

Undersized Power Supplies can Cause DC Contactor Coil Failures

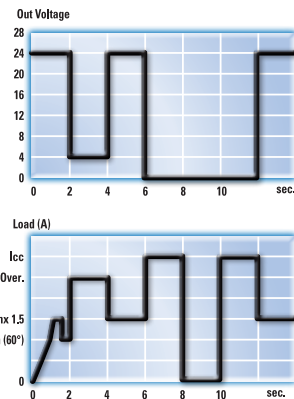
Customers often select a marginally sized 24 VDC power supply because a power supply is relatively expensive in comparison to a CCT. This often leads to DC contactor coil failures and costly lost downtime. On properly sized power supplies, the Hiccup and Continuous modes are well designed to meet demanding circuit needs, however when undersized their unique features can cause havoc on DC coils.



Automatic Restart "Hiccup" Mode:

Let's first define the "hiccup" mode. In case of a short-circuit or over-current condition on the output side, the 24VDC output current is interrupted. The power supply tries again to re-establish 24VDC output voltage to the circuit approximately every second until the problem is cleared – to restate, indefinitely until a problem is cleared. A contactor DC coil typically demands a significant amount of inrush power (Watts), what happens if the power supply is undersized in the "hiccup" protection mode? Here is one common example.

A power supply must produce 25 amps X 24 volts = 600 watts for 10 ms for just one CA6-EI contactor with a 24 VDC electronic coil or the power supply will be under powered. If a power supply is under powered for the control circuit consisting of the contactor coil inrush demands and other device loads, the power supply will proceed to shut-down into the "hiccup" mode as described above. Since most 24 VDC coil circuits are essentially maintain circuits (2-wire control), then after the 'hiccup' the power supply tries again and the 24 VDC contactor coil experiences repeated inrush. This is a vicious cycle that eventually burns out contactor coils and can also weld main contactor contacts.

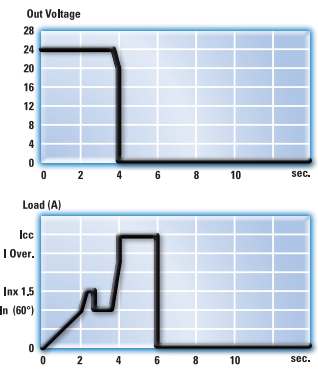


Continuous Output Mode:

The Continuous Output protection mode (also known as Fold-Forward) is used to meet the requirements of demanding current needs for loads such as small motors, solenoid valves, lamps and contactor/relay coils. In the event of short-circuit or over-current in this mode, the power supply can reach up

to 3x the rated output current as the voltage drops to near zero without switching off the output current. How would low voltage and increased currents damage a contactor DC coil?

Let's recall the formula Power (Watts) = Volts X Amps. Sizing a power supply is very critical for 24VDC control since most coils only operate continuously at a minimum of 0.85 (85%) of nominal voltage without damage to the coil. Doing a little math (24 volts x 0.85 = 20.4 volts minimum) shows that an undersized power supply which drops below 20.4 volts is too low for proper coil operation. Therefore, an undersized power supply in Continuous mode by design will lower the voltage which would eventually cause low voltage burn out of the contactors 24VDC coils.



Manual Reset Mode:

For users which require the output power to shutdown during short-circuit or over-current episodes, the manual reset mode is ideal for this situation. Once an event is detected by the power supply, the output will shutdown. In order to re-start the user must recycle the input power after one minute. The shutdown of the power supply drops the coil out of the contactor and provides protection to the equipment. It would then require a technician to investigate and manually reset the operation.

