

Power Supplies

The purpose of this document is to provide detailed explanation of multi-output switch mode power supply operation and wiring. This information will help with the installation and troubleshooting of a supply in the field. This example is for the UIC 30109000 (LH or Deltron) Power Supply having four outputs. Concepts in this document may lend themselves to other power supply applications.

Deltron Model SQ175-1233

Output	Voltage	Current
V1	5 VDC	20 A
V2	12 VDC	5 A
V3	15 VDC	4A
V4	15 VDC	1.5 A

LH Model TM34-12Y33

Output	Voltage	Current
V1	5 VDC	20 A
V2	12 VDC	5.0 A
V3	15 VDC	4.0A
V4	15 VDC	1.5 A

Total Power

It is important to note all current ratings are individual maximums and in no way could the power supply deliver the total power of 242.5 W if all outputs were loaded to their maximum output capacities. The Deltron supply and the LH supply are both rated for 175W continuous output power. Exceeding this limit will cause the supply to overheat and result in damage.

Derating

Derating a supply is a process of discounting the power supply's output capacity due to reduced airflow or poor heatsinking. If the supply is operated in a cabinet with poor or reduced airflow, the power supply ratings must be derated to account for the heat buildup over time. A supply may function well initially but begin to fail after the circuit temperature rises above 85 degrees Celsius. Make certain the chassis cooling fan is functioning properly as part of a preventative maintenance program on the machine. If the cooling fan fails, make certain to replace it with a fan of equal or better airflow ratings.

Connections

Warning! *The following information is for discussion purposes only, wiring must be performed by a qualified electrician or electronics technician. Do not attempt to modify or make wiring connections unless you are qualified to do so. Machine power to the entire machine must be off and mechanically locked out with a padlock before attempting to install, remove or correct wiring.*

Power Supply Terminals

AC	AC	Gnd	s1	v1	v1	s1	v2-	v2+	v3 -	v3+	v4 -	v4+	RS
			-	-	+	+							

Input Power

The power input connections (AC) terminals must be connected to fuse or circuit breaker protected AC source. Most UIC installations use 120 VAC, in some cases 240 VAC may be used. Supplies must be modified (jumpers) to function with 240 VAC - Do not attempt to operate a 120 VAC configured supply in a machine installation using 240 VAC!

Ground

Make certain the ground (Gnd) connection is wired to both an earth ground wire and to a chassis ground jumper wire for additional safety.

V1

The first output on the supply is the V1 output. This output is 5 VDC and supplied power to all of the I/O boards located in the I/O box of the machine. This does not supply the controller (ex. 8221 or 8222) of the machine, the controller has its own supply. The V1 output has a sense feature that allows wiring sense wires from the I/O box backplane back to the V1 output circuit to automatically compensate for any voltage drop due to the high current through the wiring and bus plane. Sense wires, when employed are typically a light gauge wire (20 AWG) compared to the heavier gauge for the 5 VDC bus wiring.

Sense jumpers must be installed across the v1- and s1- terminals and the v1+ and s1+ terminals if no sense wires are present on the machine. Sense wires are used to bring the +5 VDC signal level back to the supply to account for a voltage drop in the bus wires. UIC may or may not employ the sense wiring on all machines. When the sense wires are present, the sense jumpers may be removed. Minimal loading of V1 is necessary for the remaining outputs of the supply to function. Do not attempt to operate the supply with V1 open or loaded less than 5 Amps.

V2

The second output on the supply is the 12 VDC output. This output is typically used for peripheral I/O boards utilized on the machine and in some cases may be wired to the I/O box.

V3 and V4

V3 and V4 provide the -15 and +15 VDC to the machine I/O box. These sources are primarily used by the servo system components such as DAC Feedback and Servo Amp cards. In order for the V3 and V4 outputs to provide the bipolar output, a jumper or wire in the harness should tie the V3 and V4 supplies together at a common point. Either the V3+ is tied to the V4- or the V4+ is tied to the V3- terminal to create a -15V and +15V supply with a common at the V3+ and V4- terminal or the V4+ and V3- terminals respectively. It is important to note the current rating on the V3 supply is 4 Amps Verses the V4 supply is only 1.5 Amps. If the +15 VDC loading on the machine is above 1.5 Amps, the second wiring option would be the best option. It is important to consult the machine-wiring diagram for the correct wiring of these outputs. The common tie may occur at the machine I/O box and wiring the V3 and V4 may not involve any jumpers at the power supply terminal strip.

RS

No connection to the RS terminal is used, leave it open.

Troubleshooting

The most important consideration is that all outputs are connected to the machine. V2, V3, V4 outputs will not work properly unless V1 is loaded (5A min). Connecting just the +- 15VDC and 12V without the 5VDC will result in the supply failure or incorrect operation. A digital voltmeter (DVM) may be used to measure the DC terminal voltages on the power supply. All outputs should be at or above (no more than 10%) their rated outputs. The + and - 15 VDC outputs should be equal within 10% of each other. Using the AC setting on the DVM will show any AC ripple or unfiltered noise on the supply outputs, ripple must be less than 5% on all outputs. An AC line isolated oscilloscope may be used to visually detect any noise on the power supply outputs. Use extreme caution when using this method to prevent damage or injury. Always use an isolation transformer or a battery-powered oscilloscope when troubleshooting with an oscilloscope.

Safety

Make certain all terminal screws are tightened down, the supply is physically mounted, wire insulation and lugs are in good condition and no combustible materials are in close proximity to the power supply. Clean all dust and dirt in and around the supply and its chassis. Replace all machine covers, safety covers and chassis before attempting to run the machine.