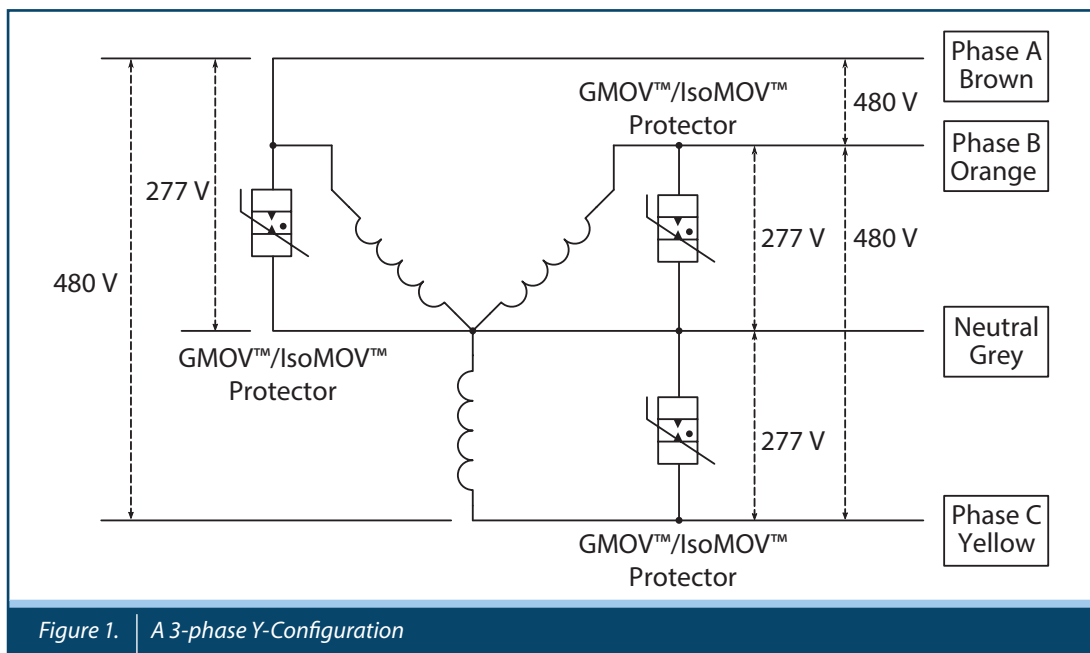


DESIGN NOTE

Where to Use Bourns® GMOV™ or IsoMOV™ Overvoltage Protectors in a 480 Vac 3-Phase Delta or Wye Configuration AC System



Many systems use 3-phase power due to its cost-efficiency and load balancing advantages. Like all electrical equipment, 3-phase AC systems require protection from voltage transients. For these designs, Bourns® IsoMOV™ and/or GMOV™ hybrid overvoltage protectors offer an excellent protection solution due to their clamping voltage performance along with low leakage and low capacitance in a small form factor. In a 480 Vac 3-phase system, there are two types of configurations: a 3-phase wye configuration (also known as Y-configuration, see Figure 1) and a 3-phase delta configuration (see Figure 2). In the Y-configuration, neutral is typically tied to ground.



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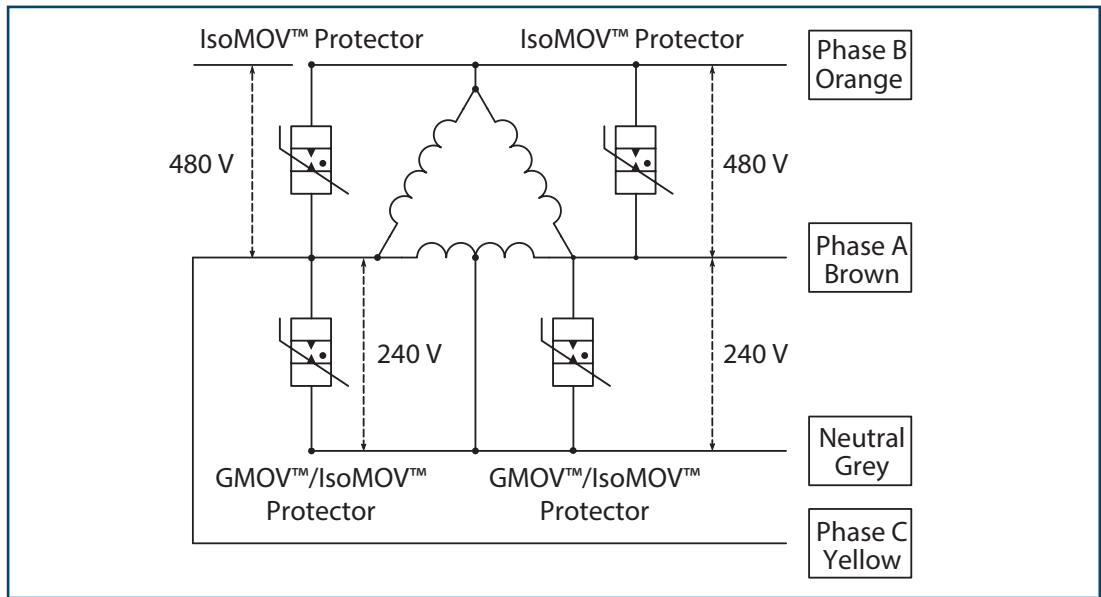


Figure 2. | A 3-phase Delta Configuration

The highest Maximum Continuous Operation Voltage (MCOV) a GMOV™ component can support is 320 Vac. The highest MCOV with an IsoMOV™ component is 550 Vac. This application note reviews the two configurations to help users determine the best component for each configuration.

In the Y-configuration, the Vac is 480 from phase to phase. However, from phases to neutral, the voltage is only 277 Vac. Therefore, suppression components can be installed between phases and neutral. In this case, either the GMOV™ component or the IsoMOV™ component can be used. Designers preferring a GMOV™ component can specify either the GMOV-14D321K or the GMOV-20D321K models. The two digits before the letter D indicate the diameter size. The 14 mm component's nominal current (I_n) is rated at 3 kA while the 20 mm I_n is rated at 5 kA.

The IsoMOV™ component would also be a good solution here. In this configuration, the highest MCOV for the IsoMOV™ component is 555 Vac and models IsoM5-320T or IsoM8-320T would be the best choice. The letter "M" in the Bourns® IsoMOV™ component part number signifies the component's rating. So, the M3 is rated for 3 kA I_n , M5 is rated for 5 kA I_n , and M8 is rated for 8 kA I_n . One advantage of IsoMOV™ protectors is that the M3 size is equivalent to a 10 mm MOV, but with a surge rating equivalent to a 14 mm MOV. The M5 size is equivalent to a 14 mm MOV, but with a surge rating equivalent to a 20 mm MOV. Finally, the M8 size is equivalent to a 20 mm MOV, but with a surge rating equivalent to a 23 mm MOV.



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In the delta configuration shown in Figure 2, Phase B to Phase A and Phase B to Phase C are 480 Vac. The GMOV™ component cannot be used as a solution in this configuration because it does not have an MCOV rating high enough to cover the voltage. An IsoMOV™ component would be the best solution in this configuration.

In some delta configurations between Phase A to Phase C, there is a neutral connected at the center tap. The Phase A to neutral and Phase C to neutral are rated halves of the 480 Vac, which total 240 Vac each. This voltage is within the GMOV™ component's MCOV rating. For a delta configuration that has Phase A to neutral and Phase C to neutral, both the IsoMOV™ component and the GMOV™ component would be good protection solutions.

In other types of delta configurations, one of the phases may be tied to ground/neutral rather than at the center tap between the phases. In this configuration, the IsoMOV™ component would be the optimal solution (see Figure 3).

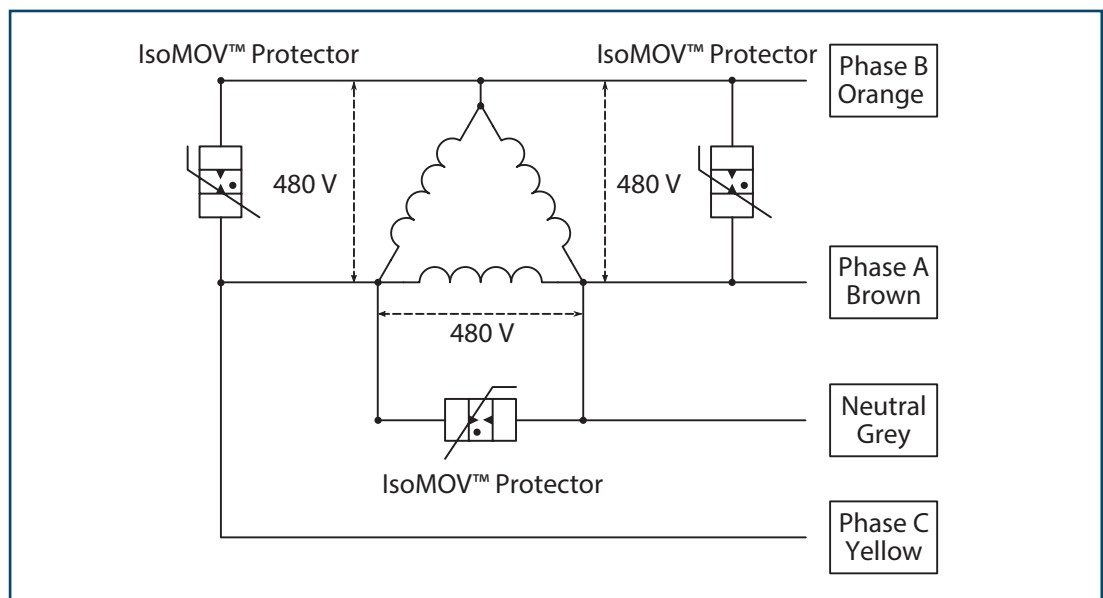


Figure 3. | A 3-phase Delta Configuration with Neutral / Ground Tied to One of the Phases

Bourns® GMOV™ hybrid components are offered in 14 mm and 20 mm versions with MCOV ratings from 45 Vac to 320 Vac. The 14 mm version has a maximum surge current rating of 6 kA, while the 20 mm version has a 10 kA maximum surge current rating.



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Bourns® IsoMOV™ hybrid components are available in 10, 14, and 20 mm versions. The MCOV ratings range from (i) 130 Vac to 320 Vac in the 10 mm models; (ii) 130 Vac to 555 Vac in the 14 mm models; and (iii) 250 Vac to 555 Vac in the 20 mm models. The maximum surge current for an IsoMOV™ component is 5 kA (10 mm), 8 kA (14 mm), and 15 kA (20 mm). Both Bourns® IsoMOV™ and GMOV™ hybrid component families are UL 1449 recognized and RoHS compliant*. The IsoMOV™ component is Type 4 UL recognized while the GMOV™ component is Type 5 UL recognized. The voltage availability in an IsoMOV™ component varies between models as seen in Figure 4.

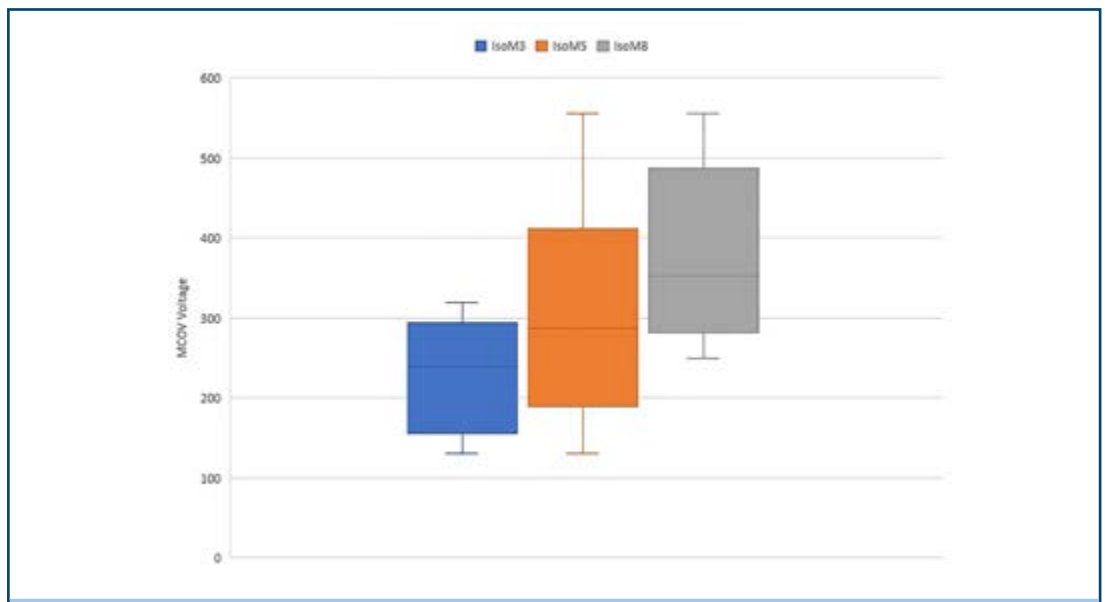


Figure 4. | IsoMOV™ Component Model Voltage Availability



*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

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