly assigned in the DMS, and perform a Diagnostics mode > Comms Test to ensure communications is operating properly.

Cleaning and general maintenance

IPS recommends the following procedures for general cleaning. The frequency of these performing these procedures is determined by the local maintenance staff, based upon use and environmental conditions, and can increase / decrease appropriately.

- Meter surfaces should be kept clean with mild soap and water.
- Compressed air should be used to clear debris from the coin acceptor and card reader.
- Cleaning cards should be used every 1-2 months to clean the card reader, to ensure optimum performance. Cleaning cards can be purchased from IPS.
- The coin validator should be visually inspected for damage and / or debris every 6 months.

Display cleaning instructions

DO NOT use cleaning solvents or alcohol of any kind to clean the LCD. To clean the LCD use a damp soft cloth, ONLY. Excessive water can also damage the display. The front surface of the display / LCD is polarized, soft, and easily scratched.

Tasks and Procedures

The chapters listed below describe different tasks available on the SSPM, and how to perform those tasks and specific actions on the IPS Group, Inc SSPM.

Basic Operations

The chapters listed below describe basic operations of the SSPM.

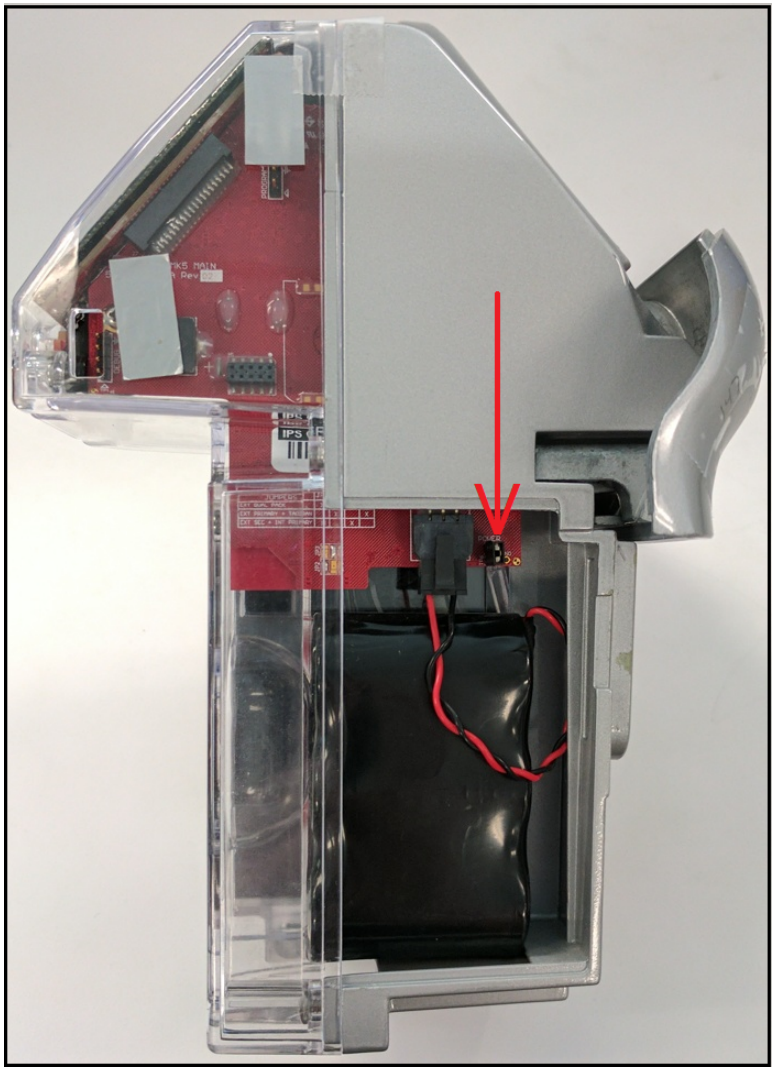
Turn the SSPM On and Off

This task topic discusses how to turn the IPS Group, Inc. SSPM ON and OFF.

Turning the SSPM On

To turn the SSPM On:

1. Connect the jumper (JMP0002, indicated in the following figure), correctly over both pins.



2. Quickly insert / remove a card into the EMV card reader.

   The SSPM and the LCD turns On.

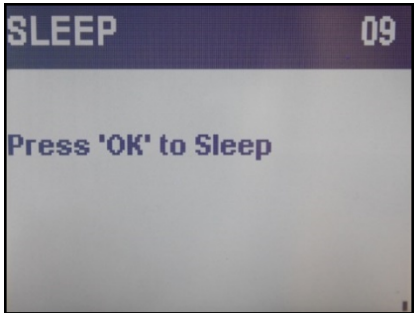
Turning the SSPM Off

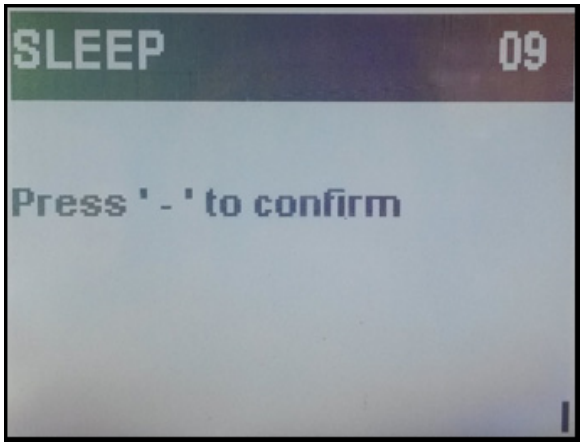
To turn the SSPM Off:

- Press and hold the Diagnostics button (below the keypad) until the SSPM and LCD turns Off,

  -OR-

- Quickly insert and remove a Diagnostics card from the EMV card reader to enter *Diagnostics* mode, ress **+ Time** (more time) / **— Time** (less time) to scroll to *Sleep*, press √ **OK** to select Sleep, then press **— Time** (less time) to *confirm* the selection.





SSPM Coin Operation

This task topic discusses how to use the IPS Group, Inc. SSPM with a coin.

To pay for parking on the SSPM using a coin payment:

1. Insert coin(s) and / or token(s) into the SSPM coin slot.

   The LCD shows the time purchased, and the time till expiry.

2. Metering begins once payment is complete.

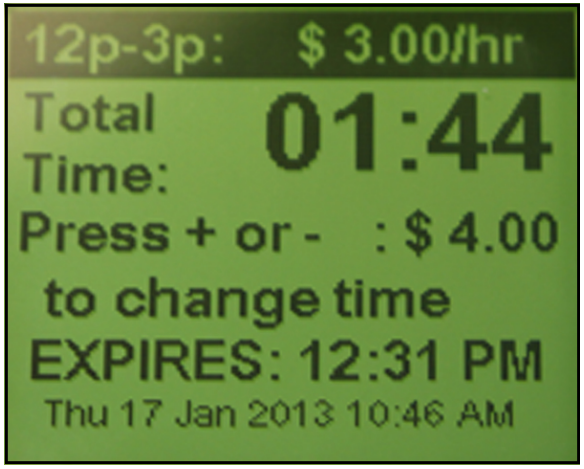
Note: The SSPM does not refund or cancel coin transactions.

SSPM Card Operation

This task topic discusses how to use the IPS Group, Inc. SSPM with a card.

To pay for parking on the SSPM using a credit, debit, and / or smart card:

1. Quickly insert and remove a card from the card reader.
2. Press **+ Time** (more time) / **— Time** (less time) to choose your desired time interval (or press **X Cancel** to cancel the transaction).



3. Press √ **OK** to submit the transaction (or press **X Cancel** to cancel the transaction).
4. Metering begins once payment is complete.

Note: If a card is left / forgotten inside the SSPM, it emits a series of audible beeps to alert the motorist. If the card is not removed, the motorist is charged the configured default amount for parking, and the SSPM reports a card jam event.

How To's

The chapters listed below describe how to perform specific actions on the SSPM.

- How To Clear an SSPM Coin Jam
- How To Replace an SSPM Coin Slot
- How To Clear an SSPM Card Jam
- How To Check the M5™ Battery Voltage
- How To Charge the M5™ Main Battery

- How To Replace an SSMP Backup Battery
- How To Force an SSPM to Update

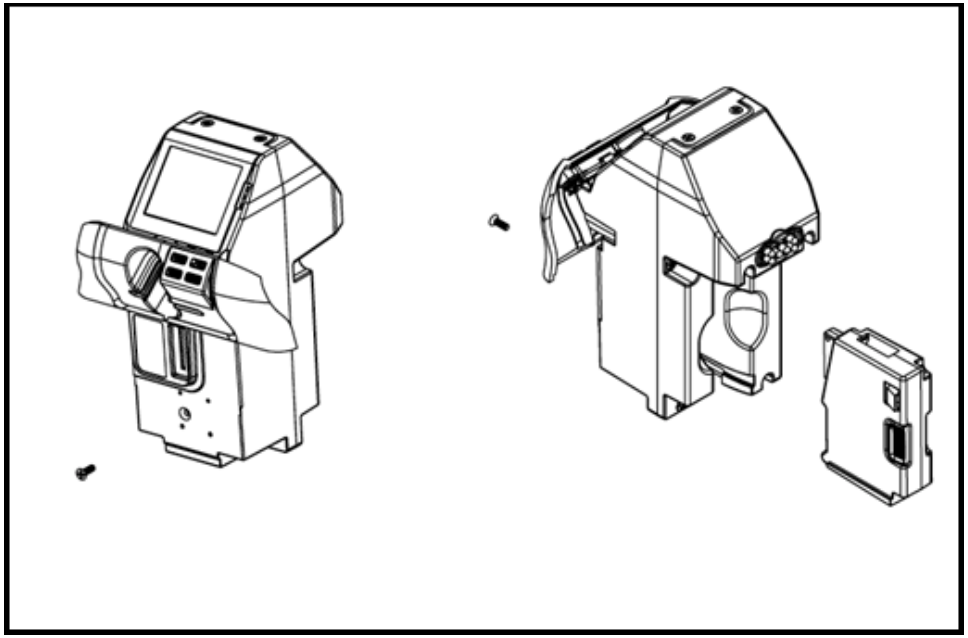
How To Clear an SSPM Coin Jam

This task topic discusses how to clear a coin jam from the IPS Group, Inc. SSPM.

When a coin jam occurs in the SSPM, the meter maintenance staff is notified via email or text message. Coin jams typically occur from intentionally actions, when foreign material is inserted, and / or when multiple coins are simultaneously inserted, into the coin slot. But the design of the meter is such that coin jams will happen very infrequently.

To clear a coin jam from the SSPM:

1. Remove the meter mechanism from the meter base housing.
2. Remove the validator screw from the front of the meter mechanism.
3. Pull the validator from the rear of the meter mechanism by squeezing the spring loaded retention clip.
   The jam will be visible due to the design of the clear validator cover.



4. Insert a thin object (such as a screwdriver) to remove the jam.
   If necessary, disassemble the validator completely by removing the screws at the corners of the validator assembly.
5. Return the cleared validator to the rear of the meter housing, clipping it into its original position.
6. Replace the validator screw to the front of the meter mechanism.
7. Reinstall the meter mechanism into the meter housing.

How To Replace an SSPM Coin Slot

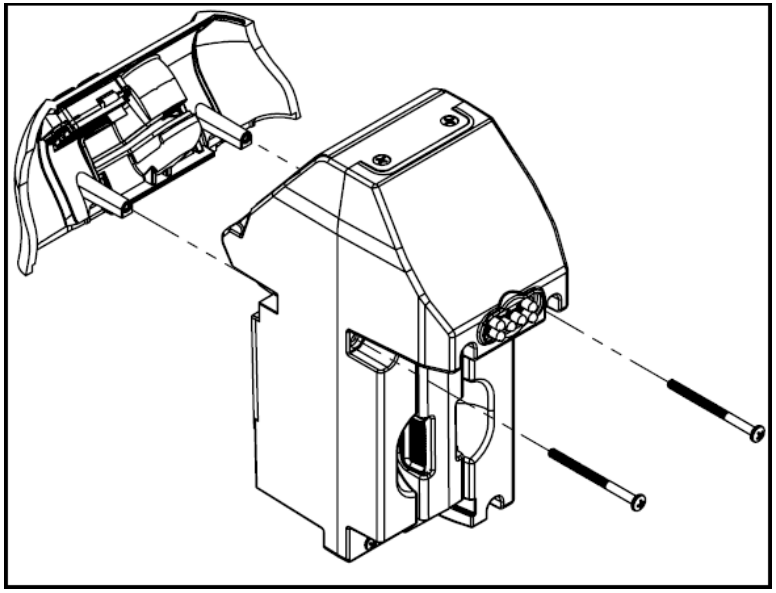
This task topic discusses how to replace a SSPM coin slot.

The M5™ SSPM coin entry slot can easily be changed to accept coins of different sizes. To replace the coin slot, remove the Card Entry Slot (as shown below) and the Coin Validator. The coin slot should easily slide out. Insert the new coin slot with the notch-side up, replace the coin validator, and the card entry slot to complete the installation.

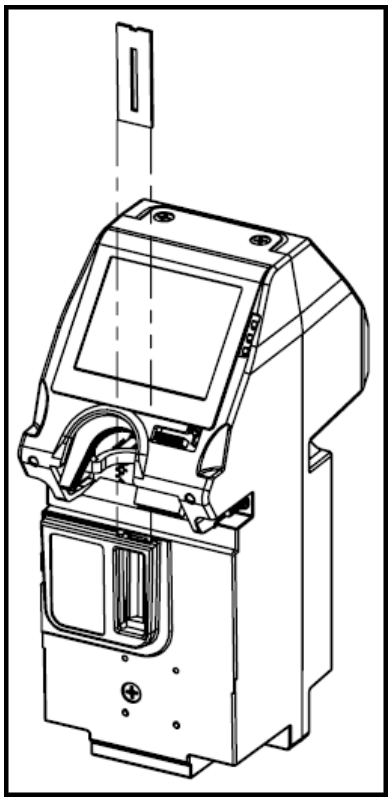
To replace a coin slot on the SSPM:

1. Remove the meter mechanism from the meter base housing.
2. Remove the validator screw from the front of the meter mechanism.
3. Pull the validator from the rear of the meter mechanism by squeezing the spring loaded retention clip.
4. Carefully disconnect the keypad from the meter mechanism at the ribbon harness (circled in red in the following figure).

5. Remove 2 screws from the rear of the meter mechanism, and remove the card reader casting.



6. Lift the coin slot to remove it from the meter mechanism.



7. Insert a new coin slot into the meter mechanism, and reassemble the meter assembly / meter base housing in reverse order.

How To Clear an SSPM Card Jam

This task topic discusses how to clear a card jam from the IPS Group, Inc. SSPM.

The SSPM is designed to ensure that any coin(s) jammed into the card reader slot is automatically cleared with the insertion of a credit card. The coin(s) fall through an opening in the card reader and clear the card path. (Coins that fall into the meter mechanism housing may

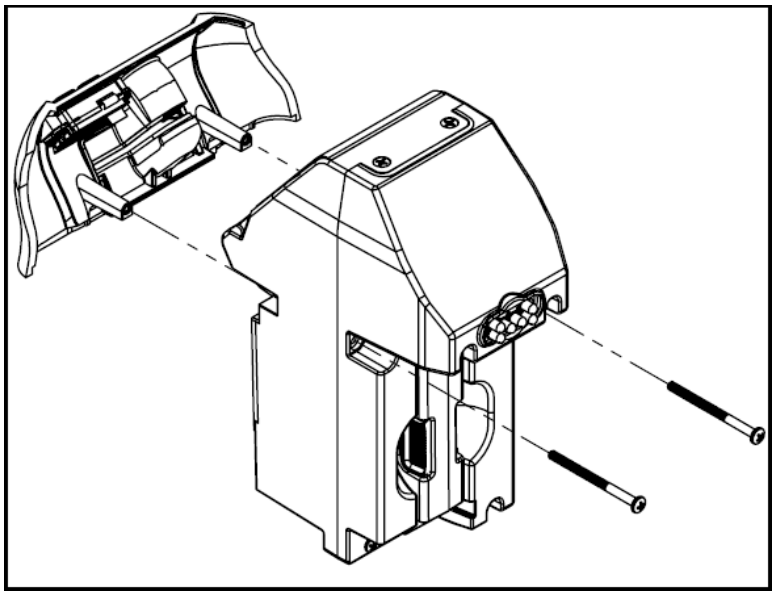
be removed at a later time.) In the rare case where foreign objects / coins are maliciously jammed into the card reader slot, any thin sturdy device (such as a letter opener), can be used to clear them.

The card reader entry slot may be removed to clear the jam.

To clear a card jam from the SSPM:

1. Remove the meter mechanism from the meter base housing.
2. Carefully disconnect the keypad from the meter mechanism at the ribbon harness (circled in red in the following figure).

3. Remove 2 screws from the rear of the meter mechanism, and remove the card entry casting.



4. Inspect the exposed card entry casting and card reader, and use a thin sturdy device to remove all obstructions . The card reader slot casting and card reader are clear.
5. Reassemble the card entry, and carefully reconnect the keypad to the meter mechanism.
6. Reinstall the meter mechanism into the meter housing.

How To Check the M5™ Battery Voltage

This task topic explains how to check the battery voltage on the IPS Group, Inc. M5™ parking meter.

The IPS Group, Inc. SSPM's operate with two batteries. The voltage of each battery can be checked to determine if an individual battery must be recharged or replaced. This procedure outlines how to properly charge the IPS Group, Inc. M5™ SSPM. It is intended for internal use by IPS personnel, or a customer’s authorized field technicians.

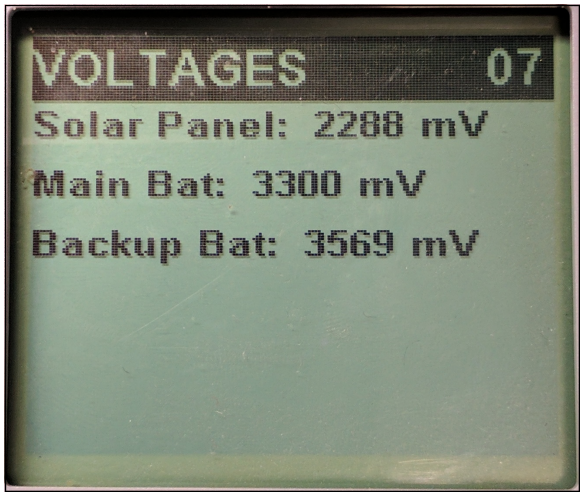
The M5™ SSPM uses two different batteries:

- Rechargeable Main Battery
- Non-rechargeable Backup Battery. (Large external battery.)

Checking battery voltages

To check the SSPM battery voltages:

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



3. Check the voltage of the Non-rechargeable Backup Battery.
   If the Non-rechargeable Backup Battery measures < 3100 mV, replace it with a new battery.
4. Check the voltage of the Rechargeable Main Battery.
   If the Rechargeable Main Battery measures < 3100 mV, click here to view the task topic How To Charge the M5™ Main Battery.
5. If the Non-rechargeable Backup Battery and the Rechargeable Main Battery both measure > 3100 mV, deploy the M5™ SSPM for use, or place it into *Sleep* state for future use.

How To Charge the M5™ Main Battery

Caution: At the JMP6 header on the main board, ensure the jumper (JMP0002, indicated in the following figure), is connected correctly and remains connected while charging.