SECURITRON POWER SUPPLIES
MODELS: BPSM-12-6, 9 AND 15; BPSM-24-4, 6 AND 10
OPERATION AND INSTALLATION INSTRUCTIONS

1. DESCRIPTION

These instructions cover 6 different models as shown above. The part number expresses first the **output voltage** (12 or 24V DC) and second the **maximum output current capacity**. For example, a model BPSM-24-6 can supply up to 6 amps at 24 volts. Securitron large power supplies consist of a power module and CCS8M control board to which all installer connections are made. The board accomplishes several functions. It provides terminals for line voltage input and eight separate DC output circuits, so that a number of devices can be powered. Each control circuit has an individual slide switch to turn it on and off and an LED to annunciate its status. The CCS8M control board also provides the following:

- AC input and DC output LED indicators
- Emergency release terminals (fire alarm disconnect)
- AC status (form “C” contact) and DC status (form “C” contact) terminals
- Line voltage and DC fuses
- Built-in charger for sealed lead acid or gel cell batteries
- Automatic switch over to stand-by battery when AC fails

All power supplies in the BPSM series are **Class 2 rated** when installed following these instructions.

The models which incorporate the suffix “H” in the part number have not been evaluated by UL. These power supplies have only been evaluated by UL for use in the EXD-1and EXD-1F FWAX systems.

2. SAFETY

Two hazards are present in the supply. Line voltage input presents a high voltage shock hazard and the DC/battery output, represent a high energy (current) hazard. A shorted battery can swiftly supply levels of current sufficient to melt wiring insulation and cause a fire. To insure safety, note first that the cover LED (red) is on at any time that the supply is dangerous, which is either if it is receiving line voltage or if batteries are operating. **The supply enclosure must only be opened by trained service personnel when the red LED is on. The green LED on the CCS8M control board is on when AC line voltage is present.** Other safety features include line voltage and DC fuses and the fact that the line voltage input terminals are under a warning guard plate.

3. OPERATING CHARACTERISTICS

3.1 LINE VOLTAGE INPUT

110-120 VAC should be input to terminals "H", "N", "G", as shown in the drawing. This is fed to the input of the power module through factory made connections. The green LED will illuminate when AC line voltage is present. The line voltage current drawn by the power supply module will be approximately half the DC output. For example, for a 4 amp power supply, the line voltage service should be able to supply at least 2 amps. Note: if the suffix “H” appears in the part number (i.e. BPSMH-24-4), the unit requires 220 VAC input. Apart from this change, all other characteristics are the same.

3.2 DC OUTPUT

The maximum DC output of the power supply is expressed by the final figure in the part number. The BPSM-24-4 can supply up to 4 amps; the BPSM-12-6, up to 6 amps etc. However, these power supplies are adjustable and the voltage level set affects the current output capacity. When **used with batteries**, the power supplies must be set at 12.5% over voltage (13.5 V for 12 volt supplies and 27 V for 24 volt supplies). **This is the factory setting** and if the voltage is to be changed, use the potentiometer marked "V Adj" on the power supply module. The current rating takes into account the possibility of the supplies operating at 12.5% over voltage.

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Therefore any supply which is operated at its nominal voltage (12 or 24 v) can supply about 20% more than its rated current. Despite this, we **strongly recommend** that supplies be operated substantially below their maximum output capability. Operating power supplies at their maximum greatly increases the possibility of heat induced failure. "Margin for error" is lost and this is inappropriate for a security system. **Power supplies should be run at no more than two thirds of their maximum capacity for optimum reliability.**

3.3 EMERGENCY RELEASE (FIRE ALARM) TERMINALS

If the power module is operating or if batteries are operating, the red LED will illuminate. +V (12 or 24VDC depending on the model power supply) will then be on terminal F1. A connection must then be made between terminals F1 and F2 (this will turn on a power relay) before +V is routed to the "P" terminals. **Terminals F1 and F2 therefore constitute an emergency release point.** If desired, for instance, NC contacts controlled by the user's fire alarm system can be connected across terminals F1 and F2 such that the connection between these terminals will be broken in the event of a fire. **UL listed auxiliary latching normally closed contacts (minimum switching capability of 75 mA) from the fire alarm system should be used.** "Trouble" contacts must not be used. This will automatically release all the devices being driven by the unit. If the emergency release terminals are not to be used in this way, a jumper should be placed between them so that the board's output terminals will function.

Terminal FA is a free parking terminal.

3.4 OUTPUT TERMINALS

The CCS8M board has three types of output terminals. **"P" terminals** are on individual circuit breakers and carry +12 or +24 volts on them (when the emergency release terminals are closed). **The "H" terminal** carries the full +V output of the supply on a single terminal (when F1 and F2 are closed). Use the "H" terminal for applications where the device being powered requires more than 2 Amps of current. The Polyswitch circuit breakers cannot reliably supply more than 2 Amps of current without tripping and **you should never wire multiple "P" terminals in parallel** to supply increased current. This bypasses the safety role of the Polyswitch breakers and also does not work very well. When two "P" terminals are wired in parallel, current carrying capacity is not doubled. The current conducted through the two terminals will not be identical so one switch will break first and then the second will immediately trip. When "P" terminals are correctly used as isolated outputs, each is inherently current limited to **Class 2** standards. Always use the "H" terminal for applications requiring high current. Finally, the **"R" terminals** are all for 0 volt DC negative return and are in common.

3.5 SUPERVISION

During normal operation both trouble reporting relays are energized (refer to Voltage Supervision Diagnostic Table on page 4). To report loss of AC, connect corresponding wiring to terminals marked **AC FAIL** (If AC line voltage is present, there will be continuity between the **C and NO terminals**). To report low battery, connect corresponding wiring to terminals marked **LOW BATT.** During battery operation and AC line voltage not present, there will be continuity between the **C and NO terminals**. If during battery operation the battery voltage drops below 10.4VDC (20.8VDC for the 24V power supplies) the battery will automatically disconnect to prevent possible damage to the battery. **Once the battery has been automatically disconnected, AC line voltage must be restored before the battery is again available for backup.** All relay contacts have transient/surge absorbers to protect the board from external high voltage transients. **The maximum voltage allowed on any pair of relay contact terminals is 30VAC or 38VDC.**

3.6 FUSING AND CIRCUIT POLYSWITCHES

An **AC fuse, DC fuse** and eight **Polyswitches** are present on the board. The AC fuse is on the hot 120 VAC input and protects against an internal short in the power supply transformer. A short in the DC load will not blow the AC fuse. The DC fuse protects the full DC output of the supply prior to it being divided through the Polyswitches to the individual "P" outputs. The Polyswitch is a special type of automatic circuit breaker. If one of the Polyswitches receives an overload, it will rapidly cut the current down to a small leakage current (about 100 mA) which will **allow the other outputs to continue to operate**. Note that each "P" output includes a slide switch and LED. The slide switch can cut DC power to its respective output and the LED monitors when the output is powered. In the event of one of the Polyswitches tripping, the associated LED will go out or dim. If all the LED's go out, one of the fuses has tripped or the

power supply has gone into automatic shut off (discussed later). **Always replace any blown fuse with the same rated fuse.**

The DC fuse should only trip if there is a short circuit in the supply itself (downstream short circuits or overloads will trip individual Polyswitches). This could occur if the F1-H terminal block somehow contacts DC negative. Alternately, if you are not using the "P" terminals for downstream wiring but are using the "H" terminal to operate an individual, high current, downstream load, a short circuit or overload could trip the DC fuse.

Securitron's power supply family contains an additional safety feature which is **automatic shut off** in the event of a DC short circuit or overload. This is often called a "crowbar" circuit. When you are using the power supply **without batteries**, a DC short circuit will usually cause the power supply to shut itself off rather than tripping any fuse or Polyswitch. If batteries are implemented, however, they will attempt to drive into the load as soon as the short circuit or overload occurs and the fuses and/or Polyswitches will trip to maintain safety.

If this happens there is a **reset procedure**. **First, correct the overload condition. Next, remove all current from the Polyswitch for a period of 10 seconds**. You do this by moving the associated slide switch to the "off" position. Then wait 10 seconds, return the slide switch to "on" and operation will return to normal. If you haven't corrected the overload, naturally the Polyswitch will trip again but you must always de-power and re-power the Polyswitch to reset it.

The multiple safety features of these power supplies can be confusing so the following chart provides summary information on operation of the safety features when the power supply is used with and without batteries.

	AC FUSE	DC FUSE	POLYSWITCH	AUTO SHUTOFF
WITHOUT BATTERIES	Will trip only if internal transformer shorts (all LED's will be out)	Generally will not trip. Supply will go into auto shut-off in case of overload (all LED's will be out)	Generally will not trip. Supply will go into auto shut-off in case of overload* (all LED's will be out).	Will generally occur in the case of any short or overload (all LED's will be out)
WITH BATTERIES	Will trip only if internal transformer shorts (all LED's will be out)	Will trip if terminal F1, F2 or H shorts to negative or in case of overload when terminal H is used as single output (all LED's will be out)	Will trip in the event of individual zone short or overload (individual zone LED will be out or dim)	Batteries drive into short or overload which trips another safety feature unless overload current is less than fuse or Polyswitch rating.

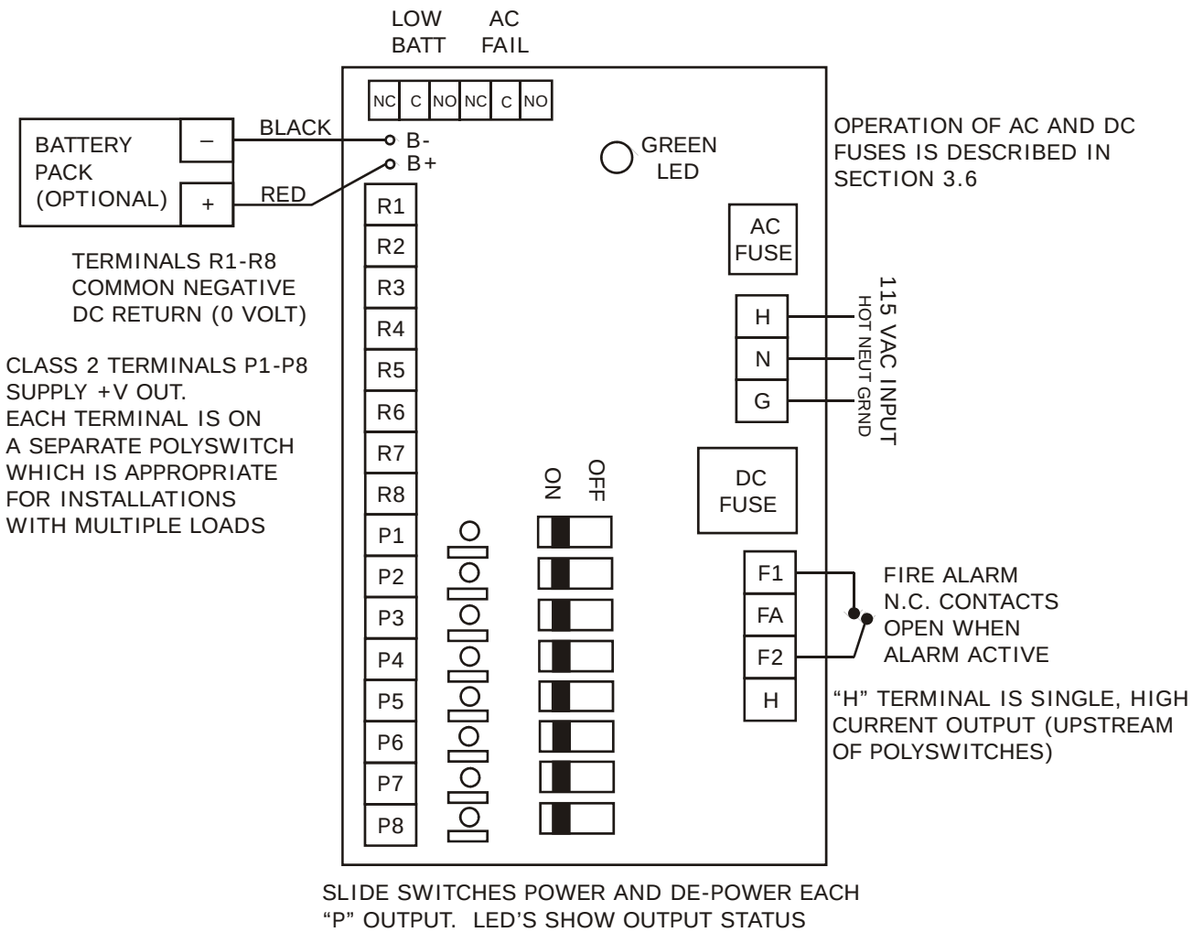
* A Polyswitch can individually trip in an overload condition without batteries in the special case where the overload current is greater than the Polyswitch trip current (2.5 Amps) but less than the power supply output capacity. This is unusual. A pure short circuit is more common and this will put the supply into Auto shut-off.

LED DIAGNOSTIC TABLE

RED (DC) on FRONT PANEL	GREEN (AC) on CONTROL BOARD	DESCRIPTION
ON	ON	Normal Operation
ON	OFF	Battery backup is powering output
OFF	ON	No DC output
OFF	OFF	No AC, no battery or discharged battery

VOLTAGE SUPERVISION DIAGNOSTIC TABLE		
AC FAIL TERMINALS	**LOW BATT TERMINALS**	**DESCRIPTION**
Continuity between C and NO	Continuity between C and NO	Normal Operation
Continuity between C and NO	Continuity between C and NC	AC present, no DC output
Continuity between C and NC	Continuity between C and NO	No AC, battery is powering unit
Continuity between C and NC	Continuity between C and NC	No AC, no battery or discharged battery

FIG. 1: POWER SUPPLY WIRING WITH CCS8M BOARD



3.7 BATTERY CHARGING CAPABILITY

A resistor and diode are present on the CCS8M board which, together with the power supply, constitute a battery charging circuit appropriate for standby rated sealed lead acid or gel cell batteries. **Dry cell or NICAD batteries must not be used.** Batteries are an option. The power supply can be used with or without them. The battery pack of the appropriate voltage is connected to the red and black flying leads following correct polarity. In the event of a line voltage power failure, the batteries will automatically drive the load at the same DC voltage. If the emergency release terminals are opened, battery power will, however, be blocked just as normal power from the power supply would be.

The components utilized on the CCS8M board for battery charging function for battery packs up to **20 amp hours in capacity** whether 12 or 24 volts. Larger battery packs can be handled but Securitron must be informed so that the board may be modified. Consult (Figure 2) to calculate the correct battery pack based on desired backup time and the current drawn by the load. **For proper battery charging, the power supply must be set at 27 volts for a 24 volt system, and 13.5 volts for a 12 volt system.** Securitron power supplies are factory set to this level and if it is not maintained, the batteries will not hold their full capacity, and may even be damaged.

FIG 2: CHART TO DETERMINE SIZE OF BATTERY PACK

TOTAL CURRENT DRAWN	BACKUP TIME DESIRED									
	MIN	1 HR	2 HR	4 HR	UL STD.	8 HR	16 HR	24 HR	48 HR	72 HR
150 MA	4 AH	4 AH	4 AH	4 AH	4 AH	4 AH	4 AH	8 AH	8 AH	12 AH
300 MA	4 AH	4 AH	4 AH	4 AH	4 AH	4 AH	8 AH	12 AH	16 AH	*24 AH*
500 MA	4 AH	4 AH	4 AH	4 AH	4 AH	8 AH	12 AH	16 AH	*24 AH*	*36 AH*
1 A	4 AH	4 AH	4 AH	8 AH	12 AH	12 AH	20 AH	*24 AH*	*48 AH*	*72 AH*
2 A	4 AH	4 AH	8 AH	12 AH	20 AH	20 AH	*36 AH*	*48 AH*	*100AH*	*150AH*
3 A	4 AH	8 AH	12 AH	16 AH	*24 AH*	*28 AH*	*52 AH*	*72 AH*	*150AH*	*240AH*
4 A	4 AH	8 AH	16 AH	20 AH	*32 AH*	*36 AH*	*72 AH*	*100AH*	*200AH*	*300AH*
5 A	4 AH	12 AH	16 AH	*24 AH*	*40 AH*	*44 AH*	*84 AH*	*120AH*	*240AH*	*360AH*
7.5 A	4 AH	16 AH	20 AH	*36 AH*	*60 AH*	*72 AH*	*130AH*	*180AH*	*360AH*	*480AH*
10 A	4 AH	20 AH	*28 AH*	*48 AH*	*72 AH*	*100AH*	*180AH*	*240AH*	*480AH*	*720AH*

"MIN" TIME REFERS TO FACILITY USING A GENERATOR WHERE THE BATTERIES ARE ONLY REQUIRED TO OPERATE THE SYSTEM FOR A FEW MINUTES

U.L. STANDARD REQUIRES 4 HOURS OF BATTERY OPERATION FOLLOWED BY A 24 HOUR RECHARGE PERIOD AND THEN A SECOND 4 HOURS OF OPERATION

STANDARD SECURITRON POWER SUPPLIES CAN ONLY CHARGE UP TO A 20AH PACK. IF A LARGER PACK IS CALLED FOR, THE FACTORY MUST BE ALLERTED TO SUPPLY MODIFIED EQUIPMENT. LARGER PACKS ARE SHOWN IN ITALICS IN THE CHART.

BATTERIES MUST BE SEALED LEAD ACID OR GEL CELL TYPES. DRY CELLS WILL NOT RECHARGE AND WILL BE DAMAGED.

THIS CHART IS ONLY VALID IF BATTERIES ARE OPERATED AT ROOM TEMPERATURE. IN A COLD ENVIRONMENT, CAPACITY IS REDUCED.

BATTERIES SHOULD BE REPLACED AFTER 5 YEARS OF USE.

3.8 CODE APPROVED WIRING METHODS

Note that these units are **Class 2 rated**. This means that the individual DC outputs of the supplies (on “P” terminals) are current limited and can pose neither a high voltage nor high energy hazard outside of the enclosure. Electrical building codes in most jurisdictions permit Class 2 wiring to be done “in the open” rather than in conduit. To **maintain the Class 2 ratings** on the “P” terminal outputs, **never connect them together** to obtain higher capacity. If you require higher capacity use the “H” terminal but the “H” terminal is high current (not Class 2) and must be in conduit. The line voltage wiring coming into the unit also must be in conduit as it poses a high voltage hazard. **Be sure to check with your local building department** to make sure you are complying with applicable wiring codes before installing these units.

4. SLAVE BOARD

Your power supply may include more than one control board. If so, the other board will be a "slave" board (part # CCB-8) whose only purpose is to provide eight additional "P", and "R" terminals. The board will not be fully populated as the functions of AC input, battery charging, emergency release, voltage supervision and DC and AC fusing are only needed on the CCS8M board. The eight additional **Class 2** “P” terminals naturally constitute individual outputs protected by Polyswitches and including zone LED’s and slide switches.

5. APPROVALS

All Securitron power supplies are tested by various agencies. Consult the label inside the supply to be advised of current approval status

6. MAGNACARE® LIFETIME REPLACEMENT WARRANTY

For warranty information visit www.securitron.com/en/site/securitron/About/MagnaCare-Warranty/