

## 1.4 Power Supply Unit

The unit consists of a 19" rack including a battery charging module (PU-A0009-1) and two or four 20 A feeding modules (PU-A0008-1), for a maximum capacity of 80 A. The following table indicates the electrical characteristics of the two possible PSU configurations. All modules can be hot-swapped at any time, with no need for power switching off.

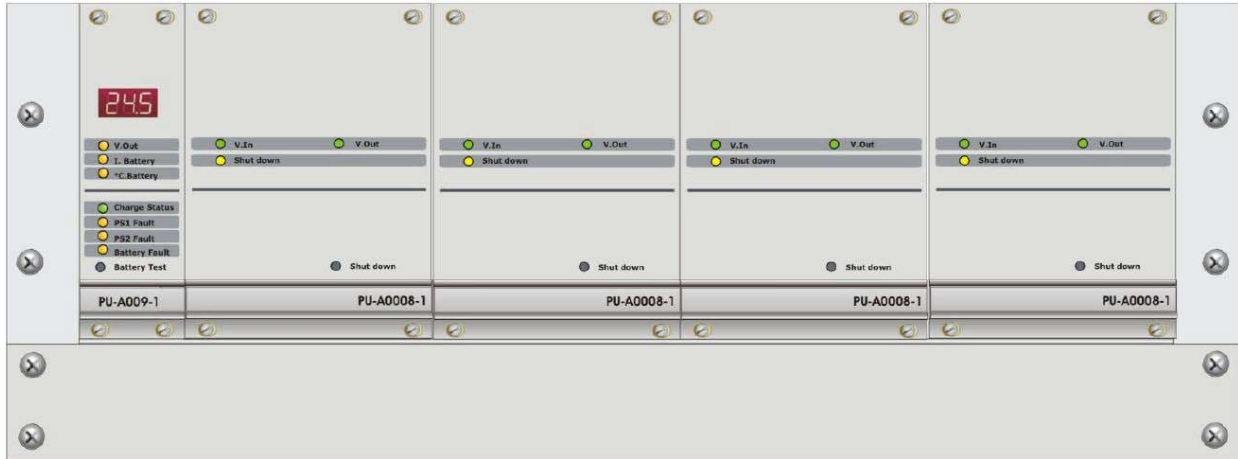
Characteristic	S81-PU002-2	S81-PU002-4
Quantity of feeding units (PU-A0008-1)	2	4
Supply voltage	120 VAC or 240 VAC	120 VAC or 240 VAC
Nominal frequency	50-60 Hz	50-60 Hz
Maximum input current @ 110V~	6 A	12 A
Maximum input current @ 240V~	2.7 A	5.25 A
Nominal output voltage	25VDC $\pm$ 2%	25VDC $\pm$ 2%

**Table 1.2 Power Supply Unit**

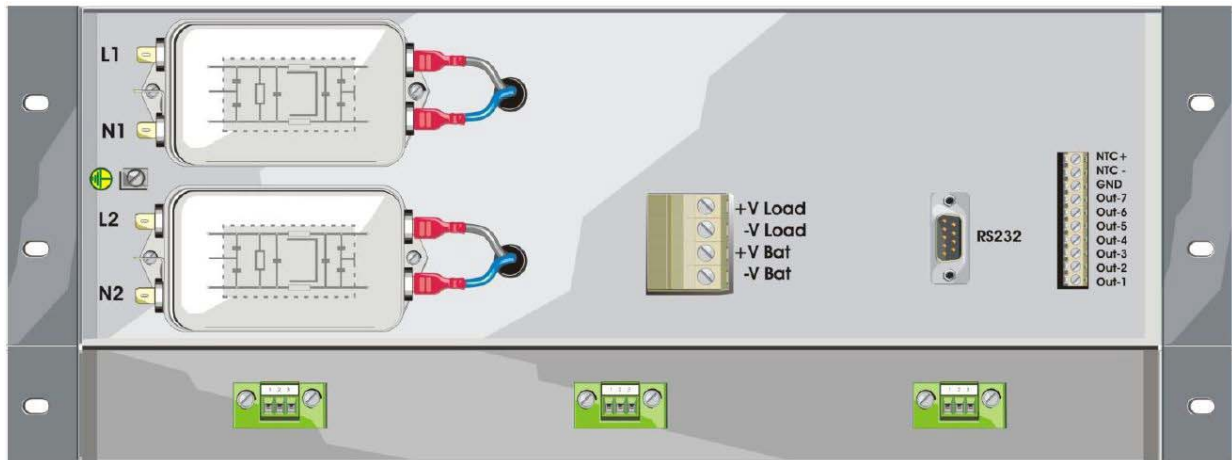
Characteristic	S81-PU002-2	S81-PU002-4
Maximum ripple	<115 mV	<115 mV
Minimum output voltage <sup>1</sup>	18.9 VDC	18.9 VDC
Maximum output current <sup>2</sup>	12 A (redundant)	32 A (redundant)
Maximum battery charging current	6 A	6 A
Maximum battery capacity	120Ah	120Ah

**Table 1.2 Power Supply Unit**

- 1 Output voltage with full load, low batteries, and no supply from mains.
- 2 Current for all field loads, plus current for panel.



**Figure 1.2 Power Supply Unit Front View**



**Figure 1.3 Power Supply Unit Rear View**



**WARNING: HIGH VOLTAGE**

THIS UNIT CONTAINS CIRCUITS WITH VOLTAGES AND CURRENTS POTENTIALLY HARMFUL TO PEOPLE.

### 1.4.1 19" Rack Unit

This 19" rack unit can accommodate a PU-A0009-1 battery charging module and up to four PU-A0008-1 feeding modules. It is provided with three cooling fans.

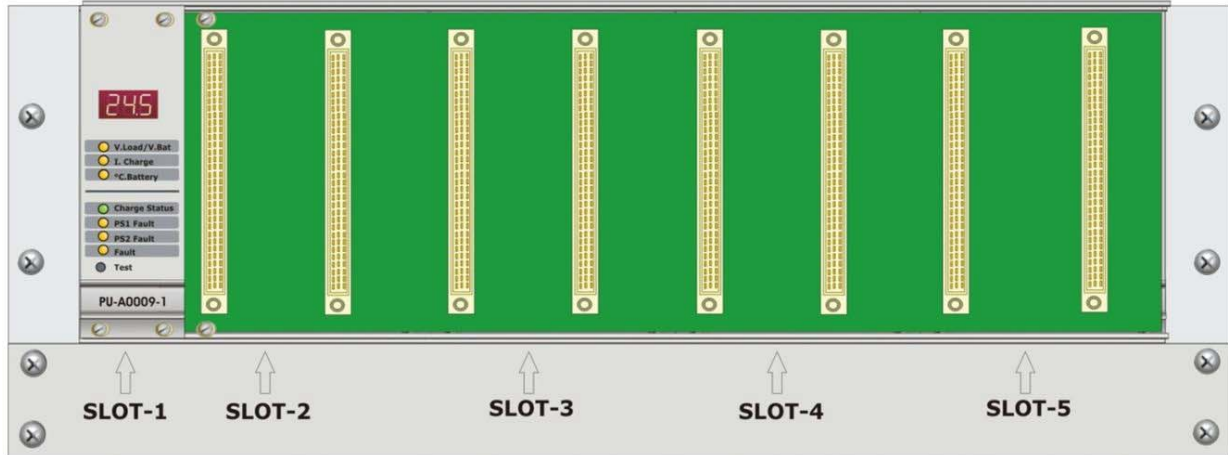


Figure 1.4 Power Supply Rack Unit

#### Connections

The figure below shows all the connections of the power supply unit (Tags 1 to 9).

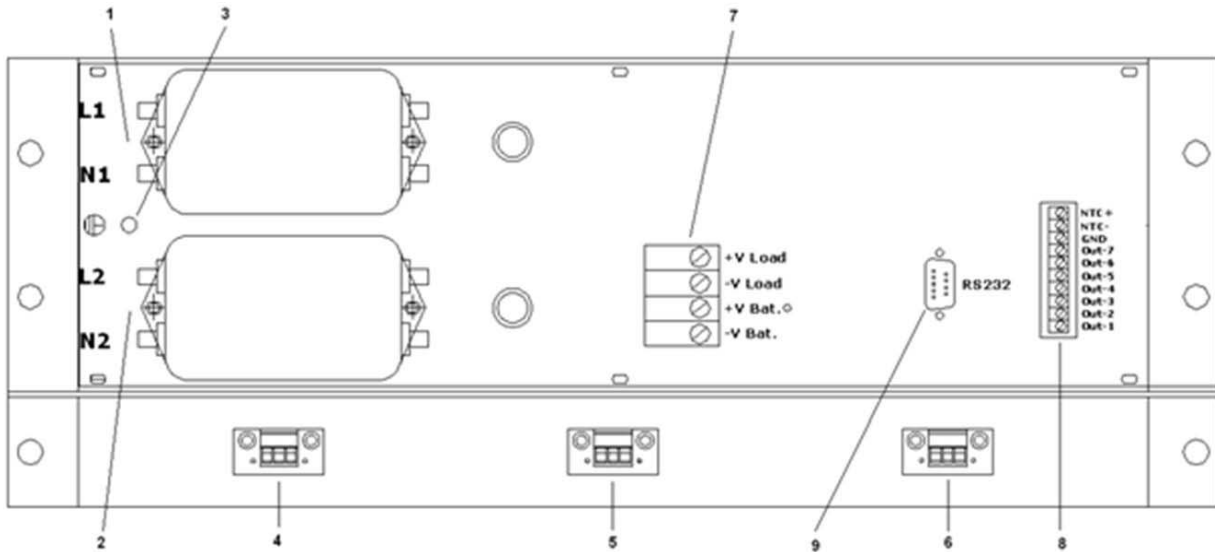


Figure 1.5 Power Supply Unit Connections

**AC L1 Input Voltage**

Tag	Terminal	Name	Function
1	F1	L1	Hot
	F2	N1	Neutral
	F3	PE1	Earth

**Table 1.3 AC L1 Input Voltage****AC L2 Input Voltage**

Tag	Terminal	Name	Function
2	F1	L2	Hot
	F2	N2	Neutral
	F3	PE2	Earth

**Table 1.4 AC L2 Input Voltage**


---

**NOTE:** PU-A0008-1 modules installed in slots 2 and 3 are connected to AC L1 input.

---




---

**NOTE:** PU-A0008-1 modules installed in slots 4 and 5 are connected to AC L2 input.

---

**Main Earth**

Tag	Screw	Name	Function
3	V1	PE	Rack Grounding

**Table 1.5 Main Grounding****Cooling Fans**

Tag	Terminal	Name	Function
4-5-6	M1	S	Fan speed signal
	M2	-V	Fan power supply negative
	M3	+V	Fan power supply positive

**Table 1.6 Cooling Fans****DC Outputs**

Tag	Terminal	Name	Function
7	M1	+VLOAD	Feeding unit positive
	M2	-VLOAD	Feeding unit negative
	M3	+VBAT	Battery positive
	M4	-VBAT	Battery negative

**Table 1.7 DC Outputs****Open Collector Outputs**

Tag	Terminal	Name	Function
8	M1	PSU1-Failure	Primary power supply failure
	M2	PSU2-Failure	Secondary power supply failure
	M3	Fault	Common Trouble
	M4	Battery status	Charge/delivery
	M5	Charge status	Full charge/trickle charge
	M6	Rep. 1	Programmable output
	M7	Rep. 2	Programmable output
	M8	GND	Temperature probe shielding
	M9	+	Temperature probe positive
	M10	-	Temperature probe negative

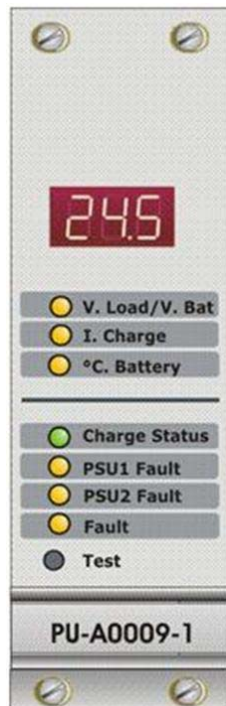
**Table 1.8 Open Collector Outputs**

## RS 232

Tag	Pin	Name	Function
9	1	N.C.	not used
	2	TXD	RS232 TX data
	3	RXD	RS232 RX data
	4	N.C.	not used
	5	GND	GND
	6	N.C.	not used
	7	N.C.	not used
	8	N.C.	not used
	9	N.C.	not used

Table 1.9 RS232

## 1.4.2 PU-A0009-1 (Battery Charging Module)

Figure 1.6  
PU-A0009-1

Besides charging two 12V batteries with a maximum capacity of 120 Ah, the module acts as a controller of the power unit.

**Visual indicators****V. Load/V. Bat (Yellow LED)**

When on, it indicates that the value displayed represents load or battery voltage.

**I. Charge (Yellow LED)**

When on, it indicates that the value displayed represents battery charging current.

**°C Battery (Yellow LED)**

When on, it indicates that the value displayed represents battery temperature measured through external probe.

**Charge Status (Green LED)**

Lights up steady during battery full charging, flashes during trickle charging and is off during battery delivery.

**PSU1-Fault (Yellow LED)**

Lights up steady following primary power supply failure and is off in normal operating conditions.

**PSU2-Fault (Yellow LED)**

Lights up steady following secondary power supply failure and is off in normal operating conditions.

**Fault (Yellow LED)**

Lights up steady following any PSU troubles and is off in normal operating conditions. Trouble details are displayed.

### Three-Digit Alphanumeric Display

In normal operating conditions, the display is off. When a trouble occurs, trouble type is displayed as follows:

Digit 1	Digit 2	Digit 3	Trouble Type	LED PSU1 Fault	LED PSU2 Fault	LED Fault	OUT PSU1 Fault	OUT PSU2 Fault	OUT PSU Fault
F	0	1	Failure of cooling fan 1			X			X
F	0	2	Failure of cooling fan 2			X			X
F	0	3	Failure of cooling fan 3			X			X
F	0	4	Memory data/osc. CRC error <sup>1</sup>			X			X
F	0	5	Vcbat<23VDC Vcbat>29.5VDC <sup>2</sup>		X	X		X	
F	0	6	Tbat<-2°C Tbat>+52°C			X			X
F	0	7	Failure of partial battery test		X	X		X	
F	0	8	Failure of complete battery test		X	X		X	
F	0	9	Battery full charging time T>Tmax		X	X		X	
F	0	A	Vload<23VDC Vload>29.5VDC	X		X	X		
F	1	E	Feeding module 1 VAC failure	X		X	X		
F	1	F	Feeding module 1 VDC failure	X		X	X		
F	2	E	Feeding module 2 VAC failure	X		X	X		
F	2	F	Feeding module 2 VDC failure	X		X	X		
F	3	E	Feeding module 3 VAC failure	X		X	X		
F	3	F	Feeding module 3 VDC failure	X		X	X		
F	4	E	Feeding module 4 VAC failure	X		X	X		

**Table 1.10 Trouble Codes**

- 1 In these conditions, battery charger stops operating.
- 2 Voltage is tested during trickle charging only.

#### Test Button

If you press this button for 1 second, the following parameters are displayed in the sequence here below:

**V. Load** Output Voltage

**I. Charge** Battery charging current

**°C Battery** Battery temperature

**V. Bat** Battery Voltage

If you press this button for 3 seconds a complete battery test is run.

#### Partial Battery Test

This test is performed automatically, every 30 seconds, during trickle charging, to confirm battery presence. During the test, charging voltage is switched off and, then, battery voltage is measured. If measured value is lower than **V. Bat min**, a trouble condition is signaled.

#### Complete Battery Test

In normal conditions, this test is performed either automatically, with the preset frequency, or manually through the test button. This test is used to confirm the efficiency of batteries and wiring. During the test, the battery charger is switched off and the voltage from the feeding modules is reduced to 23 Vdc. In these conditions, the load is powered by the batteries and both battery current and voltage are monitored. A battery trouble is signaled if voltage rapidly decreases towards the **V.Bat min** value. During complete testing, voltage from the feeding modules is not switched off

but reduced to approximately 23 VDC, so as to guarantee uninterrupted power supply to the load even in the case of battery failure. Minimum voltage and duration of the test can be set using the appropriate program.

### Battery Charging Voltage Compensation

During maintenance charging, battery charging voltage is automatically compensated, in relation to the temperature measured by the external probe. The factory-set compensation factor is 48 mV/°C, which implies the following charging voltages:

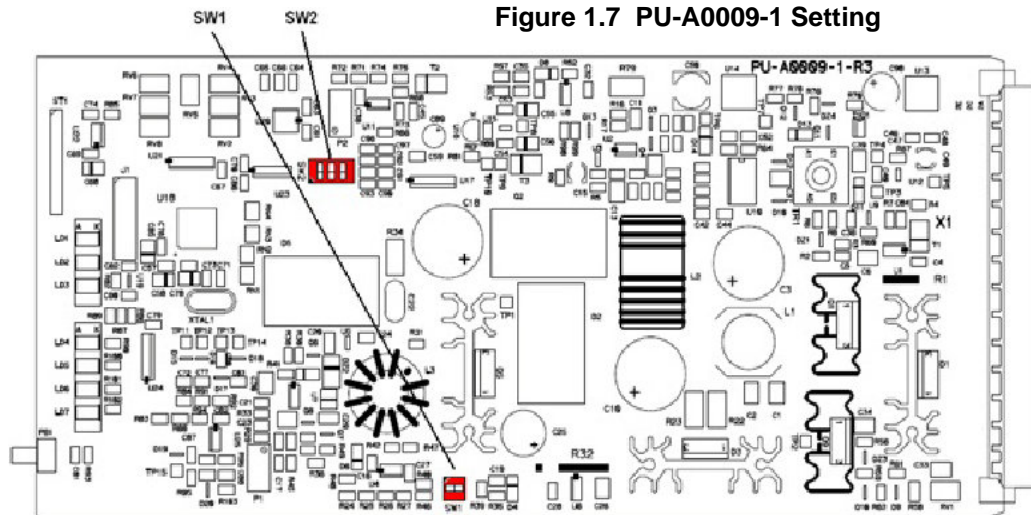
Temperature	Vbat Voltage
122°F (50°C)	26.16VDC
77°F (25°C)	27.36VDC
32°F (0°C)	28.56VDC

**Table 1.11 Voltage Compensation**

During fast charging, battery voltage is kept at 27.6 VDC. If batteries are not fully charged within the preset time, battery trouble is signaled. If battery temperature is higher than 125.6°F (52°C) or lower than 28.4°F (-2°C), battery charging is inhibited and temperature trouble is signaled.

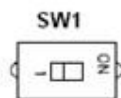
### Conf guration

**Figure 1.7 PU-A0009-1 Setting**



The two dip-switches on the PU-A0009-1 module are used to set the maximum battery charging current and the number of feeding modules installed.

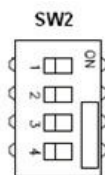
#### ■ Setting Max Battery Charging Current



SW1-1	Max battery charging current
OFF	4A
ON	6A (factory setting)

**Table 1.12 SW1 Settings**

#### ■ Conf guring PU-A0008-1 Feeding Modules



SW2-1	OFF	Feeding module 2 not installed
	ON	Feeding module 2 installed
SW2-2	OFF	Feeding module 3 not installed
	ON	Feeding module 3 installed
SW2-3	OFF	Feeding module 4 not installed
	ON	Feeding module 4 installed

**Table 1.13 SW2 Settings**



A program is available for setting the following parameters:

Parameter	Function	Admitted Values	Factory Setting
Battery check	To enable/disable battery control	Enabled/Disabled	Enabled
Battery capacity	To select battery capacity (Ah)	40-65-120 Ah	120 Ah
Vbat min	To select minimum Vbat during complete test	22 to 27 VDC	24 VDC
T-Test	To set duration of battery complete test	1 to 30 seconds	5 seconds
F-Test	To set frequency of battery complete test	0 to 240 minutes	60 minutes
T	To set Vbat mv/°c compensation factor	20 to 60 mV/°C	48 mV/°c
Tmax	To set max battery charging time	24/48 hours	24 hours
RPM	To set number of revolutions of cooling fans	1000-2000 RPM	1500 RPM
Out-1	To set conf gurable output 1	See Table 1.15	PSU1-Fault
Out-2	To set conf gurable output 2	See Table 1.15	PSU2-Fault

**Table 1.14 Programming Options**



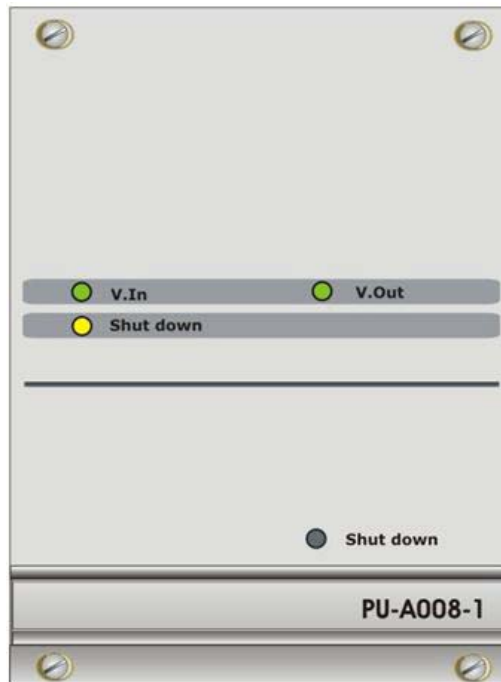
**NOTE:** To ensure compliance with UL864, battery check must always be enabled.

The table below shows the statuses that can be associated to the two conf gurable outputs. Only one of these statuses can be associated to each output.

Conf gurable Status	Code/Type	Output Status
PSU1 failure	F0A-F1E-F2E-F3E-F4E-F1F-F2F-F3F-F4F	Off upon any indicated PSU1 failures
PSU2 failure	F07-F08-F09	Off upon any indicated PSU2 failures
Battery charging module failure	F04-F5	Off when module fails
Cooling fan failure	F01-F02-F03	Off when fan fails
Battery temperature out of range	F06	Off when range is exceeded
Battery partial test failure	F07	Off when test fails
Battery complete test failure	F08	Off when test fails
Battery charging time exceeded	F09	Off when time is exceeded
Battery status	Charge/Delivery	On during delivery
Battery charge status	Trickle/Full	On during full charge
Complete battery test	On/Off	On during test

**Table 1.15 Out-1 & Out-2 Programming Options**

### 1.4.3 PU-A0008-1 (Feeding Module)



This module is a switching AC/DC converter, has universal input ac voltage and can deliver max 20 A at 25 VDC. It is provided with a load-sharing circuit that allows connecting up to four modules in parallel. It can be hot-swapped.

#### Visual indicators

##### V. In (Green LED)

It lights up steady in presence of ac input voltage.

##### V. Out (Green LED)

It lights up steady in presence of DC output voltage.

##### Shut down (Yellow LED)

It lights up steady in case of module failure, or shut down button is pressed.

##### Shut down Button

To be operated before replacement of module.

Figure 1.8 PU-A0008-1

### 1.4.4 Batteries

Batteries ensure panel and field devices operation in case of failure of power supply from mains. Batteries are mounted inside the cabinet. Both batteries must be of the same Ah rating. Use only UL Recognized Sealed Lead Acid Batteries. To calculate battery capacity, refer to Appendix C.



#### CAUTION: BATTERIES

DO NOT TRY TO PARALLEL MULTIPLE BATTERIES TOGETHER TO OBTAIN A HIGHER AH RATING.