Training Guide

Effective Date:
August 1, 2011
POWER SUPPLY:

DEFINITION:
Industrial power supplies take an AC voltage input and produce a DC voltage output. Most will also take a DC input as well. They are typically mounted to a DIN-Rail but can be directly mounted to the controller or to the electronic board. Micron’s "MDP" and "MD" Series are designed as DIN-Mountable product. The MTM Power product can be purchased as DIN-Mount, Chassis Mount or PCB-Mount. All are defined as "switching power supplies".

TERMS:
Switching power supply, Switched mode, SMPS: An electronic power supply that incorporates a switching regulator in order to be highly efficient in the conversion of electrical power.
Linear power supply: Linear power supplies do not incorporate high frequency electronic switching. They can produce less harmonic feedback (noise), but are heavier and less efficient than switchers.
Wattage: Volts X Amps. Determined from the output side. 24V X 5A=120W
Negative voltage: A negative output in reference to ground. Negative output in combination with positive output is often used to increase on/off switching speed of transistors in digital circuits.
Hiccup, fold back, crowbar, active crowbar: As applies to power supplies, it is a protective circuit that causes the output of the power supply to drop out if there is an overcurrent, over voltage or short circuit fault. All methods describe protection circuits.
Auto-restart: the ability of a power supply to reset itself after a fault condition without manual intervention.
DIN-Rail mount: The power supply is mounted to a piece of rail via a spring clip. The DIN-mount facilitates ease of mounting.
Chassis mount: The power supply can be bolted directly to the interior control panel. Typically fan-cooled above 200 watts. The fan is a source of failure on many units.
PCB mount: The power supply has contact pins which are directly solderable to a Printed Circuit Board.
UL 1310 Class 2: Output power is certified to be limited to less than a total of 100 watts.
UL 1604 Hazardous Location: The power supply is certified by UL not to exceed combustable temperatures in operation.
Paralleling: The ability to wire multiple units either to obtain higher output voltage or wattage. Some utilize a switch, others allow automatic paralleling.
Decoupling Module: Also called a Redundancy Module. The device installs between multiple power supplies and allows each to evenly share a portion of the load. If one fails the other picks up the full load thereby averting a shutdown of critical equipment.
Power Boost: The ability of a power supply to support higher than nameplate wattage before going into hiccup mode. Normally varies from 105% to 150% of rated output.
MTBF: Mean Time Between Failure. Average life expectancy. Normally expressed in hundreds of thousands of hours.
Derating Curve: Normally refers to the calculation that measures available output power as a function of ambient temperature.
DC "OK" Output: Available terminal outputs that allow a remoted LED or indicator to signal a power-out condition.
Two-Phase Operation: Much like with control transformers, the power supply can be powered from two of the three wires making up a three-phase circuit. Normally applies to three-phase power supplies.
Ripple: Unwanted residual AC feedback on the DC output of a power supply.
EN Standard: Harmonized standards defining the operational parameters including safety of a device.
SELECTION:
You need to find out some of the information in **ITALICS** in order to properly quote a power supply.

1 *Try to get a competitive P/N Quantity and if possible competitive price*
   
   If you get this information you will likely not need step two.
   
   Primary competitors:
   
   - Sola
   - Puls (also sold under Allen Bradley brand)
   - Idec
   - Phoenix
   - Weidmuller
   - Omron
   - Mean Well
   - Carlo Gavazzi
   - Siemens
   - Delta

2 *If competitive P/N not available you will need to get the following information:*

   a. **Single Phase, Two Phase or Three Phase**  (two-phase or three-phase normally operates above 240AC)
      
      Micron only offers single phase at this time
      
      Two-Phase power supplies use two input leads from a three-phase system. Typically from 240Vac - 575Vac.
      
      Three-Phase power supplies use all input leads from a three-phase system. Typically from 240Vac - 575Vac.

   b. **Primary voltage**  (most single-phase power supplies can accept from 88V - 267V)
      
      Micron has tested (not UL Certified) to operate up through 300Vac input on 60-480Watt units

   c. **Secondary Voltage: Always DC, typically 12V, 24V or 48V**
      
      Non-catalog output voltage can be achieved by wiring two power supplies in series or through adjustment of the power supply voltage pot.
      
      **EXAMPLE:** Two 36VDC power supplies in series = 72VDC output voltage
      
      **EXAMPLE:** An MDP 30-15-1 can be adjusted to provide from 14 - 18 VDC

   d. **Load Rating**
      
      This is expressed as Amps or Watts
      
      Watts equate to Secondary Voltage X Amps  **EXAMPLE:** 24VDC X 5Amps = 120Watts
      
      Non-catalog wattage can be achieved by wiring two power supplies in parallel
      
      **EXAMPLE:** Two MDP 30-15-1 can be connected in parallel to provide 60 watts @ 15VDC
      
      The Micron product offering starts at 30 watts. Applications for wattages of less than 30 watts can be satisfied with a 30 watt unit as its dimension is as small as that of many 15 watt products
      
      An oversized power supply can provide customer required wattage at higher than rated ambient
POWER SUPPLY DISCUSSION POINTS

BASICS:
* Micron's DINergy Line of switch-mode power supplies
* Available in 30, 50, 60, 120, 240 & 480 Watt
* UL 508 Listed
* UL 1604 Hazardous Location Listed (30, 60, 120 & 240 watt)
* 85-264Vac input [two-wire plus ground]
* 12, 24, 36, 48 Vdc output (individual units)

USER FEATURES:
* Autoranging input voltage
  >>>>>>No switch necessary between high & low input voltage
* Full output wattage to 60°C (140°F) ambient [50°C ambient on MDP product]
  >>>>>>Many competitors de-rate wattage after 40°C
* Small frame dimensions 30W = 22.5MM; 50W = 32MM
  >>>>>>Saves valuable rail space
* Auto recovery from:
  Overtemperature
  Overvoltage
  Overamperage
  Shortcircuit
  >>>>>>Not necessary to reboot or take off line to restart
* Metal case design > 50W
  >>>>>>Dissipates heat better than plastic at higher wattages
* Units can be connected in parallel to increase output wattage (must use same wattage)
* Units can be connected in series to increase output voltage (must use same voltages)
  >>>>>>Provides capability to increase current or voltage to fit application.

TECHNICAL FEATURES:
* Active power factor correction on units > 60W
  >>>>>>Meets current EN standards
  >>>>>>Many competitors only offer passive filtering
* DC remote contact on units > 60 Watts
* Ripple <100mv (60-480W)
  >>>>>>Best designs fall between 50 - 150mv
  >>>>>>Ratings of 2% Vnom = 480mv @ 240Vac
* Output preset with 0.5% accuracy
  >>>>>>Eliminates need to match unit-to-unit voltage
* Output voltage regulation 0.5%
* Output load regulation 1%
**SPECIALTY PRODUCTS:**

**MD-PDMA** Redundancy Module
* Typically used for 24VDC "fail-safe" requirements
* When connected will allow two equal power supplies to evenly share load, switching all to one of the units in case of failure of one unit
* Also known as a "decoupling diode module" the MD-PDMA prevents back-feeding or looping if one unit fails
* One P/N can handle through 480 watts of power
  >>>>> When continuous operation is critical

**MD-VSB240-24-1** 24VDC Sag Buffer/UPS
* When the application cannot tolerate a momentary (or longer) power loss
* Connected to a 240 watt power supply the Sag Buffer will "ride through" 700ms at 240 watts on its internal capacitor before requiring battery
* When combined with a battery, the Sag Buffer will seamlessly transition through a power outage and then revert to line power and begin the recharge cycle for the capacitor and battery (if) installed
* The **MD-VSB240-24-1** is a compact highly reliable device simply operating from the 24 volt power supply connected to it
  >>>>> Provides for customer's most sensitive applications

**MTM Power:** Micron has a strategic alliance with MTM Power of Mellenbach Germany. MTM is a manufacturer of proprietary encapsulated power supplies, both AC/DC and DC/DC, serving the transportation, alternative energy, and industrial markets.
* Tested to survive repetitive impact from 30G's to 70G's
* Available as chassis, PCB and DIN mountable
* Ranging from 5 - 400 watts
* Multiple and UL Class 2 outputs available
* Certification to -55°C and IP67 available
  >>>>> When absolutely nothing else will work
**COMMON QUESTIONS**

**Why are there multiple output terminals?**
If the power supply has two positive (+) and two negative (−) terminals they are meant to be all connected. The reason the terminals are duplexed is to provide ample current carrying capabilities for both the terminals and wires.

**I am getting no output. Why?**
First, make sure that the power feeding the power supply is good. The operating range is from 85 - 265V. Second, make sure the connection to the primary terminals are secure. Third, make sure that the output wires are connected to a (+) and a (-) terminal. In many cases the power supply must be connected to both positive and both negative terminals in order to properly carry the full load. If the power supply still does not operate after assuring the above, assume it is defective.

**The DC OK lamp just blinks**
The power supply is in "hiccup" mode. It is trying to energize but may be seeing too high an amp draw on the secondary side. Try disconnecting the load and see if the power supply output stabilizes. The power supply should be able to carry a load of up to 25% - 40% over nameplate rating before shutting down.

**Can I wire in series for higher voltage?**
Yes, two can be wired in series to provide a higher output voltage. Make sure that the maximum current is no more than the rated load of the smallest power supply used.

**EXAMPLE:** If you put an MD240-12-1 (12V @ 20A) in series with an MD240-24-1 (24V @ 10A) to obtain 36V, the maximum current must be 10A.

**How can I get more power?**
Up to three units can be wired in parallel to increase the available output current. If one of the units fails the other will go into hiccup mode due to an overcurrent situation.

**Will the power supply be damaged by running without connecting a load?**
No. The power supply is designed to provide a constant output voltage throughout its power range.

**Do I need a redundancy module?**
Also called a "diode module", redundancy devices are used when a system cannot shut down for loss of a single power supply. Two power supplies are connected in parallel with both secondaries feeding into the module. The load is then "shared" with each power supply carrying half of the total load. If one power supply fails, the module shifts full power to the remaining, provides a feedback buffer through the diode array and can provide for a DC-OK check signal to warn of a failure. In super critical applications where electrical failure cannot be tolerated, a Sag Buffer and/or battery backup system may also be employed.

**Can the redundancy module operate at other than 24Vdc?**
No. The MD-PDMA module is designed to operate at 24Vdc. Operation at other input voltages will cause the "Voltage OK" sensors to sense a fault.

**Do I need to restart the power supply once it shut down?**
No. The DINergy products will auto restart once an overvoltage or overload fault has been removed.

**Are the power supplies Class 2?**
No. Class 2 power limited, LPS and UL1310 all refer to a design which will not allow output above a 100 watt maximum. Although the 30 and 50 watt units would cannot exceed 100 watts in power output they have never been tested and approved by UL.

**What is a Sag Buffer?**
Technically, a Sag Buffer is a capacitor circuit that connects between a power supply output terminals and the load. The charged capacitor provides voltage to ride through voltage sags of short duration (from 700 milliseconds to 10 seconds), depending on load, to allow a system an orderly shut down. The DINergy Sag Buffer also has a battery connection that with battery installed will seamlessly transition the 24Vdc power for a longer period dependent on battery size and load. In normal mode the Sag Buffer provides a charging circuit for the battery.

**What information is available for the MTM Power products?**
Technical downloads of all MTM products are available in English at www.mtm-power.com/engl/pdfs.html. Distributor and resale pricing booklets are available as PDFs on the "N" Drive under marketing/pricelists 2011. Typical delivery for MTM Power products ranges from 4-5 weeks for ≤10 pieces to 8-10 weeks for production quantities. Small quantities of certain items are kept in a US facility.

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