

“Understanding Coil Economizers for Contactors”

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1. Introduction

In the realm of electrical engineering, contactors are critical components used to control high-power circuits with low-power signals. To enhance the efficiency and performance of contactors, coil economizers are employed. This whitepaper aims to explore the different types of coil economizers, focusing on Pulse Width Modulation (PWM) coil economizers, dual coil economizers, and un-economized coils, highlighting their working principles, advantages, and typical applications. Altran Magnetics stands out as one of the few companies offering all these versions of coil economizers, making them a versatile choice for diverse applications.

2. Overview of Coil Economizers

Coil economizers are devices or circuit designs used to reduce the power consumption of the coil in a contactor. By lowering the energy required to maintain the coil's electromagnetic field after initial activation, coil economizers help in reducing heat generation, enhancing the longevity of the contactor, and improving overall energy efficiency. Altran Magnetics provides a comprehensive range of coil economizers, including PWM, dual coil, and un-economized versions, catering to various industrial and green applications.

3. Types of Coil Economizers

- PWM Coil Economizers

Working Principle: PWM coil economizers operate by rapidly switching the voltage supplied to the coil on and off. This switching is done at a frequency high enough that the coil's inductance smooths out the current, maintaining sufficient magnetic field strength to keep the contactor engaged while significantly reducing power consumption.

Advantages:

- Significant reduction in power consumption.
- Lower heat generation, enhancing contactor life.
- Improved energy efficiency.

Applications:

- Used in systems where energy efficiency is critical.
- Ideal for applications with continuous or long-duration contactor engagement.

Altran Magnetics offers advanced PWM coil economizers, ensuring top-notch energy efficiency and reliability in various applications.

- Un-Economized Coils

Working Principle: Un-economized coils are the simplest form, with a single coil that remains fully energized as long as the contactor is engaged. There is no reduction in power consumption after initial activation.

Advantages:

- Simple design with no additional circuitry.
- Reliable operation in applications where power consumption is less of a concern.

Applications:

- Used in applications where contactor engagement is infrequent or of short duration.
- Suitable for cost-sensitive applications where the added complexity of economizers is not justified.

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Altran Magnetics offers reliable un-economized coils, providing a cost-effective solution for applications with less frequent contactor engagement.

4. Comparison of Coil Economizers

Feature	PWM Coil Economizers	Dual Coil Economizers	Un-Economized Coils
Power Consumption	Low after activation	Very low after initial pull-in	Constant high
Heat Generation	Low	Moderate	High
Complexity	High	Moderate	Low
Cost	High	Moderate	Low
Application Suitability	Energy-efficient systems	Heavy-duty industrial	Cost-sensitive projects

Altran Magnetics’ comprehensive product line includes all these versions, allowing for tailored solutions that meet specific application needs.

5. Applications and Benefits

Energy Storage Systems: Energy storage systems, such as battery banks, require efficient power management to optimize energy usage and prolong the life of batteries. PWM coil economizers are ideal for these systems as they significantly reduce power consumption, thus preserving stored energy and improving overall system efficiency.

Electric Vehicles (EVs): In electric vehicles, minimizing energy waste is critical to maximizing driving range. Dual coil economizers can help reduce the energy consumed by contactors in the vehicle's electrical systems, thereby conserving battery power and enhancing vehicle performance.

Solar Power Systems: Solar power systems depend on efficient energy use to maximize the conversion of solar energy into electrical power. Using PWM coil economizers in solar inverters and other control systems helps in reducing the power draw from the system, leading to higher overall efficiency and better utilization of harvested energy.

Altran Magnetics stands out in the green applications sector by offering a range of coil economizers that enhance the efficiency and sustainability of energy storage, electric vehicles, and solar power systems.

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6. Conclusion

Coil economizers play a vital role in enhancing the efficiency and longevity of contactors. PWM and dual coil economizers provide significant benefits in terms of power savings and reduced thermal stress, making them suitable for various industrial and commercial applications. Un-economized coils, while less efficient, offer simplicity and cost-effectiveness for specific use cases. Altran Magnetics, being one of the few companies that offer all these versions of coil economizers, provides a unique advantage in selecting the right solution for specific needs, leading to better system design and energy management.

7. References

- ***"Electrical Contactors: Principles and Applications," IEEE Transactions on Industry Applications.***
- ***"Energy Efficiency in Industrial Applications," Journal of Power Electronics.***

This whitepaper provides a comprehensive overview of coil economizers for contactors, helping engineers and decision-makers choose the right type for their specific applications. Altran Magnetics' extensive range of coil economizers ensures that you can find the perfect solution for your efficiency and performance needs.