

October 21<sup>st</sup>, 2013

## 24V DC Power Supplies

Not all 24V DC power supplies are created equal; there are many factors that affect the selection of a power supply according to the particular application. Selecting the best power supply for your system will increase productivity and make your system operate correctly.

### Factors Affecting selection of power supply:

#### Voltage Rating

If a device says it needs a particular voltage, then you have to assume it needs that voltage. Both lower and higher could be bad. At best, with lower voltage the device will not operate correctly in an obvious way. However, some devices might appear to operate correctly, then fail in unexpected ways under just the right circumstances. When you violate required specs, you don't know what might happen. Some devices can even be damaged by too low a voltage for extended periods of time. If the device has a motor, for example, then the motor might not be able to develop enough torque to turn, so it just sits there getting hot. Some devices might draw more current to compensate for the lower voltage, but higher than intended current can damage something. Most of the time, lower voltage will just make a device not work, but damage can't be ruled out unless you know something about the device. Voltage higher than the specified voltage is definitely bad. Electrical components all have voltages above which they fail. Components rated for higher voltage generally cost more or have less desirable characteristics, so picking the right voltage tolerance for the components in the device probably got significant design attention. Applying too much voltage violates the design assumptions. Some level of too much voltage will damage something, but you don't know where that level is. Take what a device says on its nameplate seriously and don't give it more voltage than that.

#### Current Rating

Current is a bit different. A constant-voltage supply doesn't determine the current: the load, which in this case is the device, does. If Johnny wants to eat two apples, he's only going to eat two whether you put 2, 3, 5, or 20 apples on the table. A device that wants 2 A of current works the same way. It will draw 2 A whether the power supply can only provide the 2 A, or whether it could have supplied 3, 5, or 20 A. The current rating of a supply is what it can deliver, not what it will always force thru the load somehow. In that sense, unlike with voltage, the current rating of a power supply must be at least what the device wants but there is no harm in it being higher.

### Wattage

For overall power supply wattage, add the requirement for each device in your system, then multiply by 1.5. The multiplier takes into account that today's systems draw disproportionately on the +12V output. Furthermore, power supplies are more efficient and reliable when loaded to 30% - 70% of maximum capacity and this also allows for future extension if required with the same power supply.

### Operating Temperature

An operating temperature is the temperature at which an electrical or mechanical device operates. The device will operate effectively within a specified temperature range which varies based on the device function and application context, and ranges from the minimum operating temperature to the maximum operating temperature. Outside this range of safe operating temperatures the device may fail. Aerospace and military-grade devices generally operate over a broader temperature range than industrial devices; commercial-grade devices generally have the lowest operating temperature range.

### Derating

Derating is a design process that can make a significant contribution to reliability. Derating is defined as 'a policy of deliberately under stressing components in order to provide increased reliability'. The selection of components of higher stress capability than is required for normal operation is an empirical but effective and well established method of reducing their failure rate; e.g. the use of a half watt resistor in circuit conditions demanding a quarter watt dissipation. Derating is the specified reduction in an operating parameter to improve reliability. Generally for power supplies, it is the reduction in output power at elevated temperatures.

## **Quantum Automation's Power Supplies:**

[Quantum Automation](#) is a distributor for AutomationDirect and IDEC, offering a wide range of cost effective power supplies for your applications.

AutomationDirect offers low cost, basic DC power supplies and switching power supplies at linear power supply prices. It has some of the most practical industrial power supplies, including DIN rail power supplies, enclosed panel mount power supplies, encapsulated mini power supplies, open frame power supplies and linear stepper power supplies with a 3 years warranty.

The DC power supply categorized by series –

- PSM series – Slim line, metal case PSM series 12VDC and 24VDC DIN-rail mount switching power supplies.
- PS series – Low profile, metal case PS series 12VDC and 24VDC power supplies provide reliable, switched DC power at linear power supply.
- PSP series – Slim line, plastic case PSP series of 5VDC, 12VDC and 24VDC power supplies provides tightly regulated output voltage for sensitive loads in industrial environments. Compact in size with tightly regulated voltage output.
- PSC series – NEC class 2 compliant, low-profile, plastic case 5VDC, 12VDC and 24VDC adjustable output, switching power supplies.

- PSS series – Panel mount PSS series power supplies are perfect for applications that require a basic DC voltage power supply at a low cost.
- PSB series – DIN rail mount basic DC voltage power supplies offer high performance and reliability at lower cost.
- Open frame 24VDC – Open frame power supplies are especially useful when an inexpensive external supply is required.
- PSE series – Single and dual output encapsulated power supplies in ultra-compact, low profile housings. 5V-24V outputs operate at up to 440Hz input.
- Sure step linear power supplies – Cost effective linear supplies, perfectly suited for sure step stepper drives and stepper motors.

IDEC switching power supplies are the highest quality on the market and offer the ultimate in performance and reliability. Slim line, standard or metal frame power supplies are available with worldwide approvals, universal input voltage, fused inputs and overload protection.

- AS-Interface network can depend on the reliable PS2R AS-interface power supply. Available in 73W and 145W in a slim and rugged housing, these power supplies provide unparalleled power source for the network.
- PS3L series features a sturdy metal frame and a form factor that requires less panel space than the IDEC PS5R series power supplies. PS3L series is finger-safe with output capacities ranging from 10W to 300W with 5V, 12V and 24VDC versions.
- When you need to save space while keeping costs low, IDEC PS3X Switching Power Supplies are the answer! With sizes up to 70% smaller than conventional power supplies, the PS3X family of power supplies can fit into the most compact spots.
- PS5R power supplies were designed with a world market in mind. Output power ranges from 7.5W to 480W allow your power supply to grow with your needs. With UL508 Listing, you may even be able to use a smaller power supply than you do currently. They come in single and three phase models.
- PS5R Slim Line models give you all the power of a traditional power supply in only half the space. The NEW 10W and 15W are only 22.5mm wide, the 30W and 60W are 36mm wide, and the 90W is 46mm wide. The 120W unit has a width of only 50mm while the 240W is 80mm wide. They also come with all the convenient features you've come to expect.
- PS6R power supplies bring a previously unseen combination of features, including high efficiency (93%), high power, and expansion flexibility, all in a housing that is the same size as power supplies with half the power. The new 480W version has a housing that is similar in overall size to most 240W power supplies on the market today.

Listed are a few of the power supplies offered at Quantum Automation:

Catalog #	Input Power	Volts	Amps	Watts	Mount	House	Op Temp	Derating	Approval	Opt
PS5R-SB24	85-264VAC - 100-350VDC	24V DC	0.65A	15	DIN/Panel	Plastic	-10C to +60C	None	UL508/CL1D2	
PS5R-SC24	85-264VAC - 100-350VDC	24V DC	1.3A	30	DIN/Panel	Plastic	-10C to +60C	None	UL508/CL1D2	
PS5R-SD24	85-264VAC - 100-350VDC	24V DC	2.5A	60	DIN/Panel	Plastic	-10C to +60C	None	UL508/CL1D2	
PS5R-SE24	85-264VAC - 100-350VDC	24V DC	3.75A	90	DIN/Panel	Plastic	-10C to +60C	None	UL508/CL1D2	
PS5R-SF24	85-264VAC - 100-350VDC	24V DC	5.0A	120	DIN/Panel	Plastic	-10C to +60C	None	UL508/CL1D2	
PS5R-SG24	85-264VAC - 100-350VDC	24V DC	10A	240	DIN/Panel	Plastic	-10C to +60C	None	UL508/CL1D2	
PSB24-060	85-264VAC - 120-375VDC	24VDC	2.5A	60	DIN rail	Aluminum	-20C to +75C	>50C	UL508	
PSB24-060-P	85-264VAC - 120-375VDC	24VDC	2.5A	60	DIN rail	Plastic	-20C to +75C	>50C	UL508	
PSB24-120	85-264VAC - 120-375VDC	24VDC	5.0A	120	DIN rail	Aluminum	-20C to +75C	>50C	UL508	
PSM24-090S	100-240VAC - 85-264VDC	24VDC	3.75A	90	DIN rail	Steel	-25C to +70C	>40C	UL508	Remote On/OFF
PSM24-180S	100-240VAC - 85-264VDC	24VDC	7.5A	180	DIN rail	Steel	-25C to +70C	>40C	UL508	Remote On/OFF
PSM24-REM360S	2 x 24VDC - 2 x Control Input	24VDC	15A	360	DIN rail	Steel	-25C to +70C	>40C	UL508	Redundancy Module
PSP24-024S	85-264VAC - 85-375VDC	24VDC	1	24	DIN/Panel	Plastic	-10C to +70C	>40C	UL508	Power Good Signal
PSP24-060S	85-264VAC - 85-375VDC	24VDC	2.5A	60	DIN/Panel	Plastic	-10C to +70C	>40C	UL508	Power Good Signal

You can find more power supplies in our website that suits your application.

**“Question: What is the difference between Wattage and Volt-Ampere ratings of a power supply?”**

**ANSWER THE QUESTION FOR A CHANCE TO WIN A \$100 AMAZON GIFT CARD!**

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