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Bulletin: 30598-159-01D3
Date: April, 1991

Instruction Bulletin

Subject: SY/MAX®

Class 8030 Type PS11, 21, 31, 41, 51, 61, 70, and 74 Power Supplies

DESCRIPTION

The Class 8030 Type PS Power Supplies provide low-voltage DC power for the components of SY/MAX programmable controller systems. All SY/MAX power supplies have incoming power terminals, connectors for I/O rack cables, and a front-accessible fuse or circuit breaker. Each SY/MAX power supply also contains three "D" cell alkaline batteries that provide backup power to racks in the event of line power failure. This backup retains programs and register data stored in random access memory (RAM) that is contained in various SY/MAX devices.

SY/MAX power supplies have different incoming power and output current/voltage capabilities to meet the requirements of various applications. The AC-type power supplies provide "BATTERY LOW" and "DC OK" LED indicators. Type PS31 and PS61 power supplies also have a third LED for "OVERVOLTAGE" indication; the Type PS31 power supply also has two 120 VAC convenience outlets.

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SELECTING A POWER SUPPLY

A power supply is selected according to the incoming voltage used and the type and quantity of SY/MAX equipment to be powered by the supply.

SY/MAX power supplies are rated for incoming voltages of 120 VAC, 240 VAC, 110 VDC, and 24 VDC (see "SPECIFICATIONS FOR EACH TYPE" on page 4). All SY/MAX power supplies provide 5 VDC output; some also provide 12 VDC output for certain SY/MAX equipment such as bubble memory devices.

SY/MAX power supplies also differ in output current capacity, as well as in the number of connectors provided for racks. These factors determine the number of SY/MAX devices a particular power supply can support.

Calculate the total load on a power supply by adding up the current draws for all the SY/MAX devices in the programmable controller system. See Figure 6 on pages 5 and 6 for the rated current draw of most SY/MAX devices.

Select the proper power supply by confirming that the total current draw for the system is less than the power supply's output current capacity.

Note: Large programmable control systems may require more than one power supply.

The rated current draw for many modules is based on a duty cycle of either 75% or 100%. A 75% duty cycle means that the I/O are "ON" 75% of any given time period. A 100% duty cycle means the I/O are ON continuously. Most applications for SY/MAX modules fall into the 75% duty cycle category.

Note: Certain modules (indicated by asterisks in Figure 6) use an "AC-FAIL" signal sent from the power supply. To avoid overloading the AC-FAIL circuit, a single supply should power no more than ten of these modules. Depending on the total rated current draw of the ten modules, certain power supplies will not be able to power all ten.

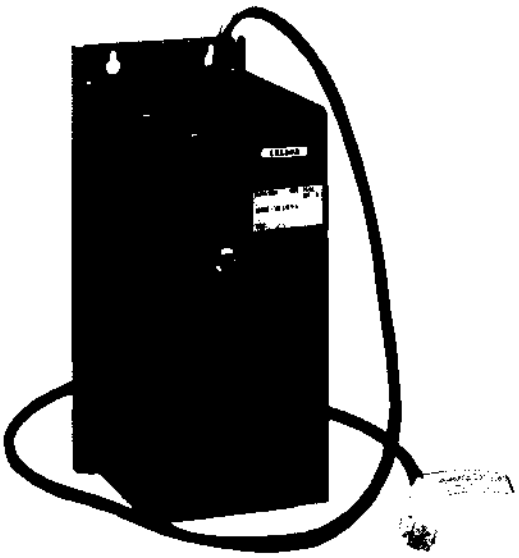


Figure 1 Type PS11 and 41 Power Supply

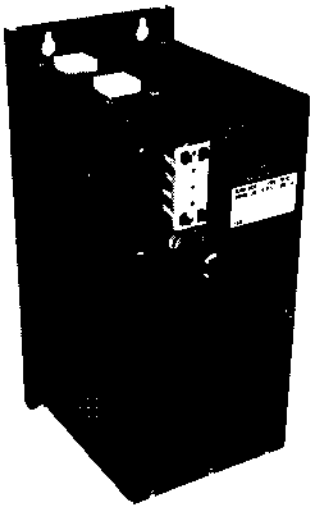


Figure 2 Type PS21 and 51 Power Supply

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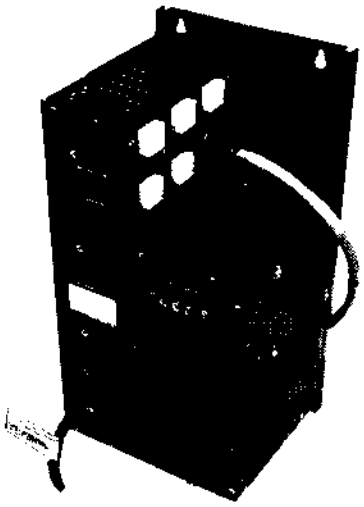


Figure 3 Type PS31 and 61 Power Supply



Figure 4 Types PS70 and 74 Power Supply

SPECIFICATIONS FOR *ALL* POWER SUPPLY TYPES

Note: Specifications for each type power supply are listed on page 4.

Ambient Temperature Rating	0-60°C (See Application Considerations)
Humidity Rating	0-95% non-condensing
Battery Type	Alkaline Batteries or equivalent
Battery Life - no load	3 years minimum at 25°C, 3 months at 60°C
Battery Life after red "BATTERY LOW" LED Indicator Illuminates	2 weeks minimum
Battery Life with Load (Processor RAM Support Time)	1 year at 25°C. See Figure 21 on page 14 for derating curve.

LIGHT DIAGNOSTICS

Indicating lights on the power supplies for diagnostic purposes include any or all of the following depending on the power supply type: *Battery Low*, *DC OK*, and *Overvoltage*. See Figure 5 to determine which indicating lights are available on each power supply type.

The *Battery Low* light is off when the battery voltage is sufficient to retain the memory of a processor or other modules which require battery backup during power outages. All batteries in the battery pack should be replaced upon illumination of the *Battery Low* light or after rated life.

Approximate RAM support time provided by power supply batteries deteriorates from one year for new batteries down to six months for batteries which are 18 months old. Power supply batteries cannot be expected to provide backup power for RAM memory retention if they are three years or older.

The *DC OK* light is on when proper 5VDC and 12VDC output signals are being supplied by the power supply. When the *DC OK* light is off and AC power is applied, any of the following may be the cause:

- Power supply fuse may be blown
- Incorrect line voltage at the power supply
- Power supply load exceeding specified output current rating
- Inoperative power supply

The *Overvoltage* light will be off under normal conditions. If it comes on, it indicates a problem with the regulation circuitry within the power supply. The unit should be returned for repair.

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SPECIFICATIONS FOR EACH TYPE POWER SUPPLY

POWER SUPPLY TYPE:	PS11	PS21	PS31	PS41	PS51	PS61	PS70	PS74
Input Voltage Range @ Frequency	102-132 VAC @ 47-63 Hz	102-132 VAC @ 47-63 Hz	102-132 VAC @ 47-63 Hz	204-250 VAC @ 47-63 Hz	204-250 VAC @ 47-63 Hz	204-250 VAC @ 47-63 Hz	22.5-28 VDC	77-132 VDC
Power Consumption	60 VA	150 VA	350 VA	60 VA	150 VA	350 VA	80 W	50 W
Power Loss Ride-Through at Full Rated Load	16 mS @ 102 VAC	16 mS @ 102 VAC	16 mS @ 102 VAC	16 mS @ 204 VAC	16 mS @ 204 VAC	16 mS @ 204 VAC	16 mS @ 22.5 VDC	5 mS @ 77VDC
Input Fuse Rating	1A 125V	2A 125V	Circuit Breaker	0.5A 250V	1A 250V	Circuit Breaker	5A 250V	5A 250V
Input Fuse Type	AGC-1	AGC-2	--	AGC-½	AGC-1	--	MTH-5	MTH-5
Input Circuit Breaker	None	None	6A Thermal Trip	None	None	3A Thermal Trip	None	None
I/O Capacity (Approx.)	64	128	512	64	128	512	128	128
Output Voltage (Nominal)**	5 VDC	5 VDC	5 VDC & 12 VDC	5 VDC	5 VDC	5 VDC & 12 VDC	5 VDC	5 VDC
Output Current Capacity @ 40°C	4 A	12 A*	23 A @ 5V* 2.2A @ 12V	4 A	12 A	23 A @ 5V 2.2A @ 12V	10 A	8 A
Output Current Capacity @ 50°C	4 A	12 A	20.2 A @ 5V* 1.9 A @ 12 V	4 A	12 A	20.2 A @ 5V 1.9 A @ 12V	10 A	8 A
Output Current Capacity @ 60°C	3 A	7 A	17.4 A @ 5V* 1.6 A @ 12V	3 A	7 A	17.4 A @ 5V 1.6 A @ 12V	7 A	8 A
Weight (LB/KG)	10.1 / 4.6	10.2 / 4.6	23 / 10.5	10.1 / 4.6	10.2 / 4.6	23 / 10.5	8.5 / 3.9	8.5 / 3.9
Size (H x W x D), Inches	11 x 4.8 x 7.3	11 x 4.8 x 7.3	14 x 7 x 7.5	11 x 4.8 x 7.3	11 x 4.8 x 7.3	14 x 7 x 7.5	11 x 4.8 x 7.3	11x 4.8 x 7.3
Output Connections (QTY/TYPE)	1 - P1	1 - P1 1 - P2	1 - P1 5 - P2	1 - P1	1 - P1 1 - P2	1 - P1 5 - P2	1 - P1 1 - P2	1 - P1 1 - P2
P1 Connection Type	Captive 4 ft. Cable	Use a CC10 Cable	Captive 4 ft. Cable	Captive 4 ft. Cable	Use a CC10 Cable	Captive 4 ft. Cable	Use a CC10 Cable	Use a CC10 Cable
Cables Included (QTY/TYPE)	None	1 - CC10 1 - CC20	1 - CC20	None	1 - CC10 1 - CC20	1 - CC20	1 - CC10 1 - CC20	1 - CC10 1 - CC20
LEDs	• BAT LOW • DC OK	• BAT LOW • DC OK	• BAT LOW • DC OK • OVERVOLT	• BAT LOW • DC OK	• BAT LOW • DC OK	• BAT LOW • DC OK • OVERVOLT	• BAT LOW	• BAT LOW
AC Receptacles	None	None	2	None	None	None	None	None

* *This is TOTAL Current Rating of all three branches - each P2 connector is limited to 8A. SEE FIGURE 9.*

** *5 Volt range = 4.90 to 5.29 volts*
12 Volt range = 12.025 to 12.645 volts

Figure 5 Specifications for EACH Power Supply Type

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CLASS	TYPE	DESCRIPTION	CURRENT DRAW, mA	
			75% DUTY CYCLE	100% DUTY CYCLE
8030	CBP320	RS422 Isolator/Protector Module	---	330
8030	CIM101	120 VAC/VDC Input Module	30	30
8030	CIM131	12-24 VAC/VDC Input Module	30	30
8030	CIM141	48 VAC/VDC Input Module	30	30
8030	CIM151	TTL Input Module	20	20
8030	CIM161	240 VAC/VDC Input Module	30	30
8030	CIM191	Simulator Input Module	35	40
8030	COM221	120 VAC Output Module	125	145
8030	COM231	240 VAC Output Module	125	145
8030	COM241	9-55 VDC Output Module	115	135
8030	COM251	60-160 VDC Output Module	195	245
8030	COM252	250 VDC Output Module	195	245
8030	COM261	TTL Output Module	120	145
8030	COM271	Reed Relay - Form A Output Module	285	350
8030	COM281	Reed Relay - Form B Output Module	285	350
8030	COM291	Simulator Output Module	55	65
8030	CRM115	Bus Expander/Driver Interface Module	---	320
8030	CRM116	Bus Expander/Terminator Interface Module	---	100
8030	CRM210*	Local Interface w/512 Registers	---	1600
8030	CRM211*	Local Interface w/4096 Registers	---	1600
8030	CRM214	Local Analog Interface	---	1600
8030	CRM220*, 222*	Remote Interface	---	1000
8030	*CRM230*	*Local Transfer Interface*	---	*1600*
8030	CRM232	Remote Transfer Interface	---	1000
8030	CRM310	Fiber Optic Interface Module	---	400
8030	CRM510*	SY/NET Network Interface	---	950
8030	CRM511	Multimedia NIM Module	---	950
8030	CRM530	SY/NET Fisher Provox Communications Interface	---	950
8030	CRM540	Network Interface Module for Model 50	---	950
8030	CRM560*	SY/NET Honeywell and Modbus Interface	---	950
8030	CRM570	Network Interface Module	---	950
8030	CRM580	Transfer Network Interface Module	---	950
8030	CRM601	RS232/RS422 Converter Module	---	430
8030	CRM720	Speech Module	---	1400
8030	DIM101	120 VAC/VDC Deluxe Input Module	50	60
8030	DIM141	6-48 VAC/VDC Deluxe Input Module	50	60
8030	DIM161	240 VAC/VDC Deluxe Input Module	50	60
8030	DLM110*	D-LOG Data Controller, 9K Memory	---	725
8030	DLM120	D-LOG Data Controller, 29K Memory	---	800
8030	DOM221	120 VAC Deluxe Output Module	125	145
8030	DOM225	120 VAC 5A Deluxe Output Module	100	100
8030	DOM231	240 VAC Deluxe Output Module	125	145
8030	DOM235	240 VAC 5A Deluxe Output Module	100	100
8030	DOM241	9-55 VDC Deluxe Output Module	115	135
8030	DOM251	60-160 VDC Deluxe Output Module	195	245
8030	EQ5138G1	Parallel Digital Driver Interface	---	875
8030	EQ5138G2	Parallel Digital Receiver Interface	---	10
8030	GOM221	120 VAC Isolated Output Module	125	145
8030	GOM231	240 VAC Isolated Output Module	100	125
8030	HIM101	8 Function 120 VAC/DC Input Module	60	70
8030	HIM102	6 Function 120 VAC/DC Input Module	60	70
8030	HIM131	8 Function 12-24 VAC/DC Input Module	65	70
8030	*HIM141*	*8 Function 48VAC/DC Input*	*65*	*70*
8030	HIM151	8 Function TTL Input	32	32
8030	HIM161	8 Function 240VAC/DC Input	65	70
8030	HIM191	8 Function Simulator Input	40	40
8030	HIM310	8 Function Input Module	75	75

* *A maximum combination of 10 of these modules can be operated from a single power supply, provided their total current draw does not exceed the supply's rating.*

--- *75% duty cycle does not apply*

Figure 6 Module Current Draw on SY/MAX Power Supply (continued on next page)

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CLASS	TYPE	DESCRIPTION	CURRENT DRAW, mA	
			75% DUTY CYCLE	100% DUTY CYCLE
8030	HOM211	8 Function 12 - 50 VAC Output	220	265
8030	HOM221	8 Function 120 VAC Output	225	270
8030	HOM222	6 Function 120 VAC Output	225	270
8030	HOM231	8 Function 240 VAC Output	225	265
8030	HOM232	6 Function 240 VAC Output	225	270
8030	HOM241	8 Function 9 - 55 VDC Output	250	275
8030	HOM251	8 Function 60 - 160 VDC Output	385	455
8030	HOM261	8 Function TTL Output	225	275
8030	HOM271	8 Function Reed Relay, Form A Output	525	625
8030	LIM111	Thumbwheel Input Module	---	90
8030	LIM112	Pushbutton Input Module	---	40
8030	LOM111	LED Display Output Module	---	300
8030	LOM112	Backlit Display Output Module	---	▸1700
8030	LRK100	Main Rack	---	760
8030	LRK101	Expander Rack	---	0
8052	MCM701	Microcell Controller	---	2500
8052	MCM702	Microcell Controller	---	2500
8052	MCM713	Microcell Controller	---	2500
8054		Minicell Controller	---	4250
8040	PCM110	PID Loop Controller	---	2000
8030	RIM101	16-Function 120V AC/DC Input Module	275	300
8030	RIM121*	4-Function Analog Input	---	1400
8030	RIM125	16-Channel Analog Input Module	---	800
8030	RIM126	8-Channel Analog/Thermocouple Input Module	---	1250
8030	RIM131*	High Speed Counter Module	---	1200
8030	RIM141	BCD Multiplex Input Module	---	750
8030	RIM143	Fast BCD Input Module	---	750
8030	RIM144	Multiplexed BCD and Fast BCD Input Module	---	750
8030	RIM331	32-Function 24 VDC Input Module	520	600
8030	RIM361	16-Function 240V AC/DC Input Module	275	300
8030	ROM121*	4-Channel Analog Output Module	---	1500
8030	ROM122	4-Channel Isolated Analog Output Module	---	1200
8030	ROM131	Stepper Motor Output Module	---	1500
8030	ROM141*	BCD Multiplex Output Module	---	900
8030	ROM221	16-Function 120 VAC Output Module	850	950
8030	ROM271	16-Function Isolated Relay Output Module	750	900
8030	ROM431	16-Function 240 VAC Output Module	850	950
8030	ROM441	32-Function 24 VDC Output Module	880	980
8020	SCP311*, 312*, 313*, 321*,322*, 323*	Model 300 Processors	---	1500
8020	SCP332*, 333*, 344*	Model 300 Processors	---	2000
8020	SCP521*, 522*, 523,* 544*	Model 500 Processors	---	4000
8020	SCP721*, 722*, 723*, 724*	Model 700 Processors	---	5100
8020	SCP400*	Model 400 Processor	---	2500
8020	SCP423*, 424*, 444*	Model 400 Processors	---	3500
8020	SCP631*, 632*	Model 600 Processors	---	5500
8020	SCP654*, 655*	Model 650 Processors	---	5500
8020	SMM710*	Bubble Memory for Model 700	---	2000
8020	SMM720*	Bubble Memory for Model 700	---	2200
8010	SLM100	Loader/Monitor	n.a.	n.a.
8010	SPR100	Hand-held Programmer	n.a.	n.a.

* ***A maximum combination of ten of these modules can be powered from a single power supply, provided their total current draw does not exceed the supply's rating.***

▸ **Inrush Current Rating**

--- ***75% duty cycle does not apply***

Figure 6. (cont.) Module Current Draw on SX/MAX Power Supply

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POWER SUPPLY CABLES AND CONNECTORS

Power supply cables connect the power supply to the I/O racks holding the SY/MAX modules. The cable is plugged into sockets on the power supply and I/O rack.

There are two types of power supply connectors: P1 and P2. All power supplies have a P1 connection. Depending on the type, the number of P2 connectors will be none, one, or five as shown in Figure 7. On **PS11, PS31, PS41**, and **PS61** power supplies, the P1 connector cable is "captive", that is., permanently attached to the power supply.

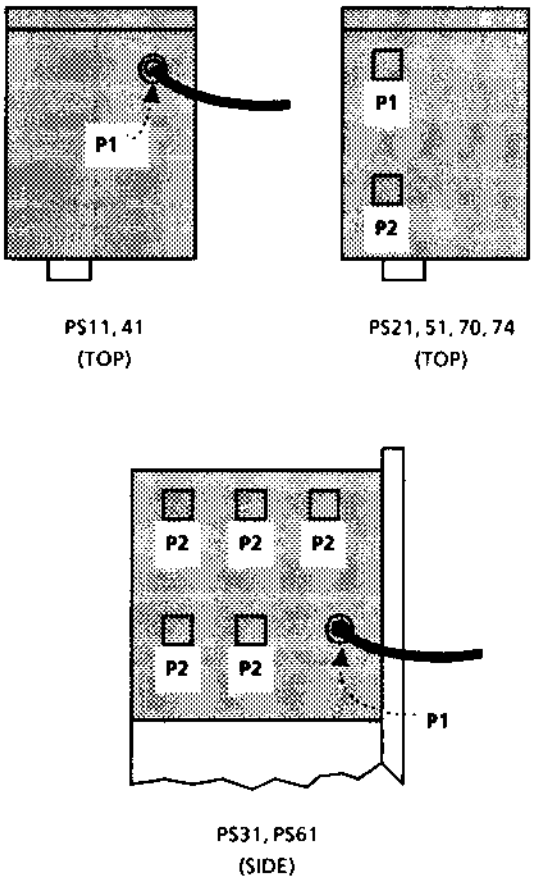


Figure 7 Power Supply Connectors

Rack assemblies containing a SY/MAX processor (Model 300, 400, 500, 600, or 700) must be powered from the P1 connector using a Type CC10 cable (or the captive P1 cable). This cable provides the processor with a "Battery Low" signal from the power supply that indicates when the backup batteries in the supply are getting weak.

The 12 VDC power needed for bubble memory devices is only available from the P1 connector of a **PS31** or **PS61** power supply.

Note: To maintain memory in a processor or other module which requires battery backup, the cable from the power supply must remain connected to the rack assembly.

A variety of power supply cables are available in different lengths and with different types and quantities of connectors. Refer to Figures 9 and 10 for cable specifications and length.

The CC21 and CC31 cables allow more than one rack to be powered from a single power supply connector.

For applications that require more than one power supply to be connected to a single rack assembly, the CC51 cable is used as illustrated in Figure 8 below. This cable is primarily used for critical applications that require redundant power supplies. The CC51 cable must be used with a Type PS11, PS21, PS31, PS41, PS51 or PS61 power supply. Consult the CC51 Instruction Bulletin (30598-224-xx for other considerations).

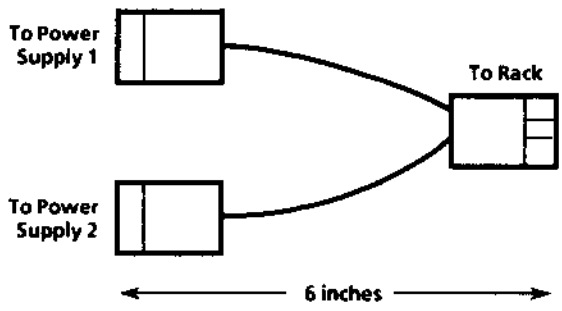


Figure 8 CC51 Cable

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CABLE	SERIES	PLUG INTO POWER SUPPLY CONNECTOR	CABLE LENGTH, INCLUDING CONNECTORS	MAXIMUM CURRENT CAPACITY	USAGE
CC10	E	P1	36 inches (91 cm)	25 A**	For connecting the power supply to the rack assembly containing the processor module.
CC20*	D	P2	60 inches (152 cm)	8 A	For connecting the power supply to a second rack assembly which DOES NOT contain a processor module.
CC21	C	P2	48, 60, 72 inches (122, 152, 183 cm)	5 A, 4 A, 3 A (Total not to exceed 8 Amps)	A three-drop cable used to connect the power supply to rack assemblies which DO NOT contain processor modules.
CC30	A	P2	120 inches (305 cm)	8 A	For connecting the power supply to a second rack assembly which DOES NOT contain a processor module.
CC31	A	P2	96, 120 inches (244, 305 cm)	8 A Total	A two-drop cable used to connect the power supply to rack assemblies which DO NOT contain processor modules.
CC40	A	P1	72 inches (183 cm)	3 A	This cable carries only + 5 VDC and common. It is used to supply power to TTL I/O modules When this cable is used, no other cables can be connected to the power supply.
CC41	A	P2	72 inches (183 cm)	3 A	This cable carries only + 5 VDC and common. It is used to supply power to the Class 8030 Type CBP320 RS422 Isolator/Protector Module. The CC41 cannot be used to supply power to TTL I/O modules, the CC40 is used.
CC51	A	Connects to any power supply cable listed above except CC40.	6 inches (15 cm)	24 A**	Connects any SY/MAX I/O rack to two power supplies, thereby providing a backup power supply. See Figure 8.

* *Series C CC20's are 60". Series A and B are 42".*

** *All the connected devices (power supplies, rack assemblies, power supply cables) each must be rated for this current. If not, this rating is limited to the lowest rating of the connected devices.*

Figure 9 Power Supply Cable Usage

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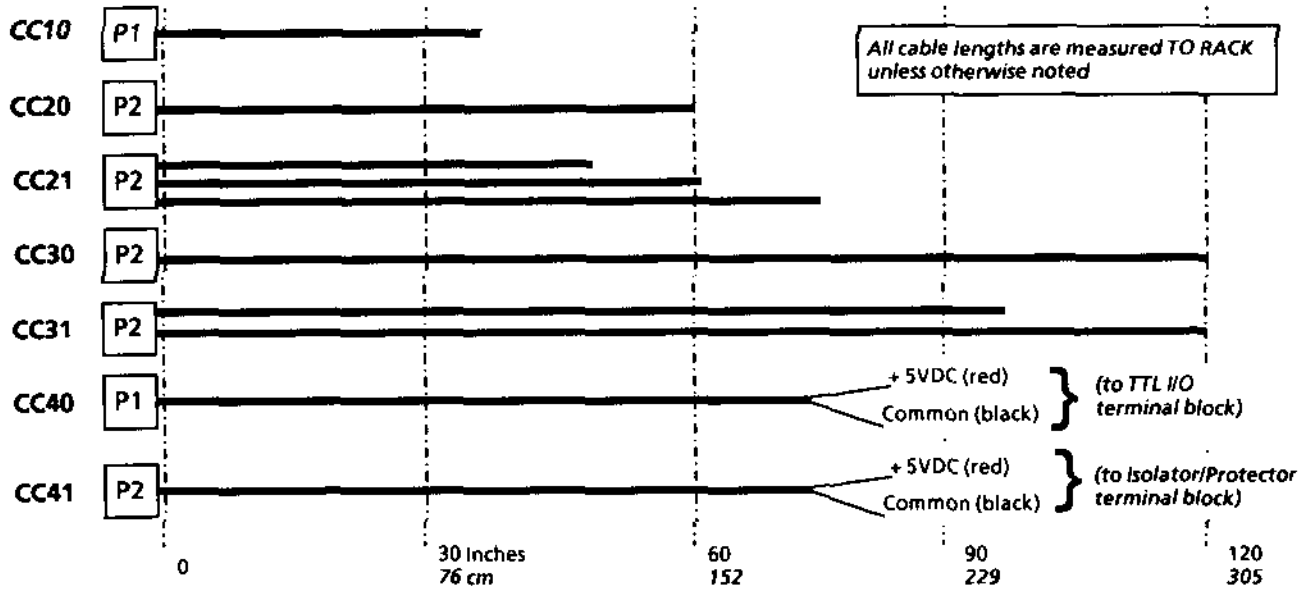


Figure 10 Power Supply Cable Length Comparison

MOUNTING INSTRUCTIONS

The power supply can be mounted either vertically or horizontally. If mounted vertically, make sure the power supply is right side up.

The power supply can be mounted directly alongside a SY/MAX rack assembly as shown in Figure 11. For side mounted installations leave a three inch (7.6 cm) clearance between the power supply and other surrounding objects or the side of the enclosure. In those installations where the power supply is mounted above a SY/MAX rack assembly, *leave a six inch (15.2 cm)* clearance between the power supply and rack.

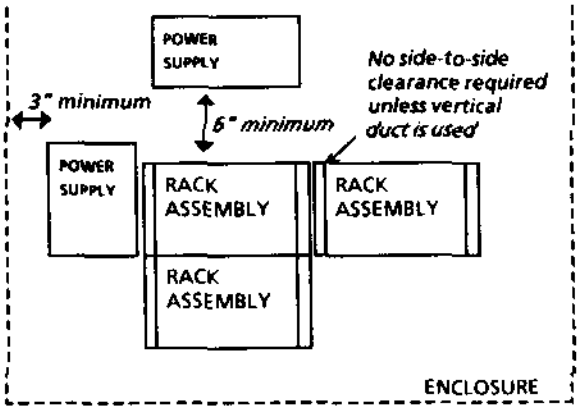


Figure 11 Power Supply Mounting Locations

There should be a minimum of six inches (15.2 cm) of clearance between the power supply and any electromechanical device such as a motor starter. If electromechanical devices are mounted above the power supply insert a barrier between the power supply and the device to prevent debris from falling onto (or into) the power supply.

Ensure that the power supply is mounted within available cable distance from the rack assembly. See Figure 10 for power supply cable lengths. When determining required cable length, allow for the bending of the cable at the connectors.

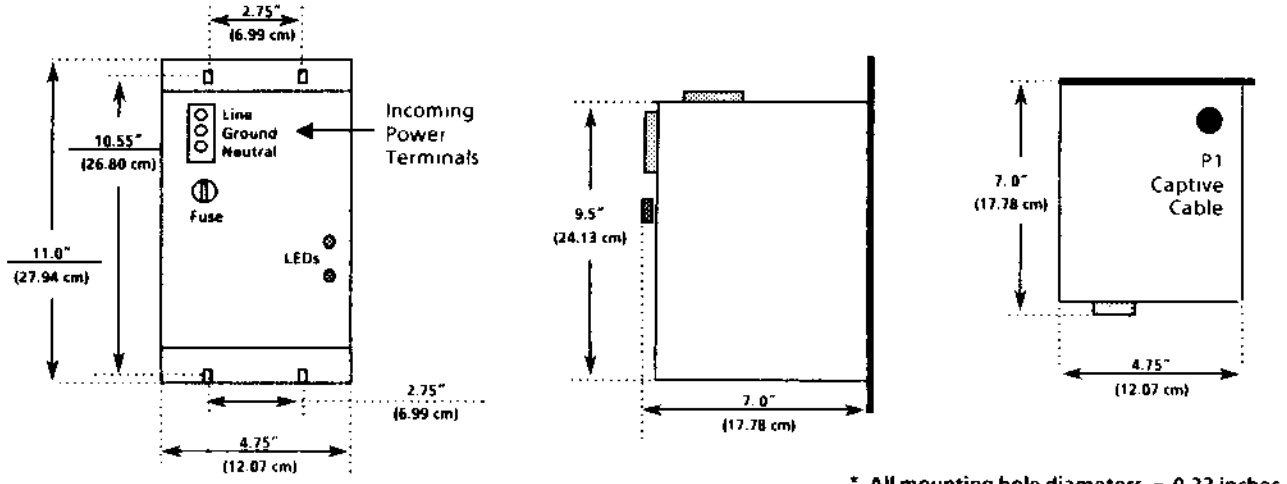
CAUTION

Lengthening the cables may decrease the maximum current capacity of the power supply. For such applications consult Square D Company.

Locate the power supply in an enclosure so that the supply's battery pack can be easily removed and replaced. *See Figures 12, 13, and 14 for dimensions.*

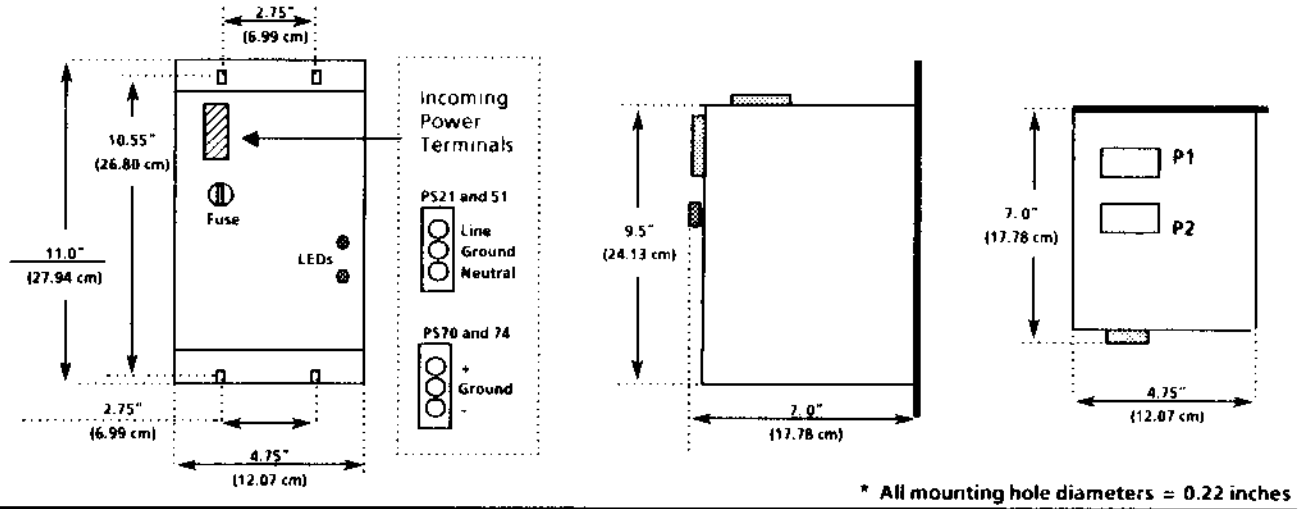
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DIMENSIONS: FRONT SIDE TOP



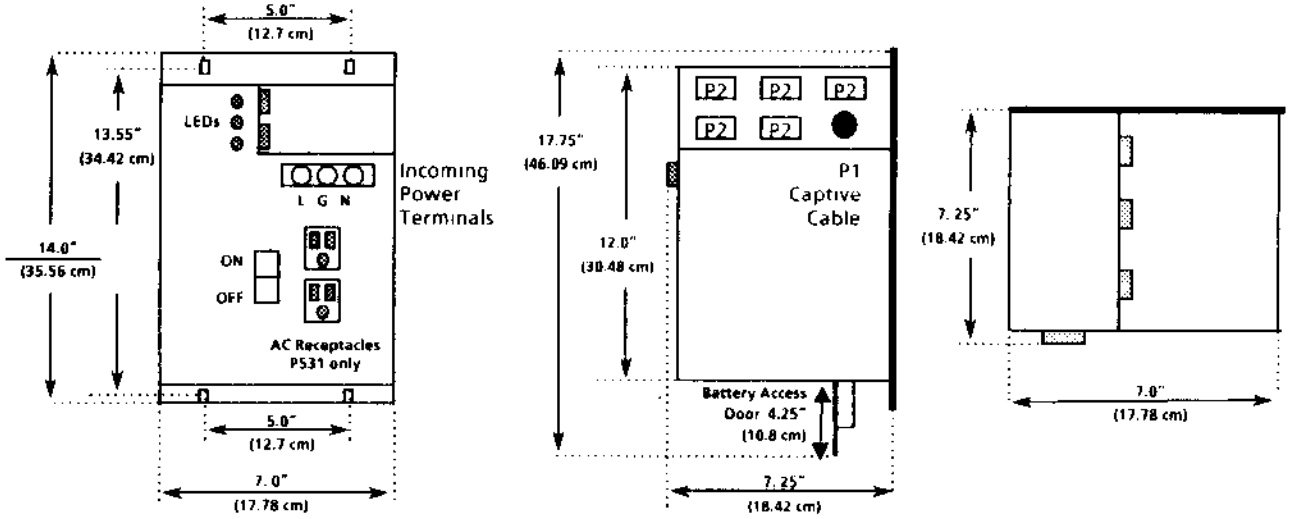
* All mounting hole diameters = 0.22 inches

Figure 12 Type PS11 and 41 Dimensions



* All mounting hole diameters = 0.22 inches

Figure 13 Type PS21, 51, 70, and 74 Dimensions



* All mounting hole diameters = 0.22 inches

Figure 14 Type PS31 and 61 Dimensions

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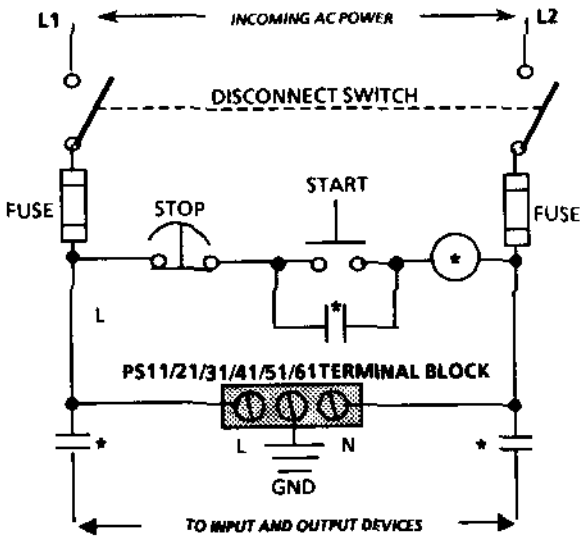
WIRING INSTRUCTIONS

In all wiring installation, wire the power supply according to all applicable electrical codes. Incoming power is wired directly to the terminal block on the front of the power supply. Be sure the ground terminal is wired directly to ground. The terminals will accept two #14 stranded or solid wires. Ring lugged wires may be used. A properly sized disconnect switch should be used as a means to remove power from the programmable controller system. An optional I/O power relay may also be used if a manual restart of the programmable controller I/O system is desired in the event of a power loss. See Figures 15 and 16 for AC and DC wiring connections.

Note: Be sure the power supply's mounting plate is tied to "true earth" ground either by direct mounting (use "star" washers) or by running a braided grounding strap from the power supply mounting plate to the ground.

WARNING

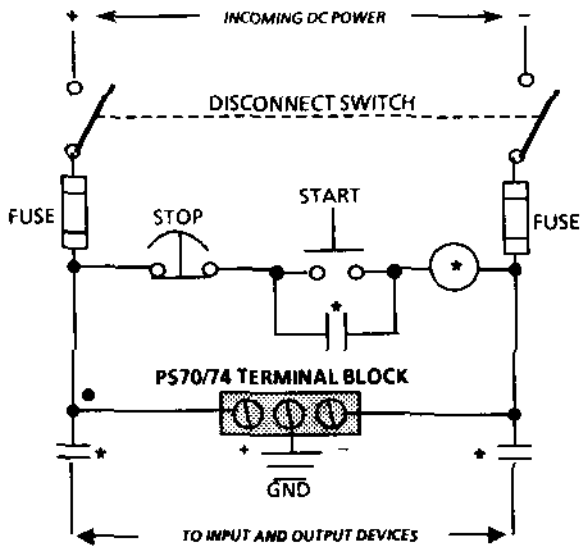
Full line voltage is present on the terminal block when the power supply's line cord is connected to incoming power.



* Optional I/O Power Relay

Figure 15 Type PS11, 21, 31, 41, 51 and 61 Incoming AC Power Connection

Note: For detailed pin-out and signal diagrams for P1 and P2 connectors, please refer to Section 2, pages 4-8 of the SY/MAX Troubleshooting Guide (Instruction Bulletin #30598-502-xx).



* Optional I/O Power Relay

Figure 16 Type PS70/74 Incoming DC Power Connection

Power is supplied to the rack assemblies through the connectors on top of the power supply. See the **"POWER SUPPLY CABLES AND CONNECTORS"** section for more information. For non-captive cables, the cable end labeled "P1" or "P2" must be attached to the appropriate connector on the power supply. The cable end labeled "PR1", "PR2" or "RACK" is attached to the rack assembly connector.

Be sure to observe the maximum current capacity of the power supply cables. Currents exceeding these maximum values may prevent modules in the rack assembly from operating.

Rack assemblies containing a SY/MAX Model 300, 400, 500, 600, 650 or 700 processor must be powered by the P1 connector on the power supply and a CC10 cable, or by the captive P1 cable.

Note: To maintain memory in a processor or other module that requires battery backup, the *cable from the power supply must remain connected* to the rack assembly.

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POWER LINE DISTURBANCES

Line voltage disturbances that exceed the specifications of the power supply (see Specification table) may cause problems in the programmable controller system. Such disturbances include:

(1) HIGH-FREQUENCY TRANSIENTS -- power line disturbances that can be caused by lightning strikes or the switching of large loads.

(2) SURGES -- line voltage spikes that are greater than the maximum input voltage of the power supply.

(3) BROWNOUTS -- line voltages that are less than the given power loss ride-through voltage/ time.

(4) BLACKOUTS -- Complete loss of line voltage.

To protect against these types of noise and disturbance problems, **TOPAZ*** Power Peripherals are recommended. The **TOPAZ ULTRA-ISOLATOR*** suppresses both common and transverse mode noise (decaying oscillatory transients and voltage spikes).

TOPAZ Line 2* power conditioners not only attenuate most transients, but also stabilize line voltage fluctuations by extending the operating voltage range. To provide power to the programmable controller during blackouts, a **TOPAZ Powermaker Micro-UPS*** (Uninterruptible Power System) is recommended.

* Registered trademark of TOPAZ, Inc. TOPAZ is a wholly-owned subsidiary of Square D Company.

POWERING TTL DEVICES

A Class 8030 Type CC40 cable is used with Class 8030 Type PS Power Supplies to provide power to the external I/O devices of SY/MAX TTL I/O modules.

When a power supply is used for TTL power, no other cables can be connected to that power supply.

Note: To prevent losing the contents of the processor memory or other modules with memory, make sure the power supply is powered up, and all supply cables are connected securely.

BATTERY MAINTENANCE, REMOVAL, AND REPLACEMENT

All SY/MAX power supplies contain D-cell alkaline batteries that maintain the memory of a processor (or other module that requires battery backup) during a power outage. Power supplies can be operated without batteries installed, but only with rack assemblies that do not require battery backup.

The three batteries in the battery tray should be replaced when the red "BATTERY LOW" LED on the power supply illuminates, or after the battery's rated life has expired. Battery performance characteristics are listed in the SPECIFICATIONS section of this manual.

Battery Replacement Procedure:

1. Always have a fresh set of three, D-cell alkaline batteries available.

2. Unscrew the battery plate retaining screw:
   - On Type **PS11, 21, 41, 51, 70,** and **74** Power Supplies, this screw is on the front of the power supply.
   - On Type **PS31** and **61** Power Supplies, the screw is on the bottom of the power supply.

3a. For Type **PS11, 21, 41,** and **51** Power Supplies, remove the battery tray cover plate. See Figure 17.

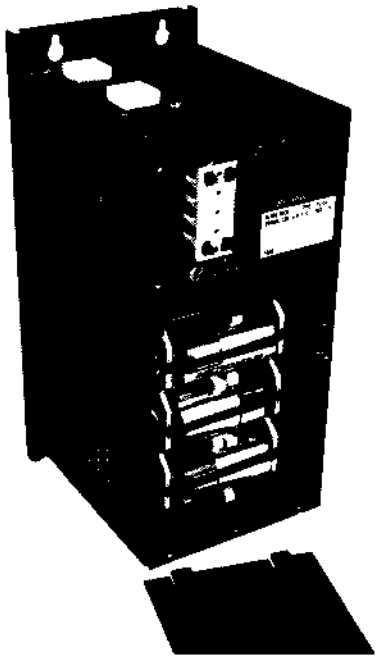


Figure 17 PS11, 21, 41, 51 Battery Cover Plate Removed

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3b. For Type **PS31** and **61** Power Supplies, loosen the screw and let the battery tray swing down on its hinge. See Figure 18.

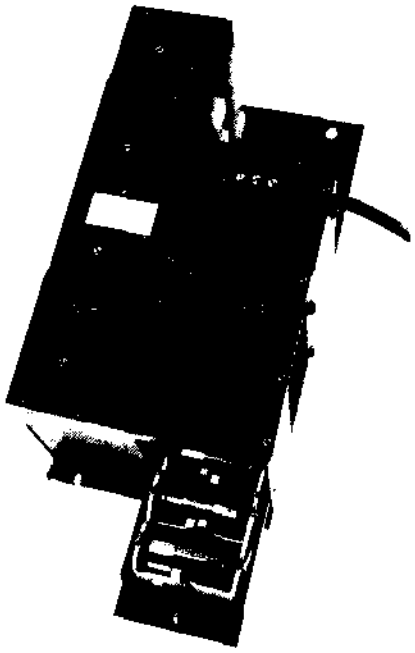


Figure 18 PS31, 61 Battery Pack Opened

3c. For Type **PS70** and **74** power supplies, disconnect the cable from the bottom of the battery tray and loosen the captive screw. Slide the battery tray out from the front of the power supply. See Figure 19.



Figure 19 PS70, 74 Battery Pack Opened

4. *Remove the three batteries from the battery* tray.

5. Insert three fresh batteries into the battery tray. Orient the batteries for proper polarity.

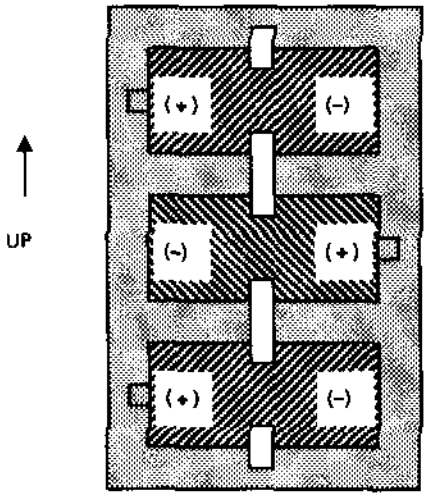


Figure 20 Battery Orientation in Battery Pack

6. Close the battery tray cover and tighten the retaining screw. On types **PS70** and **74** power supplies, be sure to reconnect the cable to the bottom of the battery tray.

Note: When the batteries are removed from the *power supply, the "BATTERY LOW" LED* will light. When fresh batteries are installed, the "BATTERY LOW" LED may remain lighted for up to 3 minutes before resetting.

POWER SUPPLY REPLACEMENT

If it becomes necessary to replace the power supply (thereby removing power and battery backup to the rack assembly), the contents of any RAM memory may be lost.

If the only RAM memory in a rack is contained in a processor, capacitors within the processor maintain its memory for up to one minute after power from the supply is removed. Therefore, if done quickly, the power supply can be replaced without loss of processor memory. Keep the following points in mind:

Position the replacement power supply within cable reach of the rack assembly before attempting replacement so that the new power supply can be connected without delay. Once the new supply is connected to the rack, its batteries will provide backup power until the new supply can be mounted and powered up.

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APPLICATION CONSIDERATIONS FOR *ALL* POWER SUPPLY TYPES

- Isolate all AC power wires from SY/MAX power supply cables, DC signal wiring, and rack-to-rack communication cables.

- Do not combine AC and DC signal wires in the same wire trough, or bundle them together for parallel runs. Right-angle crossovers should be used where wires cross over each other. This minimizes the chance of coupling electrical noise into the system.

- The age of the power supply batteries affects how long they can maintain an adequate voltage. See Figure 21 for battery derating curve.

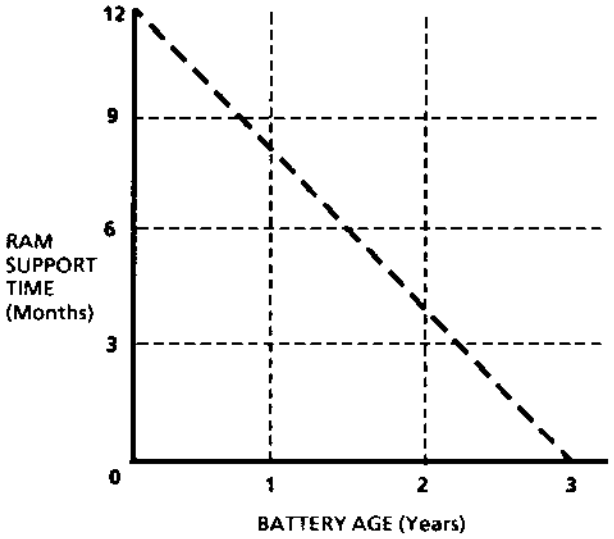


Figure 21 RAM Support Time vs. Battery Age

- The "BATTERY LOW" LED indicator on the power supply's front panel will not operate if incoming power is lost. In other words, under power loss conditions the "BATTERY LOW" LED will NOT indicate a battery low condition.

- If a power supply is used in an ambient temperature that continuously exceeds 45°C (113°F), the batteries within the supply should be examined at least every six months for signs of corrosion. Replace the batteries if necessary. Do not rely on the "BATTERY LOW" indicator, since corrosion does not always cause low battery voltage.

- Maintain a single ground point in programmable controller systems with multiple power supplies. Use a building support column or grounding electrode that is a known "true earth" ground.

APPLICATION CONSIDERATIONS FOR *SPECIFIC* POWER SUPPLY TYPES

- When using the Type **PS11, 21, 31, 41, 51, or 61**, incoming power must be sinusoidal AC with a frequency of 47 to 63 Hz. Square wave, or sine wave inputs with other frequencies, should not be used.

- The convenience outlets on the Type **PS31** have a total output current capacity of 15A at 120 VAC.

CAUTION

The convenience outlets on the PS31 are not protected by the PS31's circuit breaker.

- When using the Type **PS70** Power Supply incoming power must not exceed 32 VDC maximum peak (including ripple).

- The **PS74** provides a +5 VDC output whenever its input voltage is between 28 and 145 VDC.

- The **PS74**'s AC FAIL signal causes the attached SY/MAX processor to HALT if the power supply's input voltage falls below 70 VDC (typical).

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