



# **Model HM-535 Power Supply**

## **Installation and Service Instructions**



**SENTRY  
INSTALLATION  
& SERVICE  
INSTRUCTIONS**

**POWER SUPPLY UNIT  
Model HM-535**

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**IMPORTANT SAFETY INSTRUCTIONS**

**WARNING** - When using electrical devices, basic safety precautions should be followed to reduce the risk of fire, electrical shock, or injury.

1. **READ ALL INSTRUCTIONS BEFORE INSTALLING THIS POWER SUPPLY.**
2. This device must be grounded. Connect only to a properly grounded outlet.
3. Install or locate this power supply only in accordance with the installation instructions provided.
4. Use this power supply only for its intended use as a Sentry system component.
5. Do not use an extension cord with this device. If a receptacle is not available adjacent to the power supply, contact a qualified electrician to have one properly installed.
6. This power supply should be serviced only by a qualified service personnel. Contact nearest Sentry authorized service facility for examination, repair or adjustment.
7. The installation of this device must be in accordance with instructions and all applicable local codes and requirements.
8. High Voltage connections inside. Operate only with the door closed. Disconnect supply voltage when servicing.
9. Adequate ventilation is essential. Install in strict accordance with mounting instructions.
10. For continued protection from lightning damage, never connect an output wire to earth ground.

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**CAUTION**

**To reduce the risk of electrical shock, Do Not remove cover.  
Refer servicing to qualified service personnel.**

**NOTICE**

**Indoor use only. Protect this equipment from water damage.  
Never operate where water can make contact to the enclosure or interior.**

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## **1.0 INTRODUCTION**

The Sentry Model HM-535 is a regulated DC power supply specifically designed to provide low voltage to Sentry components. The power supply includes a battery charger and diagnostic system with LED status indicators. An external battery (supplied) is connected to provide backup power in the event of a power outage.

The power supply's diagnostic system communicates with the Sentry console. Messages for power supply trouble and battery trouble will alert the operator of problems. The supply's DC Output voltage can be controlled Off via reset signal from the master controller.

## **2.0 INSTALLATION**

The Model HM-535 Power Supply Unit must be wall mounted with the cabinet hinge on the left. The back surface includes four holes for mounting.

Adequate ventilation is essential. Install in a clean, dust-free and dry location. Keep a distance of 4" from the sides, top and bottom to any wall, ceiling, or other object. Allow ample space for the door to open.

**NOTE: the unit will get hot to the touch and must be installed in a safe, non-confined location. Never obstruct the air ventilation holes.**

DC voltage and data wires are intended to run out of the cabinet through the knock-outs in the right side. Install a wire clamp or grommet in the hole. The AC power cord or supply wiring should run through the knock-out in the bottom or left side. Secure wiring with a cable clamp.

All adjustments are preset at the factory. DO NOT attempt to make any adjustments to the circuitry. Unauthorized adjustments will degrade system operation and void the warranty.

### **2.1 DEVICE ADDRESS**

The Power Supply serial communication address code is preset to 63.

### **2.2 WIRING CONNECTIONS**

1. Data: Connect data line wires to the two screw terminal block on the right side of the PCB. Follow the markings for: Data- & Data+.
2. DC: The DC Output terminal block has four screw terminals. From top to bottom the terminals are: OUT-, OUT+, OUT-, OUT+. The two OUT- terminals are internally connected and the two OUT+ are internally connected.
3. AC: 120V AC line power is connected to the AC terminal block located on the left of the PCB. From top to bottom the terminals connect to: Ground, Neutral, Line. The Ground terminal is connected to the case.

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4. Batt: The battery is connected via the screw terminals marked BATT+ and BATT-. Connect these terminals to the Sentry battery with 14AWG wire.  
**Make sure of correct polarity.**

### 2.3 GROUNDING

The metal power supply enclosure is electrically connected to the AC Ground terminal for connection to earth ground (AC wiring ground).

**For continued protection from lightning damage, the DC output must be isolated from earth ground.**

In other low voltage systems the negative side of the DC voltage is often referred to as "system ground", however in a Sentry system, the DC negative is "System Common" and is never to be connected to the building's electrical ground or earth ground.

Always operate the power supply with the door closed for proper cooling and protection from electrical shock.

### 2.4 BATTERY BOX

Refer to the Installation Wiring Diagram on page 12. Install the battery box in close proximity to the power supply. Mount the box with the door hinge at the bottom or top. The supplied cable length is 36". Mount the battery box to the wall with screws or anchors. Note that the battery weighs almost 15 pounds and the box must be securely mounted.

Route the battery cable to the battery through a knock-out in the box side. Install a plastic grommet (supplied) to protect the wire. Install the push-on connectors to the battery after the power supply is operating. Secure the box door with a screw.

### 3.0 TROUBLE SHOOTING

Check the status indicators.

- OUTPUT: The green OUTPUT LED lights to show the DC output is On.
- LPSV: The Red LPSV LED lights to indicate low power supply voltage.
- LOW BATT: Lights to indicate low battery voltage or disconnected battery.
- XMIT: Flashes green to indicate data communication with the console.
- CHG TRBL: Lights to indicate the battery charger is not functioning.
- IN BACKUP: Lights to indicate when the load is powered from the battery.

During normal operation the OUTPUT LED is On and the XMIT LED will flash.

### 3.1 POWER SUPPLY

If the LPSV (Low Power Supply Voltage) LED is On, plus the OUTPUT and BACKUP are Off, the power supply has failed or is shut-down because of overload. Note that the CHG TRBL LED will always light when the LPSV indicator is On; the

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charger is automatically shut off to prevent the load from being powered by the charger.

- A. Low Power Supply Voltage usually means the current fold-back feature is active and the DC load is too great. Disconnect the DC output leads, then check if the output voltage is restored. When the DC Output recovers, the green OUTPUT LED will light. In extreme cases, the AC power may need to be cycled Off for 5 seconds to restore the output. This reset will only work with the DC load disconnected. If the DC Output recovers with no load connected, the problem is usually a device on the system that is drawing excessive current. Find the defective device in the system and reconnect the wiring.
- B. The DC power supply can be controlled off by the master controller. The controller will turn off the supply for 15 seconds when an apartment number shows in the Service screen. This shut-down will allow all connected devices to reset. To check if this feature may have malfunctioned and is controlling the supply, disconnect both data line wires. Loss of data for 30 seconds will reset the controller and will allow the supply to turn on. If disconnecting the data wires restores the output, reboot the master controller.
- C. If removing the load, cycling the AC supply Off and disconnecting the data wires does not restore the DC output, the switching power supply has probably failed. Replace with a new one. Call Sentry for information on replacement parts.

### 3.2 CHARGER

If the CHG TRBL remains lit and the LPSV LED is Off, the charger circuitry has failed.

The power supply's controller automatically tests the battery every 9 hours or when the TEST button is pressed. The CHG TRBL LED will normally light for 5 seconds while the charger is inhibited during the battery test.

If the charger's power transformer fails, it can cause the supply to go into the back-up mode. In this case, the battery will supply the DC output until it gets drained, then the output will shut off.

Replace with another supply. Send the defective unit to Sentry for repair.

### 3.3 CONTROLLER

If the console's screen message lists "Power Supply Comm Trouble" the data communication to that supply has failed. In most cases the power supply is functioning normal but the green XMIT indicator isn't flashing at 3 to 4 second intervals.

This trouble is usually associated with a low voltage surge in the power supply. The

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supply's controller can be reset by: 1. disconnecting the battery, and 2. cycling the AC power Off for 10 seconds.

If that does not restore data communication, the data line wiring to the power supply is probably bad.

A spare host panel, set to address code 63 can be temporarily connected to check the data line.

If the data wires are functional and the power supply does not communicate, the data driver and microcomputer will require replacement. These components are installed in sockets for easy replacement. Replace components labeled U9 & U10 on the lower right PCB. Be certain to install the components in the proper direction and assure that all pins insert into the proper holes. Contact Sentry for service parts.

### 3.4 AC POWER

If all of the indicators are off, the supply has lost power and the battery is disconnected or drained.

Check the AC power to the supply. Test the AC terminal block for 117V AC.

### 3.5 BATTERY

The LOW BATT indicator will light when the battery gets discharged below 10V or if the battery fuse is open.

Check the battery fuse on the bottom of the PCB. If necessary replace with another fuse.

**For continued protection: replace fuse with only the same type and rating.**

Check the battery voltage when connected to the power supply. It should be above 13 volts. Check the battery voltage when the test button is pressed. If the battery voltage drops to less than 9 volts, the battery is no good and must be replaced.

When a new battery is installed, it can be checked by manually pressing the TEST button. The LOW BATT indicator will go Off.

The CHG TRBL LED normally lights for 5 seconds when the battery is being tested. This test inhibits the battery charger during the battery load test.

## **4.0 OPERATION**

### **4.1 OUTPUT**

The DC output voltage is factory set at 14 volts. The supply is capable of 12 Amps maximum. Load regulation will maintain output voltage to within 2% from no load to full load. Line regulation will maintain output voltage to within 2% at full load from 102V to 125V AC line voltage. The OUTPUT LED lights when the DC output voltage is On.

### **4.2 OUTPUT PROTECTION**

A current fold-back circuit is used to protect the supply from over current. When the 12 amps is exceeded, the output voltage will automatically decrease in an attempt to reduce the fault current. The output voltage will recover when the fault is cleared. The supply is protected from a catastrophic short circuit, but may require the AC and battery power to be interrupted momentarily to recover from total fold-back.

### **4.3 BATTERY CHARGER**

The charger is a constant voltage type that can supply up to 3 amps for fast charging. When the battery is fully charged, the current is reduced to a standby amount and the battery is maintained with a float charge of 13.8 volts. The battery charger is automatically inhibited if the DC power supply shuts down and during the battery test.

### **4.4 BATTERY PROTECTION RELAY**

A circuit protects the battery from being drained to level that will cause permanent damage. When the power supply is in the backup mode, the battery will typically supply the load for an hour. When the battery drains to 9 volts, a relay will disconnect it. When the AC power is restored, the battery will reconnect and will be charged.

### **4.5 BATTERY TESTER**

The power supply's controller will test the battery every 9 hours. During the 5 second test, the charger is inhibited, and a test load is connected across the battery. If the battery tests bad, the LOW BATT LED will light and a Battery Trouble message will be sent to the console.

### **4.6 DC SHUTDOWN**

A control is incorporated to shutdown the DC output voltage via a special signal from the Master Controller. If host panels cease data communication with the console, the power supply will be directed to shutdown for 15 seconds. The shutdown and power on cycle will usually restore data communication. This action is completely automatic and does not require operator intervention.

## **4.7 POWER SUPPLY CONTROLLER**

The controller operates the battery test and DC shutdown functions described above. It also provides data communication, diagnostics, and status indicators.

In the event of Low Power Supply Voltage (LPSV) or Charger Trouble (CHG TRBL) a trouble signal is sent to the console and the message: Power Supply Trouble will appear on the screen. If the LOW BATT indicator stays on, a separate signal will alert the screen with a Battery Trouble message. The green XMIT LED will flash during data transmission to show proper operation. When data communication is lost, the XMIT LED will not flash and the message "Power Supply Comm Trouble" will appear on the console screen.

When a power supply or battery trouble message appears on the screen it will include the power supply's ID number and the data line number.

## **4.8 INDICATORS**

Six LEDs indicate operational status of the power supply.

	DS1	OUTPUT
LED Status	DS3	LPSV (Low power supply voltage)
Indicators:	DS5	LOW BATTERY
	DS6	XMIT (Data line data signal)
	DS7	CHARGER TROUBLE
	DS8	IN BACKUP

Indicator Descriptions:

OUTPUT - is on when the DC output is powered, either by the supply or battery.  
LPSV - indicates the power supply voltage is low.  
LOW BATT - indicates the battery is: disconnected, fuse is open, or low voltage.  
XMIT - flashes to show proper data communication.  
CHG TRBL - indicates when the charger is inhibited or malfunctioning.  
IN BACKUP - indicates when the supply is operating from the battery.

## **4.9 VENTILATION**

The HM-535 Power Supply unit dissipates heat and must be mounted in accordance with the installation instructions in section 2. The power supply must be operated with the door closed. Holes are placed in the door side for a fastening screw.

## **4.10 SURGE PROTECTION**

The HM-535 Power Supply is completely protected from electrical transients on both the input lines and outputs.

## **5.0 SPECIFICATIONS**

LINE VOLTAGE	110 to 128 Volts, 60 Hz
AC LINE CURRENT	3.0 Amps Max.
OUTPUT VOLTAGE	12.8V to 15.5V DC
LINE REGULATION	2% Output, 102 to 125V Input
LOAD REGULATION	2% Output, No Load to 12 Amps
OUTPUT CURRENT	12 Amps Max.
CURRENT LIMIT	Factory Set at 12.5 Amps
BATTERY	Sealed Gel type 12 Volt, 15 Ah
BATTERY FUSE	12 Amp, Type 3AG
OPERATING TEMPERATURE	50 C (122 F) max. ambient
DATA COMMUNICATION	Standard Sentry protocol, 1200 baud, RS 485. Permanently set to address 63

## **6.0 POWER SUPPLY LOAD ESTIMATES**

The HM-535 Power Supply has a rated output of 12 Amps. This output limits the amount of devices that can be powered by a single power supply. All installations have a host panel in each apartment and most include a smoke detector, and remote call switches. Many installations use other Sentry devices as options, such as dome lights, intercoms, and security. A table in the section below shows the current draw of each device. Use this table to calculate the total current draw per apartment, then determine how hallways or wings will be wired to figure the current draw to the apartment groups. Knowing the total current in a typical apartment will also determine the maximum number of apartments that can be powered by a single HM-535 Power supply.

**EXAMPLE:** The typical apartment with one host panel and one smoke detector: Sentry recommends to always figure current with smoke detectors in the alarm state, 70mA. With the host panel at 45mA and the smoke detector at 70mA the apartment total is 115mA. The 12 amp rating of the 535 power supply is divided by the .115A (115mA) to show a total of 104 apartments with this configuration can be powered from one power supply.

As a basic guide for estimating typical installations, Sentry usually uses '100 apartments maximum' to approximate power supply requirements. Always calculate currents before providing a final design and consider all possible optional devices. The '100 apartment' number estimate also relates well with the data line capacity which is limited to 51 apartments maximum each. Usually one power supply is used to power all apartments

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on two data lines. The Sentry model HM-588 terminal board provides a simple and clean method for making the wiring connections between a power supply, 2 data lines, and the apartment panels. Seldom are data lines connected to the 51 panels maximum. Therefore the power supply is rarely connected to it's 104 panel limit.

### Sentry Devices Maximum current requirements:

HM-520 Sentry Plus Panel	0.085 Amps	85mA
HM-523 Intercom Panel	0.063 Amps	63mA
HM-524, 527, 528 Host Panel	0.045 Amps	45mA
HM-541 Remote Call Station	0.015 Amps	15mA
HM-544 Remote Assurance Panel	0.022 Amps	22mA
HM-545 Latching Call Station	0.030 Amps	30mA
HM-547 Pendant Receiver (standby)	0.010 Amps	10mA
Pendant Receiver (activated)	0.035 Amps	35mA
HM-560 Smoke Detector (standby)	0.010 Amps	10mA
Smoke Detector (activated)	0.020 Amps	20mA
HM-681 Dome Light	0.300 Amps	300mA
HM-685 Strobe Light	0.050 Amps	50mA
HM-694 Security Keypad (standby)	0.035 Amps	35mA
Security Keypad (speaker siren)	0.800 Amps	800mA

When calculating the power supply load, the devices that turn on temporarily or during call acknowledge are not figured into the total current. Generally models HM-523, HM-541, HM-544, HM-545, HM-681, HM-685 and the siren mode of the HM-694 security keypad are not included in current calculations.

Total the current of all the devices in each apartment. Divide the 12 Amps of the power supply rating by the total apartment current. This will give the maximum number of apartments that can be powered by one supply.

## 7.0 WIRING LAYOUT

An important consideration is how the building will be wired between the power supply and apartments. For simplicity of wiring and servicing, always attempt to group all the apartments in one hallway, on a floor, or in a wing, so they are powered by the same power supply. When following the wiring design recommendations, all the apartments on one side of each hallway should be wired together, and each side then connected to the terminal block. As apartments get wired into groups, the groups are totalled to determine the current load to the power supply. This number is always rounded down to the lesser number so that the power supply is seldom connected to a full load.

Note that usually adding another power supply to a system is simpler and more cost effective than installing a complex wiring scheme that would break up obvious apartment groups.

## **7.1 VOLTAGE REQUIREMENTS**

All Sentry apartment devices have been specifically designed to minimize current requirements. Devices such as host panels and smoke detectors will operate below 9 volts, however Sentry specifies that the panels and smoke detectors **MUST** have at least 9.0 Volts to perform properly.

## **7.2 VOLTAGE DROP**

Voltage drops are voltage losses in the wiring. As current increases, the loss increases, and the voltage available to the devices is decreased. To reduce voltage drops, the number of apartments connected to a single cable and cable length is limited. See the Sentry Wiring Design Guide (390-108) for more information.

Increasing wire gauge will decrease voltage drops. At buildings with a long distance between the power supply, terminal block, and the closest room panel, it is recommended to install a 14 gauge wire pair for the DC power, to the first panel on the cable length. The number of apartments that can be connected to a common power and data cable is significantly lower when the system is connected to a fire alarm interface. The fire alarm interface can activate all the smoke detector horns simultaneously. The higher current from all the smoke detectors sounding at one time creates higher voltage drops.

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## INSTALLATION WIRING DIAGRAM

