Frequently Asked Transformer Questions

Question 1: What information is required to size a resistance-welding transformer?

Answer: The information needed is weld current, weld time, production rate (weld/min.), primary voltage, primary frequency, and a sketch of the secondary circuit (including cable/shunt/bus bar lengths, cross sections and orientation). Additional information may be required for certain applications.

Question 2: What is the formula to calculate the effective continuous primary current for a transformer rated at a 50% duty cycle?

Answer: (KVA50% x 1000) / (Primary Voltage *1.41) This value is also known as ECTC (Effective Continuous thermal Current)

Question 3: What causes a resistance-welding transformer to growl or grunt?

Answer: Very likely the cause of the problem is saturation of the transformer core. Transformer core saturation causes half-cycle firing or imbalanced firing. Viewing the primary current waveform is the most reliable method to identify the problem. More investigation may be required to isolate the problem.

Question 4: What is the recommended mixture for the liquid coolant of a welding transformer?

Answer: The purpose of the coolant is to reduce heat developed by the transformer. Chemicals may be added to the coolant to protect against algae, corrosion or mineral deposits. The coolant must be compatible with plumbing components and cannot inhibit the ability to remove heat. Just like adding antifreeze to your car's engine, it is best to minimize the amount in a transformer as will due to poor heat dispersion. RWMA Bulletin 14 provides guidelines for coolant mixtures.

Question 5: When should I use a ground reactor or a ground strap on the secondary of a transformer?

Answer: ANSI/AWS Bulletin Z49.1 states, "The secondary of a transformer shall be grounded by one of two methods or in the case of non-portable machines required the use of an isolation contactor." The two methods listed in the bulletin are the permanent grounding of the welding secondary circuit or the use of a ground reactor. The choice of using a permanent ground or a ground reactor is an issue of the weld process and the machine design. If multiple transformers make contact to a common point, a ground reactor can prevent secondary circulating currents. There are many other situations that a ground reactor can eliminate circulating currents and should be evaluated in the machine design. Both of these methods are safe and meet the requirements of Z49.1.

Question 6: What is the accuracy of the transformer turns ratio?

Answer: The transformer turns ratio is very accurate. It is controlled by the transformer manufacturer and is tested several times in the quality control process during manufacturing. Often the turns ratio is used in a weld control to calculate the secondary current when the control is monitoring the primary current. It is common practice to adjust this ratio while calibrating the weld control with an external current meter. The true turns ratio is the ratio of turns of wire on a primary coil to the number of turns on a secondary coil. The ratio is a physical quantity and can only be changed by selecting a different turn on the primary coil through a tap switch or some other hard wired connection.

Question 7: What is the difference between the terms Inverter DC, High Freq DC (HFDC) and Mid Freq DC (MFDC)?

Answer: All three terms refer to the same thing and may be used interchangeably. The recognized resistance-welding industry term is Inverter DC. Inverter DC transformers operate at a higher frequency than 60 Hz and have diodes on the output side of the transformer. The operating range of Inverter DC transformers is between 1000 and12000 Hz.

Question 8: What is the relationship between KVA and output current?

Answer: A transformer's KVA rating is a thermal rating and deals with how many welds per minute it can make and not the weld current it can produce. A higher KVA rating does not automatically mean it is capable of more welding current. The common misconception that resistance-welding transformers are current sources. These types of transformers are instead voltage sources.