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 name-plate 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.

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.

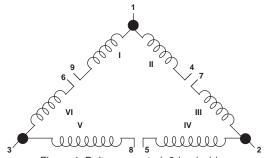


Figure 1. Delta connected, 9-lead wiring

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 to VI to Frame |
| Lead1 | 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.

Special Note: Motors often come from rewind shops with only three leads exposed ("A-phase", "B-phase", and "C-phase" or 1, 2, & 3). In order to make reconnection easier for the plant electricians the motor rewind shops internally connect 4 & 7, 5 & 8, and 6 & 9. This causes a problem for proper insulation resistance testing. Essentially it is impossible to properly test a motor's insulation resistance once this is

Contact Us

United States & Canada:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments 200 Foxborough Blvd. Foxborough, MA 02035 USA (508) 698-2115 • Fax (508) 698-2118 www.aemc.com

Customer Support – for placing an order, obtaining price & delivery:

customerservice@aemc.com

Sales Department – for general sales information:

sales@aemc.com

Repair and Calibration Service – for information on repair & calibration, obtaining a user manual: repair@aemc.com

Technical and Product Application Support – for technical and application support:

techinfo@aemc.com

Webmaster – for information regarding www.aemc.com:

webmaster@aemc.com

South America, Australia & New Zealand:

Chauvin Arnoux®, Inc. d.b.a. AEMC® Instruments 15 Faraday Drive Dover, NH 03820 USA (978) 526-7667 • Fax (978) 526-7605 export@aemc.com

All other countries:

Chauvin Arnoux 190, rue Championnet 75876 Paris Cedex 18, France 33 1 44 85 45 28 • Fax 33 1 46 27 73 89 info@chauvin-arnoux.com

