

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

Field Economy with Programmable Off Delay

This application note shows how to add Timed Field Economy to Size 2 & 3 Quantum III drives and Mentor II drives (M350/M350R through M1850/M1850R).

The larger size Quantum III drives (9500-8307/8607 through 9500-8320/8620) and Mentor II drives (M350 through M1850 regen and non-regen models) provide fixed voltage field supplies. These field supplies are configured such that a relay contact may be used to reduce the field voltage applied to the motor when it is not running.

There are several advantages to reducing the field voltage when not running besides the obvious, saving money since the field power is reduced by about 56%. Saving energy even in a small way will tend to increase the life of the insulation on the field windings since the temperature of the windings will be lower. Since there is still approximately 44% field power, the motor is kept warm enough to keep moisture out and reduce thermal shock tendencies as the motor is kept basically kept in a standby mode.

This low cost option can pay for itself in a relative short period of time

Take the case of a motor with a 300v 6A field.

**Without this option the field would be wasting about 1800watts
With this option the field would be reduced to 200v (which reduces the field current) which would result in about 800w consumption.**

A savings of approximately 1000watts or 1kW-Hr in standby

In light of energy conservation and reducing your company's "Carbon Footprint" - this is an option that should be considered for all new and existing Mentor II or Quantum III drives that are not using an FXM5 Field Regulator. An FXM5 can reduce energy waste even more as Field stand-by current can be reduced even further (80% or more) and still achieve the benefits mentioned above – plus most fixed field supplies over dissipate the field (ie usually you will measure 330vdc on 490vac drives) which is a constant waste of at least 20% whenever the drive is running. As a result in combination, these reductions permit an even quicker payback period. See [CTAN138](#) for FXM5 setup



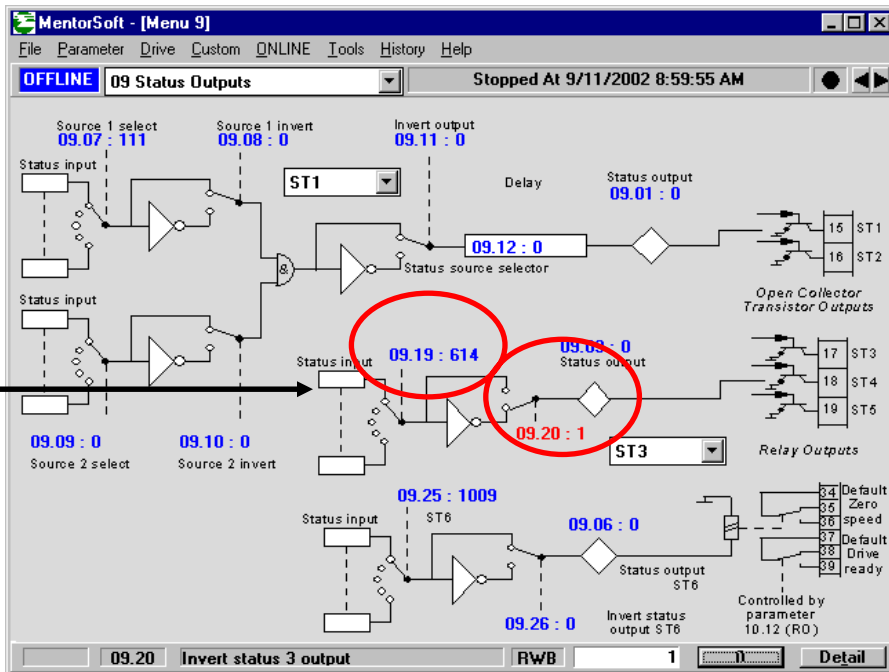
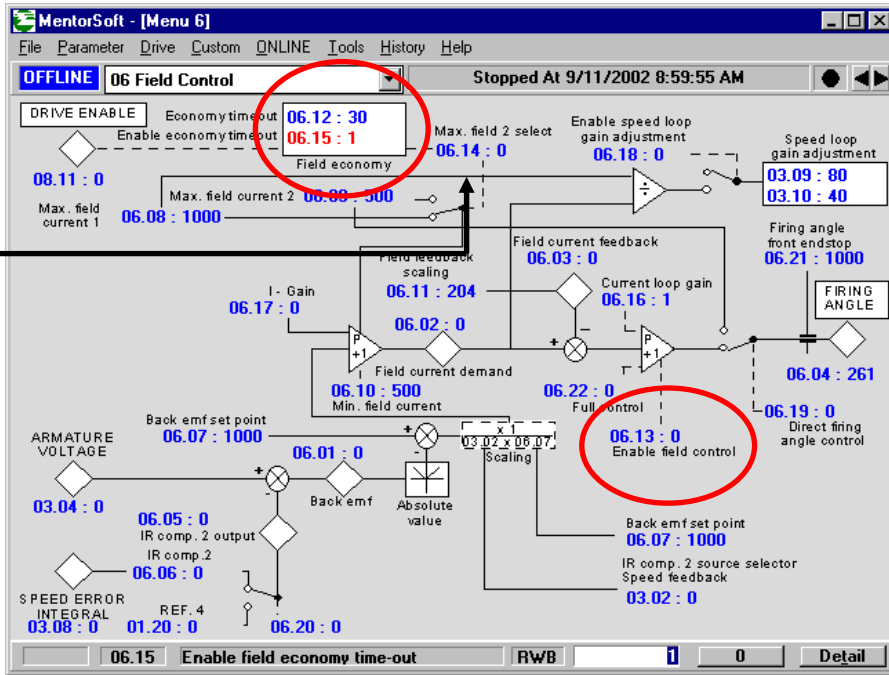
An exception to the above is when the drive is set up for the “European” field voltage setting (see [CTAN152](#) for more details on this topic). With the European wiring configuration, when the field economy contact is opened, the field voltage is reduced to zero. This will still save money but does not have the advantage of keeping the motor warm and dry.

The simplest method of providing field economy is to close the field economy contact when the drive run contact is closed (requesting full field) and open the contact when the run contact is opened (for reduced field). This is fine for many applications (extruders for example) but may not be the best for others. If the system utilizes either jog and/or dynamic braking, an off delay in the field economy is needed to maintain full motor field during the dynamic braking period and to prevent the motor contactor from needlessly opening and closing during “machine gun” jog operation. For information on contactorless jog or “machine gun” jog operation click -> [CTAN 139](#) or:

http://www.emersonct.com/download_usa/appNotes/ctan139.pdf

The relay used for Field Economy must be properly sized with respect to voltage and current ratings. A recommended relay is given on page 3.

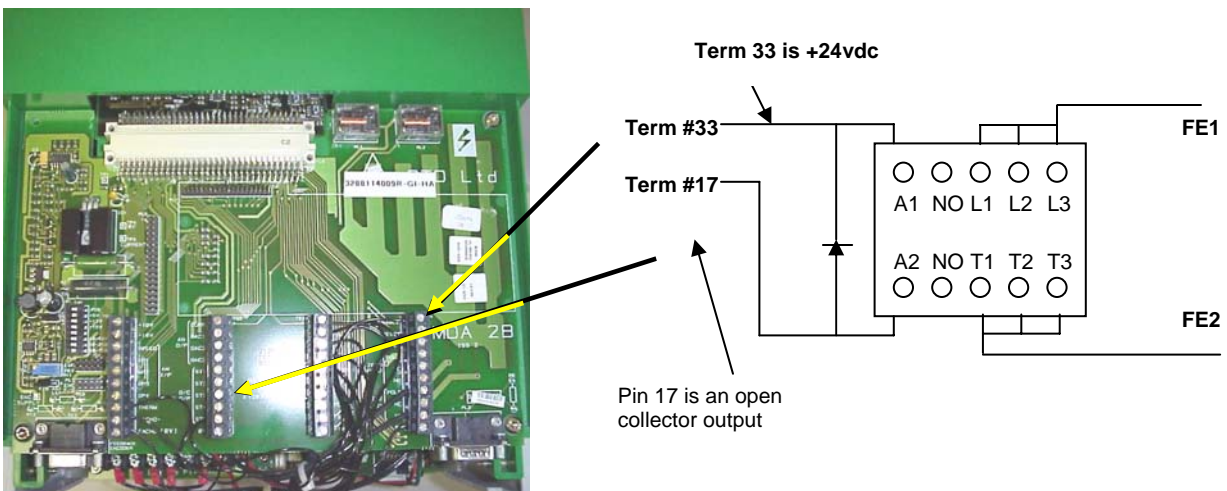
BASIC SETUP



Under normal circumstances menu 6, the field current regulator menu is not used with the Size 2 and 3 Quantum III's and Mentor II's (except when used with the FXM5 field regulator). Even though parameter #6.13 is not set to a 1 (enable field control), the field economy software is still fully functional as long as parameter #6.15 (enable field economy timeout) is set to a 1. Parameter #6.12 sets the field economy time delay (the default time is 30 seconds).

For this implementation, a logic output is tied to bit parameter #6.14. When the drive is dropped out of run or jog, this bit toggles from a "0" to a "1" after the time delay set by parameter #6.12 expires. This causes the field economy relay to drop out, thus reducing the applied field voltage by opening the FE1 / FE2 connection (L11 / L12 on Mentor II's). When run or jog is initiated, the bit changes instantly restoring the field to full voltage.

A suitable relay for FF is available from **Control Techniques Service Center**. It can be driven directly by the Quantum III / Mentor II and comes complete with the "flyback" diode installed. The physical size is approximately 2.25" x 2.25" which allows it to be mounted directly on the drive panel. The wiring configuration is shown below.

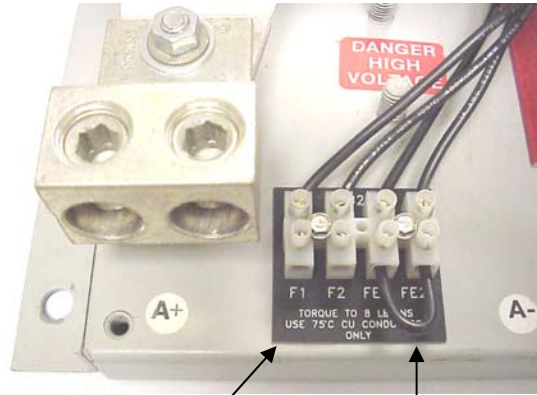
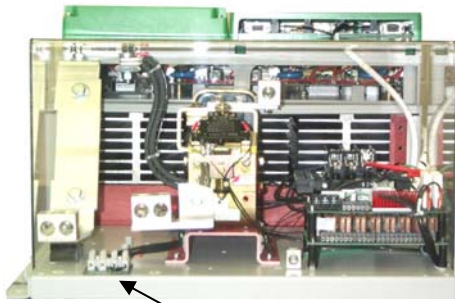


**Field Economy Kit
P/N FLD-ECON-KIT**

These components are stocked and sold through the North American Service Center

To order please contact sales @ **716-774-1193**

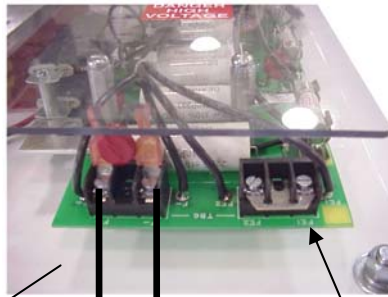
Quantum Size 2 Field Economy Connection



Field Connections
10A Max on Size 2 Quantum

Remove Jumper and
install Relay contact
between FE1 and FE2

Quantum 3 Field Economy Connection



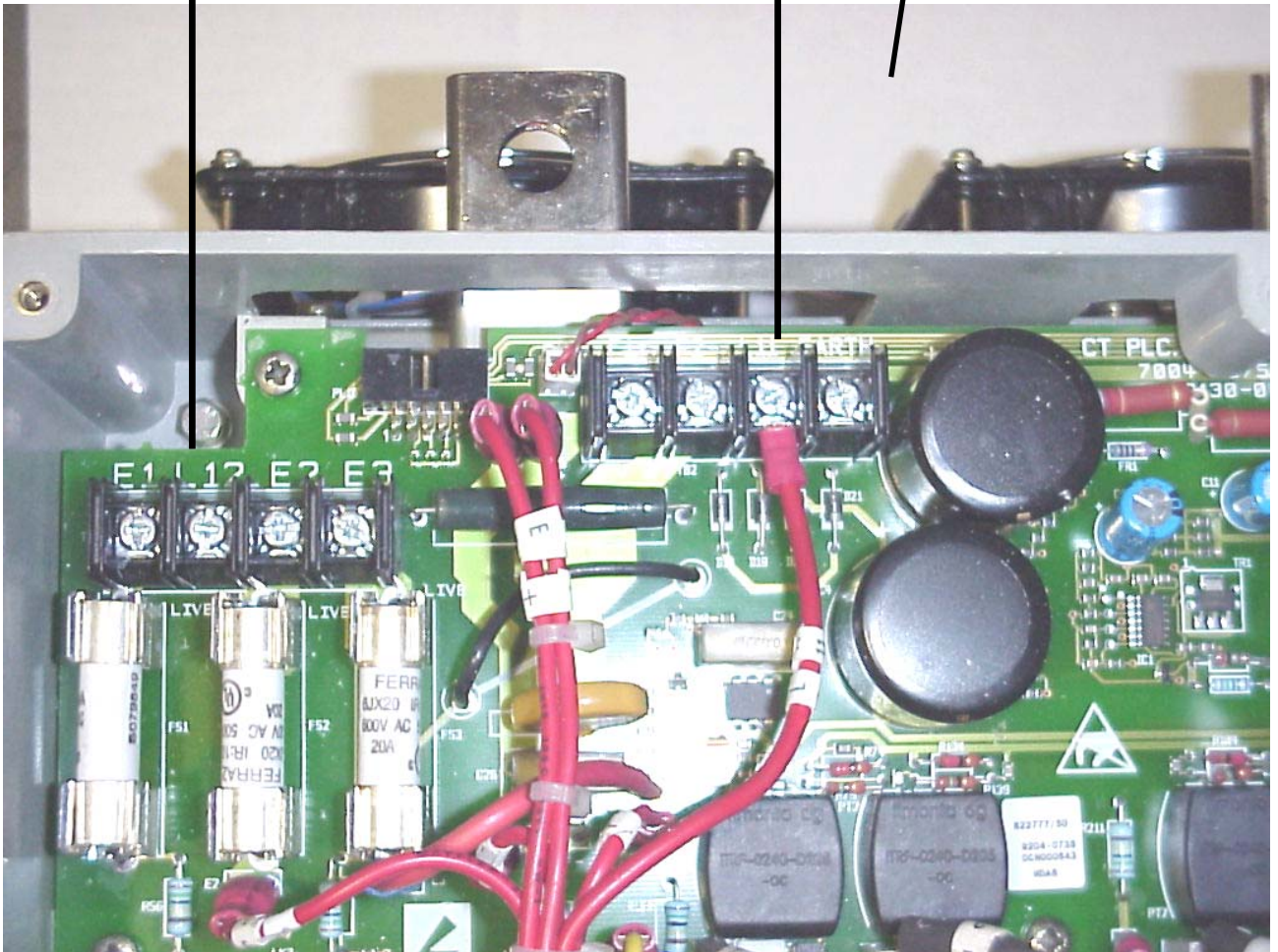
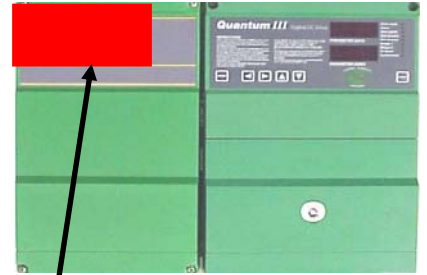
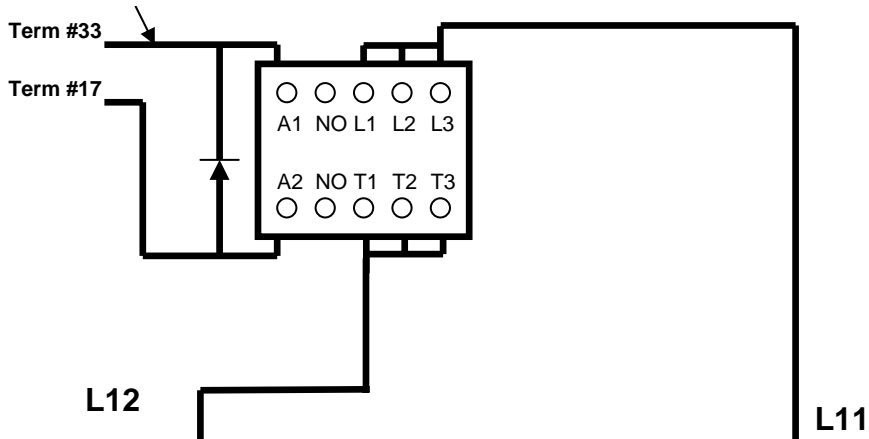
F+ F-

Field Connections
20A Max
on Size 3 Quantum

Remove Jumper and
install Relay contact
between FE1 and FE2

Mentor II Field Economy Connection

Term 33 is +24vdc



Testing the Field Economy Circuit

After installing the field economy relay, the circuit should be tested for proper operation. This can easily be done without running the drive. After powering up the drive, connect a voltmeter across the motor field connections, **F1 (+)** and **F2 (-)**. The table below shows the various full field and field economy voltage levels based on line voltage. Keep in mind that diode bridges generate the supply by rectifying the available line voltage and therefore the voltages in the table may deviate based on the actual line voltage.

Press the Reset Button on the front of the Quantum III / Mentor II faceplate. The field voltage should jump to the full field level and then drop to the field economy level after the time-out period set by parameter # 6.12. If the drive is set for the European setting, the field economy voltage level is always 0 VDC.

Input Line Voltage	"single phase rectification" <i>European setting</i> F- jumper to EF- position	"two phase rectified into the third phase" <i>North American setting</i> F- jumper to E3 position	
		<i>Full Field Setting</i>	<i>Field Economy Setting</i>
240vac	216vdc	150vdc	108vdc
380vac	342vdc	256vdc	171vdc
480vac	432vdc	300vdc	216vdc

Measured Field Voltages must be with some load. Open circuit voltages will read up to 600vdc. Refer to [CTAN152](#) for more details on programming for European / North American jumper settings.

Questions: Ask the author ??

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