

## The Fuse dilemma, you only thought you were protected.

You have 5 solid state relays, AC or DC driving correctly specified loads of 50% maximum relay capacity and now comes the decision of what size fuse or circuit breaker you need to protect your network. Things you have considered:

1. Motor start currents and time.
2. Secondary capacitance values and charge time and current.
3. Peak and average current of each load.
4. Wire and connector Current sizing.
5. Thermal requirements.

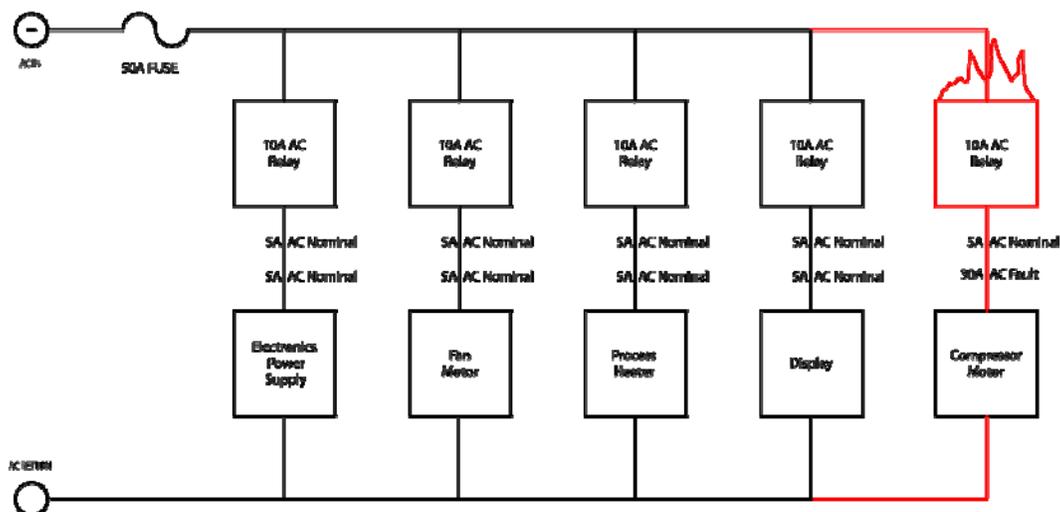
The design is decided. Five equal normal circuit loads of 5A each have a total current of 25A. A fuse sized at 50% of the expected total current is then 50A. The solid state relays are de-rated to 50% of their capability.

Are you done? Yes? No!

### So what can go wrong?

The motor starts and runs, the system capacitors come up to charge and the fuse is happy. The high and low input voltage testing works. High and low temperature testing works also.

Now the locked rotor test - the wiring smokes then the fuse blows. What happened?



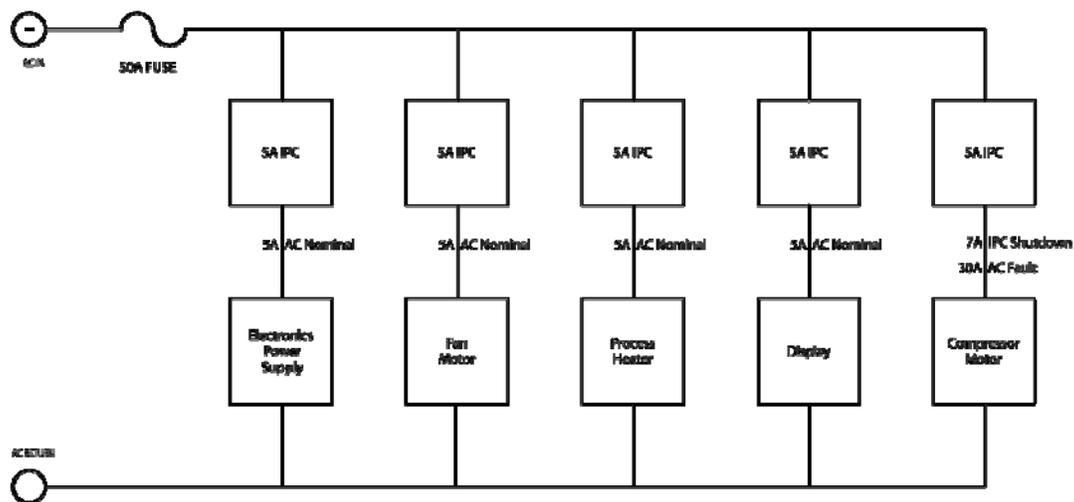
**The Stalled Compressor Motor Wants 30A.  
This is 6X the circuit's Normal Current and 3X the Relay Rating.**

**Why was the stalled rotor circuit not protected?** The 50A rated fuse allowed 25A of additional current before reaching its rating. The 5A motor circuit drew 30A before reaching the 50A fuse rating. A single point fault must draw 30A to reach the fuse rating with the others are drawing normally. This is 6X the normal current designed for a single load.

1. Connector and wiring conducted six times their intended current.
2. The solid state relay conducted 3 times its rated current (6X circuit rated at 50% rating).
3. The meltdown reached the fuse current after the damage was done.

**Micropac Industrial Power Controllers 53286 and 53287 to the rescue:** The Micropac IPC is a combined solid State Relay and Solid State Circuit Breaker. Overload and fault conditions are internally monitored and acted upon for each circuit an IPC is assigned. Any number of circuits may be powered form a common source with each load protected to its individual current requirement.

In the Locked rotor test, the Mii IPC protects at no more than 10A. 2X of the normal circuit design rating and within the operating current of the IPC. The fuse current reaches 30A. Resetting the IPC after releasing the locked rotor brings the system back to normal operation.



**Mii IPC to the Rescue.  
The Load wants 30A, the IPC shuts off at 7A.**

Capabilities that come with all of the Micropac IPCs are:

1. Current rating is determined by the circuit breaker feature requiring no in circuit de-rating.
2. Output current rating is the same for base temperatures of -55°C to 85°C.
3. The built in circuit breaker is electronically resettable – Control OFF then Back ON.

4. Status output combined with electrical breaker reset allows system integration with micro-controller / computer controls.
5. Status Output information allows multiple load management.