The Application Note is pertinent to the Quantum III / Mentor II Family

Quantum III / Mentor II High HP Drive Field Supplies

The purpose of this application note is to more clearly define the fixed field supplies on Size 2 & 3 Quantum III (models 9500-8307/8607 and larger) and the Mentor II (models M350/M350R and larger). These supplies are NOT current regulated supplies as they are in the smaller Size 1 drives and therefore Menu 6 in the software is not used. Parameter #6.13 should be set to 0 (default) otherwise the drive will trip on an FOC (field over-current) trip. If a current regulated field and/or constant horsepower operation (i.e. field weakening) is required for a particular application with Size 2 or 3 drives, the FXM5 field current regulator should be used. In this case, menu 6 within the drive is applicable and the jumper LK1 must be cut on the MDA6 power board.

The standard field supply on Size 2 & 3 drives (non-current regulated) is programmable for two voltage levels via a jumper located on the MDA6 board. This jumper configures the rectifier bridge for either "single phase rectification" or "two phase rectified into the third phase". The average voltage produced by these two configurations is 0.9 times the input line voltage or 0.675 times the input line voltage respectively. The table below shows the input line voltage verses the output field voltage for the two configurations.

Methods of producing field voltages other than what is given in the table below are provided at the end of this document.

<table>
<thead>
<tr>
<th>Input Line Voltage</th>
<th>“single phase rectification” European setting F-jumper to EF-position</th>
<th>“two phase rectified into the third phase” North American setting F-jumper to E3 position</th>
</tr>
</thead>
<tbody>
<tr>
<td>240vac</td>
<td>216vdc</td>
<td>150vdc</td>
</tr>
<tr>
<td>380vac</td>
<td>342vdc</td>
<td>256vdc</td>
</tr>
<tr>
<td>480vac</td>
<td>432vdc</td>
<td>300vdc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>108vdc</td>
</tr>
<tr>
<td></td>
<td></td>
<td>171vdc</td>
</tr>
</tbody>
</table>

Measured Field Voltages must be with some load. Open circuit voltages will read up to 600vdc.

** In some cases, the voltage level in the field economy mode may be equal to the motor rated field voltage. In this case, permanently remove jumper from L11 to L12 on Mentor II drives or FE1 to FE2 on Quantum III drives. If this is done, the drive will no longer provide a field economy mode.

Mentor II’s and Quantum III’s sold in the US are set for the “North American setting” while the Mentor II’s sold in Europe are set for the “European setting”. The jumper is located on the MDA6 power board. The photographs on page 2 show the jumper and the programming positions for the two configurations.

For additional information on Field Economy with Size 2 & 3 Mentor II and Quantum III see CTAN175.
If wiring changes are made to standard units, it is your responsibility to make appropriate notation to the unit and/or other such documentation so that if the unit needs to be replaced, the person doing the replacement is aware of the changes that needs to be performed. Failure to do so can result in Drive and/or Motor damage.
Creating Non-Standard Field Voltage Levels

Customized field voltages can be generated by the addition of a boost / buck transformer to the field circuit. The figure below shows a typical wiring scheme. The following equations may be used to calculate the voltage / current ratings of the transformer.

\[ V_{fld} = 0.9 \times (V_{pri} + V_{sec}) \]
\[ V_{pri} = \text{supplied line voltage} \]
\[ \text{VA (of transformer)} = 1.5 \times I_{fld} \times V_{sec} \]
\[ V_{sec} = (V_{fld} / 0.9) - V_{pri} \]

Notes:
1. Transformer T1 can be either an isolation transformer (as shown) or an auto transformer
2. E1 & E3 must also be connected to L1 & L3 respectively as per the User Guide.
3. Fuse 1FU should be sized to protect the secondary winding Fuse 2FU should be used to protect the primary winding.

Example: 240VDC Motor armature with a 240VDC, 10amp field running on a 230VAC Line Voltage.

\[ V_{fld} = 0.9 \times (V_{pri} + V_{sec}) \]
\[ 240vdc = 0.9 \times (230 + V_{sec}) \]
\[ V_{sec} = (240vdc / 0.9) - 230vac \]
\[ = 266 - 230 \]
\[ = 36.6vac \]

A standard boost transformer voltage is 32vac
\[ V_{fld} = 0.9 \times (230 + 32) = 236vdc \]

\[ \text{VA (of transformer)} = 1.5 \times I_{fld} \times V_{sec} \]
\[ = 480va \]

Use Control Techniques P/N BT32V15A-VR for fields 15 amps or less
P/N BT32V20A-VR for fields 20 amps or less

Questions?? Ask the Author:

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