

4.2.2 S2x Model

The following voltage specifications apply at the drive power connector. There is no special power on/off sequencing required. The extra power needed for drives differential SCSI is shown in the section called 4.2.7, “Additional 5V Power Requirements for Differential” on page 35.

Input Voltage

+ 5 Volts Supply	5V ($\pm 5\%$ during run and spin-up)
+ 12 Volts Supply	12V ($\pm 5\%$ during run) (+5 % / -7% during spin-up)

The following current values are measured values. Safety factors have not been applied.

	Notes	Population Mean	Population Stand. Dev.
Power Supply Current			
+5VDC (power-up)	Minimum voltage slew rate = 4.5 V/sec		
+5VDC (idle avg)		0.73 Amps ¹	0.02 Amps
+5VDC (R/W baseline)		0.96 Amps ⁵	0.05 Amps
+5VDC (R/W pulse)	Base-to-peak	.36 Amps	0.06 Amps
+12VDC (power-up)	Minimum voltage slew rate = 7.4 V/sec		
+12VDC (idle avg)		0.41 Amps	0.02 Amps
+12VDC (seek avg)	1 op/sec	0.0031 Amps	0.0002 Amps
+12VDC (seek peak)		1.20 Amps ⁶	0.02 Amps
+12VDC (spin-up)	4.2 sec max	1.5 Amps ⁷	0.1 Amps
Drive power			
Avg idle power		8.6 Watts	.35 Watts
Avg R/W power	30 ops/sec	10.8 Watts	.35 Watts

⁵ See Figure 5 on page 24 for a plot of how the read/write baseline and read/write pulse sum together.

⁶ The idle average and seek peak should be added together to determine the total 12 volt peak current. See Figure 6 on page 25 for a typical buildup of these currents. Refer to examples on the following page to see how to combine these values.

⁷ The current at start is the total 12 volt current required (ie. the motor start current, module current and voice coil retract current). See Figure 7 on page 26 for typical 12 volt current during spindle motor start.

: 4.2.2.1 Power Calculation Examples

: **Note:** The above formulas assume all system ops as a 1 block read or write transfer from a random cylinder
: while at nominal voltage conditions.

: **Example 1. Calculate the mean 12 volt average current.**

: If we assume a case of 30 operations/second then to compute the sum of the 12 volt mean currents the
: following is done.

	mean
: +12VDC (idle average)	0.41 amps
: +12VDC (seek average) $0.0031 * 30 =$	0.09 amps
: TOTAL	0.50 amps

: **Example 2. Calculate the mean plus 3 sigma 12 volt average current.**

| To compute the sum of the 12 volt mean current's 1 sigma value assume all the distributions are normal.
| Therefore the square root of the sum of the squares calculation applies. Assume a case of 30
| operations/second.

	sigma
+12VDC (idle average)	0.02 amps
+12VDC (seek average) $\text{sqrt}(30*((0.0002)**2))=$	0.001 amps
TOTAL $\text{sqrt}((0.02)**2+(.001)**2)=$	0.02 amps

| So the mean plus 3 sigma mean current is $0.50 + 3*0.02 = 0.56$ amps

| **Example 3. Power Calculation.**

| Nominal idle drive power = $(.73 \text{ Amps} * 5 \text{ Volts}) + (0.41 \text{ Amps} * 12 \text{ Volts}) = 8.6 \text{ Watts}$

| Nominal R/W drive power at 30 ops/sec = $(0.96 \text{ Amps} * 5 \text{ Volts}) + (0.50 \text{ Amps} * 12 \text{ Volts}) = 10.8 \text{ Watts}$

| Mean plus 3 sigma drive power for 30 random R/W operations/second. Assume that the 5 volt and 12 volt
| distributions are independent therefore the square root of the sum of the squares applies.

+5VDC (1 sigma power) $0.05 * 5$	= 0.25 watts
+12VDC (1 sigma power) $0.02 * 12$	= 0.24 watts
Total (1 sigma power) $\text{sqrt}((0.25)**2+(0.24)**2)$	= 0.35 watts
Total power $10.8 + 3 * 0.35$	= 11.9 watts

Example 4. Calculate the 12 volt peak current.

: To compute the sum of the 12 volt peak currents the following is done.

:	mean
: +12VDC (idle avg)	0.41 amps
: +12VDC (seek peak)	1.20 amps
: TOTAL	1.61 amps

: Example 5. Calculate the mean plus 3 sigma 12 volt peak current.

: To compute the sum of the 12 volt peak current's 1 sigma value assume all distributions are normal.
: Therefore the square root of the sum of the squares calculation applies.

:	sigma
: +12VDC (idle avg)	0.03 amps
: +12VDC (seek peak)	0.02 amps

: TOTAL $\text{sqrt}((0.03)^2 + (0.02)^2) = 0.036$ amps

: So the mean plus 3 sigma peak current is $1.61 + 3 \times 0.036 = 1.72$ amps

Things to check when measuring 12 V supply current:

- Null the current probe frequently. Be sure to let it warm up.
- Adjust the power supply to 12.00 V *at the drive terminals*.
- Use a proper window width, covering an integral number of spindle revolutions.
- Measure values at 25 degree C casting temperature.
- Get a reliable trigger for Seek Peak readings.