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Delta Connected, 9-Lead Motor Insulation Testing

APPLICATION NOTES | APRIL 2014

Delta Connected, 9-Lead Motor Insulation Testing

This type of motor is probably the most commonly used in factories, lumber-mills, and other commercial plants. They are dual-voltage and can be wired for either 240VAC or 480VAC. Each motor will have 9 numbered leads coming out of the motor. The leads are numbered to aid the electrician when connecting the motor. If you look at the manufacturer's nameplate it will have a table similar to **Table 1** that describes how the leads should be connected.

	L1	L2	L3	Join
Low Voltage	1, 6, 7	2, 4, 8	3, 5, 9	–
High Voltage	1	2	3	4 & 7, 5 & 8, 6 & 9

Table 1. Manufacturer's nameplate for Delta connected 9-lead motor

According to the table above, for a high-voltage connection, the electrician would connect L1 to lead #1, L2 to lead #2, L3 to lead #3, wire-nut 4 & 7 together, wire-nut 5 & 8 together, and wire-nut 6 & 9 together. Refer to **Figure 1** for a detailed internal wiring diagram.

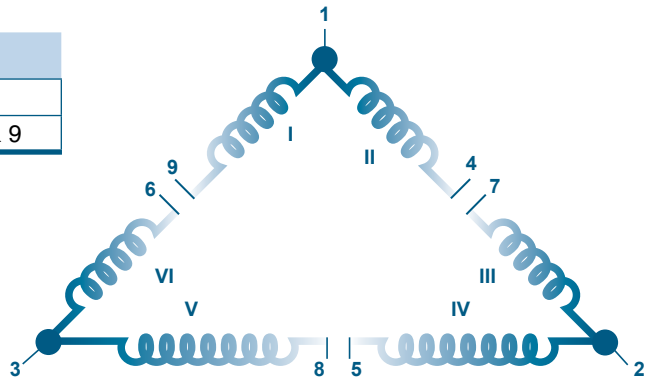

Figure 1. Delta connected, 9-lead wiring

In **Figure 1** the leads are numbered and the individual coils are referenced with roman numerals. From **Figure 1** it can be seen that some coils are permanently and internally connected. These coils are I & II, III & IV and V & VI. They can not be separated. This fact is important when considering insulation resistance testing. Since the coils do not separate it will not be possible to test coil-to-coil insulation resistance for all 6 coils and the combinations that they represent.

In order to effectively test the motor we must disconnect the field coils from one another where possible. The wire-nuts from 4 & 7, 5 & 8 and 6 & 9 need to be removed. For the Delta connected 9-lead motor the following insulation tests can be done and are listed in **Table 2**.

Megohmmeter + Connection	Megohmmeter – Connection	Insulation Resistance Tested
Lead 1	Motor Frame	Coils I & II to Frame
Lead 2	Motor Frame	Coils III & IV to Frame
Lead 3	Motor Frame	Coils V & VI to Frame
Lead 1	Lead 2	Coils I & II to III to IV
Lead 2	Lead 3	Coils III & IV to V & VI
Lead 3	Lead 1	Coils V & VI to I & II

Table 2. Testing guide for a Delta connected 9-lead motor.

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