2.1 ELECTRICAL SPECIFICATIONS

2.1.1 Main AC Supply—3 Phase, 3 Wire, Jumper Selectable

50 Hz	60 Hz
208V -5%	208V -5%
208V +10%	208V +10%
240V -10%	240V -10%
240V +10%	240V +10%
380V -10%	380V -10%
380V +10%	380V +10%
415V -10%	415V -10%
415V +10%	415V +10%
480V -10%	480V -10%
480V +10%	480V +10%

Line Frequency
Variations: 45 to 62 Hz Auto Tracking

MAXIMUM RECOMMENDED MOTOR VOLTAGES:

Supply Voltage	Field Voltage	Arm. Voltage Single-Ended (Motor Only)	Arm. Voltage Four-Quadrant (Regenerative)
230	150	250	250
380	240	440	440
415	300	460	460
460	310	510	510
480	320	530	530

2.1.2 Speed Resolution

Reference	Feedback	Total
analog 0.025%	arm 0.83 V	0.83 V
analog 0.025%	tach 0.1%	0.125%
digital 0.0%	tach 0.1%	0.1%
analog 0.025%	encoder 0.01%	0.035%
digital 0.0%	encoder 0.0%	0.0%*
encoder 0.0%	encoder 0.0%	0.0%*

*Using Digital Lock in Menu 13

2.1.3 Response Times

Analog speed input TB1-3 has a voltage to frequency converter which requires 13 milliseconds to acquire sufficient pulses for an update.

GP-1 and GP-2 are updated six (6) times per cycle, 2.8 milliseconds @ 60 Hz. GP-3 and GP-4 are updated three (3) times per cycle, 5.6 milliseconds @ 60 Hz.

The Tachometer and Encoder feedback are both updated six (6) times per cycle, 2.8 milliseconds @60 Hz.

The current loop is updated twelve (12) times per cycle, 1.38 milliseconds @60 Hz.

2.2 ENVIRONMENT:

Operating ambient temperature range:

0°C to +55°C (32°F to +131°F) at chassis

Storage temperature range:

-40°C to +55°C (-40°F to +131°F)

Altitude Derating:

Rated altitude: 3300 ft
Derate linearly by 1% per 330 ft above 3300 ft
Maximum relative humidity: 85% (non-condensing).

Overtemperature protection:

An overtemperature thermostat is installed on all fan cooled models, and is connected to the control circuit through a 2-pin connector located on the power board (PL18 on the MDA6 and PL2 on all other models). If the heatsink temperature exceeds 100°C, parameter 10.22 changes state to a logic 1 and shuts down the Quantum III, indicating an "Oh" overheat fault for all fan cooled controls. Parameter 10.33 should be set to "0" to enable this circuit. This change should be stored along with any other parameter changes.

Parameter #10.33 = 1 on models 9500-8X02, 9500-8X03 only.

2.3 POWER CIRCUIT:

Armature converter:

3 phase fully controlled six pulse SCR bridge. Available in both single ended (9500-8302 through -8320) six SCR and fully regenerative four quadrant (9500-8602 through -8614) inverse parallel twelve SCR bridge configurations.

Field supply:

8A current regulated, suitable for field weakening and field economy, on 5-100 HP (9500-8X02 to 9500-8X06)

10A on 125-400 HP (9500-8X07 to 9500-8X11) } Fixed voltage supply

20A on 500-1000 HP (9500-8315 to 9500-8320 and 9500-8612 to 9500-8614) } Rectified DC

Electrical isolation:

Low voltage control electronics to AC supply and ground. Impedance isolation of 1M ohm to electronics common. If desired, the control electronics may be grounded. However, this practice is not recommended because of the risk of erroneous signals being received by the drive if a ground fault occurs in the control wiring.

2.4 STATUS RELAY OUTPUTS

Please refer to the following TB1 terminals on the 9500-4025 board. These terminals are shown in Figure 9-1.

Terminals 13,14 - Run contact closes when drive is in Run or Jog.

Terminals 15,16 - NF (No Fault) - Relay picks up when drive is powered-up and no faults exist. Note that there will be a short time delay after power is first applied before this relay picks up. This is due to the drive self diagnostics routine which occurs after power is applied to the drive. No fault contacts shown in de-energized state. The relay will drop out when a drive fault occurs. This contact will also drop out momentarily during a drive reset. Can be selected as an N/O or N/C contact by JP2.

Terminals 17,18 - FR (System Fault) relay incorporates blower motor aux, motor thermal and other external interlocks--wired to TB1-1 through TB1-4. Can be selected as an N/O or N/C contact by JP3.

Terminals 19,20, 21 -   PGM1 (Programmable Relay) defaulted to reverse. Form C contacts--wired to TB1-19,20,21.

Terminals 22,23 - PGM2 (Programmable Relay) defaulted to drive reset. Can be selected as an N/O or N/C contact by JP4. Wired to TB1-22 and 23.

Contact Rating - 5 amps at 115 VAC
5 amps at 5 VDC

2.5 CONTROL INPUTS AND OUTPUTS
(REFER TO FIGURE 9-1)

Logic Inputs

Twelve (12) control logic inputs are provided, six(6) of which are user programmable. Logic inputs may be operated from open collector outputs or dry contacts and are individually selectable as an active high of +24 VDC or an active low of 0 VDC. They are defaulted as an active high and controlled by SW1A on the MDA-2 pcb.

Location MDA2	Description	Type
TB3-21	Run Permit	Dedicated
TB3-22	Reference On	Dedicated
TB3-23	Jog	Dedicated
TB3-24	Reverse	Programmable
TB3-25	Unassigned	Programmable
TB3-26	System Fault	Dedicated
TB3-27	Unassigned	Programmable
TB3-28	Unassigned	Programmable
TB3-29	Unassigned	Programmable
TB3-30	Unassigned	Programmable
TB4-31	Enable	Dedicated
TB4-32	Reset	Dedicated

Control Input Ratings

Maximum voltage   -.5 VDC to +35 VDC

Switching Characteristics   Maximum Low Voltage +2VDC Minimum High Voltage +4VDC

Analog Inputs

Location MDA2	Description	Type
TB1-3	Speed reference ±10VDC 100K input impedance or 20mA, both have 12 bit resolution	Programmable
TB1-4,5,6,7	Analog inputs ±10VDC 100K input impedance, 10 bit resolution	Programmable

Location 9500-4030	Description	Type
TBS-1,3	HP shunt resistor-- all drives are defaulted to 5 HP at 480 VAC rating. This resistor selects proper rating. See Figure A-1 for values.	Dedicated
TBS-4,5	Motor thermal input	Dedicated
TBA-1,2,3	AC or DC Tach input on Tach interface board, P/N 9500-4030. Jumper selectable by JP4 and JP5.	Dedicated

Logic Outputs

Location MDA2	Description	Type
TB2-15 to 18	Open collector, 100mA, 24VDC	Programmable
TB2-37 to 39	Drive Ready, Form C Relay	Dedicated
TB2-34 to 36	Unassigned Form C Relay Defaulted to zero speed	Programmable

Logic Control Output Ratings

Maximum current sinking	100 mA
Contact rating	5 amp @ 5VDC
	5 amp @ 115VAC

Analog Outputs (4)

Location MDA2	Description	Type
TB2-11	Armature Current 0-6.6V Unipolar 6.6V = 150% I	Dedicated
TB2-12 to 14	Unassigned 0 ± 10V Bipolar	Programmable

Analog Outputs—5mA

Encoder Connections

Encoder must be dual channel, 100 KHz maximum, with quadrature.

Location	Description	Type
PL4-1	0	Reference
PL4-2	NC	"
PL4-3	A	"
PL4-4	A	"
PL4-5	B	"
PL4-6	B	"
PL4-7	NC	"
PL4-8	C	"
PL4-9	C	"
PL4-10	0V	"
PL3/SK3 -1	0	Feedback
-2	Supply	"
-3	A	"
-4	A	"
-5	B	"
-6	B	"
-7	NC	"
-8	C	"
-9	C	"
-10	0V (not SK3)	"

PL4 is a 10 pin header.
PL3 is a 10 pin header connected in parallel with SK3.
SK3 is a 9 pin D type female connector for the feedback encoder.

Communications

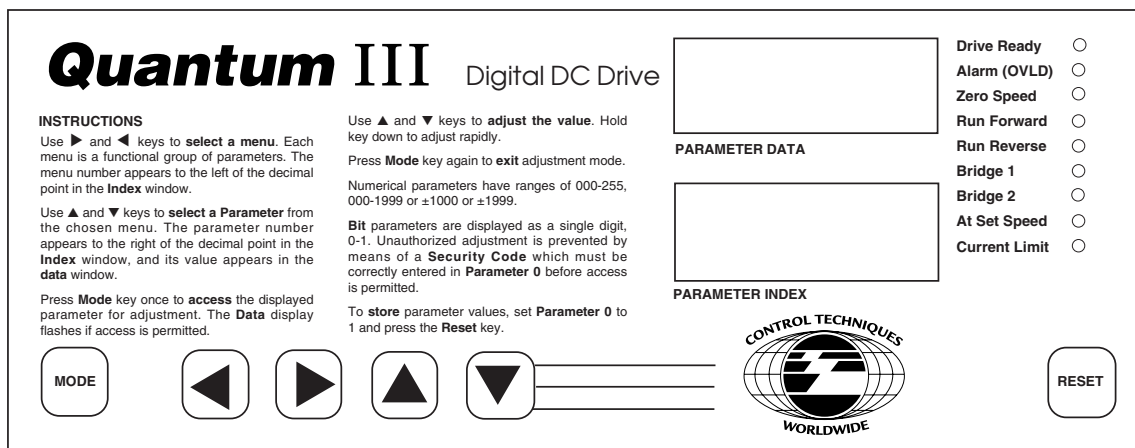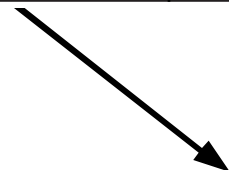| Location	Description	Type
PL2-1	0V isolated	Serial Comm
PL2-2	$\overline{TX}$	"
PL2-3	$\overline{RX}$	"
PL2-4	NC	"
PL2-5	NC	"
PL2-6	TX	"
PL2-7	RX	"
PL2-8	NC	"
PL2-9	NC	"

PL2 is a 9 pin D type male connector.

LED Status Indicators

Nine LEDs to the right of the parameter data and index panels present information, continuously updated, about the running condition of the drive and enable basic information to be seen at a glance.

The status LEDs (except for the Drive Ready LED) may be alternatively configured in software for special applications. (See description of parameters 11.21 and 11.22 in section 10.)

LED Illuminated	Information
Drive ready	The drive is turned on, not tripped.
Drive ready—flashing	The drive is tripped.
Alarm—flashing	The drive is in an overload trip condition, or is integrating in the I x T region.
Zero speed	Motor speed < zero speed threshold (programmable).
Run forward	Motor running forward.
Run reverse	Motor running in reverse.
Bridge 1	Output bridge 1 is enabled.
Bridge 2	Output bridge 2 is enabled (inactive in 1-quad drives).
At speed	Motor running at the speed demanded by the speed reference.
Current limit	Drive running and delivering maximum permitted current.

Quantum III Digital DC Drive

INSTRUCTIONS

Use ▶ and ◀ keys to **select a menu**. Each menu is a functional group of parameters. The menu number appears to the left of the decimal point in the **Index** window.

Use ▲ and ▼ keys to **select a Parameter** from the chosen menu. The parameter number appears to the right of the decimal point in the **Index** window, and its value appears in the **data** window.

Press **Mode** key once to **access** the displayed parameter for adjustment. The **Data** display flashes if access is permitted.

Use ▲ and ▼ keys to **adjust the value**. Hold key down to adjust rapidly.

Press **Mode** key again to **exit** adjustment mode.

Numerical parameters have ranges of 000-255, 000-1999 or ±1000 or ±1999.

Bit parameters are displayed as a single digit, 0-1. Unauthorized adjustment is prevented by means of a **Security Code** which must be correctly entered in **Parameter 0** before access is permitted.

To **store** parameter values, set **Parameter 0** to 1 and press the **Reset** key.

PARAMETER DATA

PARAMETER INDEX

Drive Ready ○
Alarm (OVLD) ○
Zero Speed ○
Run Forward ○
Run Reverse ○
Bridge 1 ○
Bridge 2 ○
At Set Speed ○
Current Limit ○

MODE ◀ ▶ ▲ ▼

CONTROL TECHNIQUES WORLDWIDE

RESET

2.6 CONFIGURATION SOFTWARE

MentorSoft, the Quantum III's configuration software is a Windows™ based package that allows the user to select drive operating modes and adjustment parameters for drive configuration. This program uses a window-style, menu driven program environment and can be set up for color or monochrome monitors. This program permits the user to configure a drive or series of drives in an office environment and save the resultant setup to disk. This file can be printed out for a permanent hard copy record and later "downloaded" into the Quantum drive. A drive configuration can be "uploaded" at any time and saved to disk so that drive settings can be recorded and printed. MentorSoft permits the user to set-up identical duplicates or "cloned" replacement drives in seconds.

The major functions handled by the drive support software are:

- Drive Configuration
  - Scaling
  - Feature Selections
  - I/O Selections

- Register Monitoring
  - Setpoints and Feedback Quantities
  - I/O Status

This permits the following:

Drive Configuration in Office Environment:

For the convenience of not having to power up the drive or leave your office to pre-engineer a drive configuration for your application.

Drive Configuration to be Saved to Disk or Printer:

For a permanent record and documentation.

Resulting Configuration to be Downloaded in Test

Drive Configuration can be Uploaded and Saved:

After the drive application passes through test and all configuration touch-ups are completed, the final drive setup information can be uploaded and saved.

Drive Cloning for Identical Duplicate Spares:

In this manner, should a drive need to be replaced or a duplicate system be created, the original drive data file can be retrieved from disk and downloaded into the replacement clone.

Remote Control of Drive via Communication:

This becomes a convenient feature when starting up or performing machine maintenance. The Quantum III can be remotely controlled by severing hard-wired start/run inputs and analog references and controlling the drive remotely using MentorSoft communications.

Remote Drive Monitoring

This function is particularly useful during drive setup. MentorSoft permits you to monitor logic conditions as well as drive dynamic variables and simultaneously adjust internal parameters.

Also see Section 11.1