

# Powering Up A Panel For the First Time

**How to Power Up a Control Panel for the first time,  
without tripping breakers or blowing things up if things are wired wrong**



Small Control Panel

Powering Up an Industrial Control Panel for the first time either after fabrication or after all the field wiring is connected and ready for power up verification, has some risks. The main risk is that there are short circuits in the wiring that will cause the breakers to trip or the fuses to blow. However there is also a risk that voltages can be mixed up that can cause damage to the control components. This article examines this authors recommendation for powering up control panels or other equipment for the first time after major wiring changes have been made.

**There are basically three (3) different ways to power up a panel for the first time,** at least that I have seen:

1. Method 1. Just turn on the main breaker and begin the checkout.
2. Method 2. Turn on one circuit at a time and check out once circuit at a time.
3. Method 3. Turn off the main circuit breaker or disconnecting device, turn on all downstream circuit breakers, fuses, and disconnecting means, and ohm check each phase or the load side of the main breaker phase to phase and phase to ground.

Method 1 is quickest method but only if there are no shorts. Method 2 is really no better since no checks are performed till after each circuit is turned on. Also this method takes the most time to find all of the shorts.

The above 2 methods are widely practiced but rely on everything being wired reasonably correctly in the first place. However when a control panel is first turned on, it is for the purpose of verifying that the wiring and the functionality of the controls is correct. Therefore some checks should be performed before powering up the panel for the first time. **The method I prefer is Method 3.** In this method **all the downstream circuits except the main disconnect or circuit breaker are closed.** (Verify that there are no voltages present on the load side before proceeding and follow lock out procedures as required by your facility). In closing all the downstream fuses, breakers, and switches, **any shorts in most if not all of the wiring will reveal itself when using an ohm meter on the disconnected load side of the main disconnecting means** and checking phase to phase and phase (or circuit) to ground impedance. If a short is found then open 1/2 of the switches, fuses, and breakers in repeated steps until the location of the short(s) is(are) isolated.



When checking for impedance to ground, I'm looking for at least 1 Mega Ohm. When looking for phase to phase shorts I am often only looking for more than 2 ohms typically if there are coils in the circuit such as fans, as these look like near shorts but are perfectly normal. If the phase to phase impedance is less than 2 ohms, I'll start to disconnect the fans or other coils from the circuit till the number comes up. Once it's above 2-3 ohms then I'm usually satisfied that the panel is ready to power up. If there are no coils in the circuit then there should be a higher impedance. However the impedance may not be much more, depending on the expected loading. For example if the panel draws 20 amps at 120VAC, that's just 6 ohms of impedance. If the panel is a 200 Amp 480 VAC panel, then it could be much lower. In this case it might be worthwhile to check sections of the load so the Phase to Phase impedance is above 2 ohms or is otherwise reasonable for the given connected load. Most of the time motors are turned off so this does not end up being in circuit for the ground/fault test.

**There is one more thing** however that would be good to check prior to powering up the panel. If there are multiple voltages in the panel, **check the impedance between each of the different power sources.** The Impedance should be greater than 1 Mega Ohm

between any 2 power sources such as 120VAC and 24VDC or 5VDC. Also check each power supply to ground, again making sure the impedance is high.

Once the phase to phase and ground checks are performed, then I close the door (for arch flash protection) and turn on the main breaker to turn on everything all at once. I have never seen a reason to turn things on one at time. If the ohm checks are good then all should be good. Also, this method avoids putting on the Arc Flash Suit to power up the panel as this is perhaps the most likely time that such an event will occur.

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