MGM TRANSFORMER COMPANY

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Solutions for Drive Applications

DRIVE ISOLATION

MGM Transformer is an Industry Leader:

For over forty years MGM has maintained a reputation as one of the most capable manufacturers of drive transformers in the world. MGM is one of the only companies that can provide drive-related products using either of two main transformer insulation technologies: vacuum pressure impregnation (VPI) or oil-filled.

MGM Transformer Company is among the leaders in the design and manufacturing technology of SCR/rectifier duty transformers for VFD drives whether 6, 12, 18, 24 or 36 pulse rectification. Our vast experience is built on a solid foundation with installations of our products worldwide. Whether it's a standard transformer or a custom built unit**,** MGM has the experience to provide a solution for your drive application. MGM draws from a large design team with hundreds of years of cumulative experience to find a solution to your transformer needs. Our expertise and experience combined with a focus on customer satisfaction are the reasons for our success as a leading manufacturer of all types of transformers.

MGM Drive Isolation Transformers:

The variable speed drive market covers a broad range of applications and as such demands a high level of performance and reliability. MGM Drive Isolation Transformers are designed to meet rugged demands of both AC and DC variable speed drives while reliably providing the required voltage change. In MGM Drive Isolation Transformers, the separate primary and secondary windings provide electrical isolation between the incoming line and the rectifier load. Further, the windings are designed to withstand overcurrent of 150% of the rated load for 60 seconds or 200% of the rated load for 30 seconds respectively. MGM's Drive Isolation Transformers are designed and sized to match standard motor horsepower and voltage ratings. MGM's transformers are also available in energy efficient designs to meet NRCAN requirements or higher.

Each individual transformer is designed specifically according to the drives harmonic spectrum. The magnitudes of harmonics, depending on the drive, six, twelve or eighteen pulse, fluctuate between the typical and theoretical values of ANSI C57.110-2008 and IEEE Standard 519-2014.

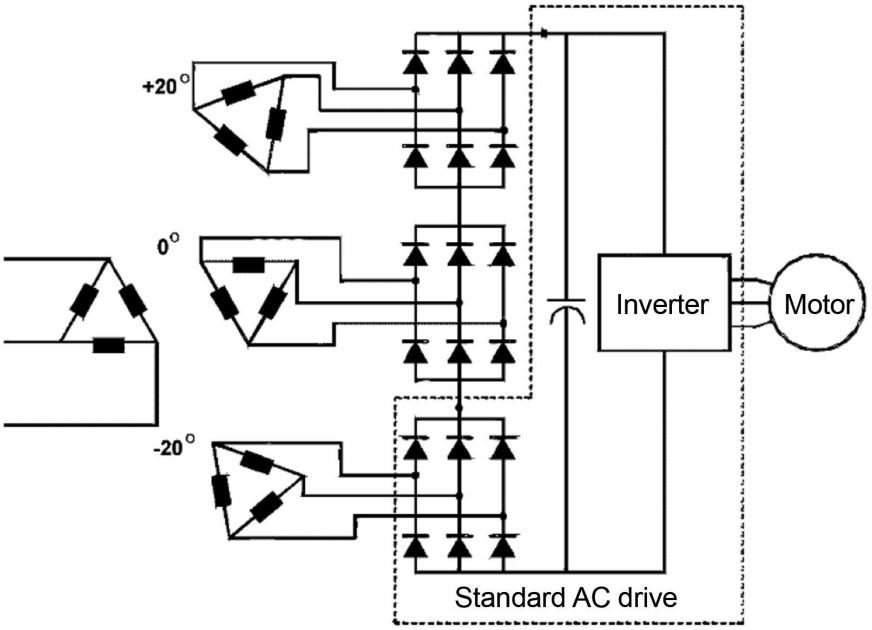
Every transformer has inherent losses comprised of load loss, I^2R loss, eddy losses and other stray losses. The calculated K-factor number is multiplied by the eddy current and stray loss values, to arrive at the elevated eddy and stray loss values. This total loss value is added to the actual transformer losses under full load, and hence, the transformer core and coils must be designed to absorb these excessive losses without overheating or exceeding the required temperature rise. The higher the percentage of stray and eddy current losses, the higher the transformer total losses will be after multiplying by the K-factor number.

The ideal design approach and the one adopted by MGM Transformer is to minimize the eddy current and stray losses in the windings, before they are multiplied by the K-factor (typically between 3 and 13), depending on the harmonic levels. This is achieved by incorporating the following parameters into the transformer design:

1) Use conductor(s) as thin as mechanically possible to reduce the stray losses due to the skin effect.

2) Use multi-stranded, thin, individually insulated conductors in parallel.
3) Transpose the conductors as many times as possible.
4) The transformer core flux density is reduced to prevent core saturation due to additional harmonic currents.
5) If the drives load on a transformer contains a large DC component, the transformer core will saturate. Therefore MGM must be informed of heavy notching or high DC current in order to design the core at a much lower flux density and or introduce an air gap to offset the DC component and prevent core saturation.
6) The core assembly is tightly clamped with structural steel angles or channels, depending on KVA rating to reduce losses and maintain lower sound levels. The coils are vacuum pressure impregnated and then the entire core and coil assemblies are dried out to drive out any possible moisture, varnished with polyester resin and baked. This cycle may be repeated as required by the transformer, voltage class, BIL and environmental conditions.

Typical 18–Pulse Transformer Drawing:



MGM Multi Pulse Transformers:

MGM is a leading global supplier of multi pulse transformers to major multinational variable frequency drive manufacturers. Our engineering capabilities, quality, on-time delivery and global presence are the top reasons that customers prefer MGM Transformer Co.

MGM has over twenty five years of experience with 6 to 36 pulse drive/inverter duty transformers in both low and medium voltage applications. MGM Multi-Pulse capabilities include (other higher ratings or approvals available on request):

Maximum Rating: 15MVA.

Max Voltage Class (Primary): 35 kV
Max BIL: 200 kV
Number of Pulses: 6 to 36 (others available like two 18 Pulse in Parallel to make it 36 Pulse)
Approvals: UL and CSA
Standards: ANSI/IEEE, IEC, ABS (details below)
Cooling: Natural convection, Forced air, or Forced air with heat exchanger
VPI transformers up to 35 kV
Oil Filled transformers up to 35 kV

Standards:

- ANSI C34.2 (withdrawn- still see in customer specs)
- IEEE C57.18.10 – 1988 Power Rectifier Transformers (mainly 6, 12 pulse)
- IEEE 1653.1-2017 – Traction Rectifier Transformers
- IEEE 1653.2 – Traction Rectifiers
- IEC 61378-1 Converter Transformers
- IEC 60146-1-1,2,3 Semiconductor Converters

Stringent QC/Engineering approach:

At MGM, all windings for drives isolation transformers are insulated turn to turn, separated over insulation and anchored and securely tied down. The coils are wedged between core legs and coils and blocked on top and bottom to prevent any movement or shifting due to short circuit forces or faults, vertical and diagonal that can be caused by SCR failures.

For almost half a century MGM Transformer has been at the forefront of design and engineering in the transformer industry and our approach to drive isolations and multi pulse transformers is no different. Customer service is our priority and we hope to get the opportunity to prove it to you.