

Mentor II

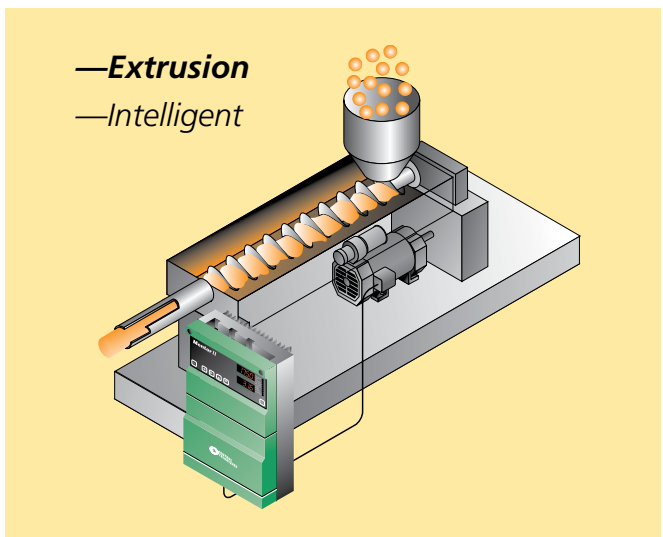
The Intelligent DC Drive

DC drives are widely used in applications that require regeneration, precise speed control, dynamic performance, and constant torque over wide speed ranges. The Mentor II delivers the universal DC drive solution.

Simple stand-alone applications are easily configured to control motor speed, voltage or current using standard internal settings. Set-up is convenient using the drive keypad, or MentorSoft, a Windows™-based drive configuration tool. The Mentor II has extensive diagnostic and communication abilities that enhance system reliability. The drive's standard yet powerful microprocessor is a versatile system component that can eliminate the need for a PLC with integral functions such as thresholds, timers and logic gates that perform basic control.

The simple addition of the MD29, a 32-bit application coprocessor card, provides high performance drive systems with local intelligence for true distributed control. The MD29 enables users to incorporate custom or proprietary process control application programs to their drive. The Mentor II also provides a wide range of communication protocol options.

Mentor II systems have proven to be extremely reliable and are ideally suited to web handling, winders, slitters, extruders, wire drawing, converting lines, and plastics production. The Mentor II's integrated design and highly programmable features make it an ideal choice for OEMs and System Integrators, as well as replacement or retrofit drives for End Users.



- Microprocessor Based Digital DC Drive
- 5 to 1000 hp, 3 phase, 208 to 660 VAC input
- Regenerative and non-regenerative models
- RS485 serial communications
- Extensive fieldbus communication capabilities
- Plug-in 32-bit application coprocessor card (MD29)
- MentorSoft Windows-based drive configuration tool
- Complete Motor Solutions



Mentor II



Note: UL only available through 400 hp @ 460V and 200 hp @ 230V

FEATURE/PERFORMANCE ADVANTAGE

Accepts wide range of supply voltage (208 to 660 VAC)

Can be applied to worldwide voltages

Non-regen and regen models share the same footprint up to M825

Allows for common mechanical design and mounting

MentorSoft Windows-based drive configuration tool

Provides easy programming and diagnostics of the drive

32-bit application coprocessor card (MD29)

Enables customized applications for distributed control system architectures

Profibus-DP, Modbus Plus, Modbus RTU, Interbus-S, DeviceNet, and CTNet plug-in communication cards

Communicates on user's preferred network

Built-in RS485 serial communications

Allows for easy programming and control of drive

Extensive and configurable analog and digital I/O

Customizes drive to specific applications

Programmable boolean logic (AND, NAND, OR, NOR) gates with delay outputs

Assists with general system interface logic needs, expanding application possibilities

Programmable threshold comparators

Expands application possibilities by providing a pair of independent numerical comparators with adjustable hysteresis

Accepts DC tachometer and encoder feedback

Enables precise speed control

Built-in digital lock function for frequency following

Allows accurate master/follower applications
Includes reference encoder connector

Extensive diagnostics and fault indicators

Special Field supply option

Three Phase Input (208-230 VAC)	Field Output (240 VDC)
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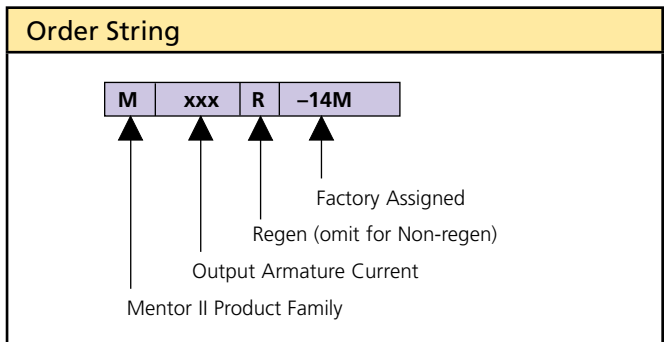
RATINGS: MENTOR II

THREE PHASE INPUT	DC Arm Output	Field Output
3 to 500 hp (208-230 VAC)	(240 VDC)	(150 VDC)
5 to 1000 hp (380-460 VAC)	(500 VDC)	(300 VDC)
Special Order (525 / 660 VAC), Models M350(R)-M1850(R) only		

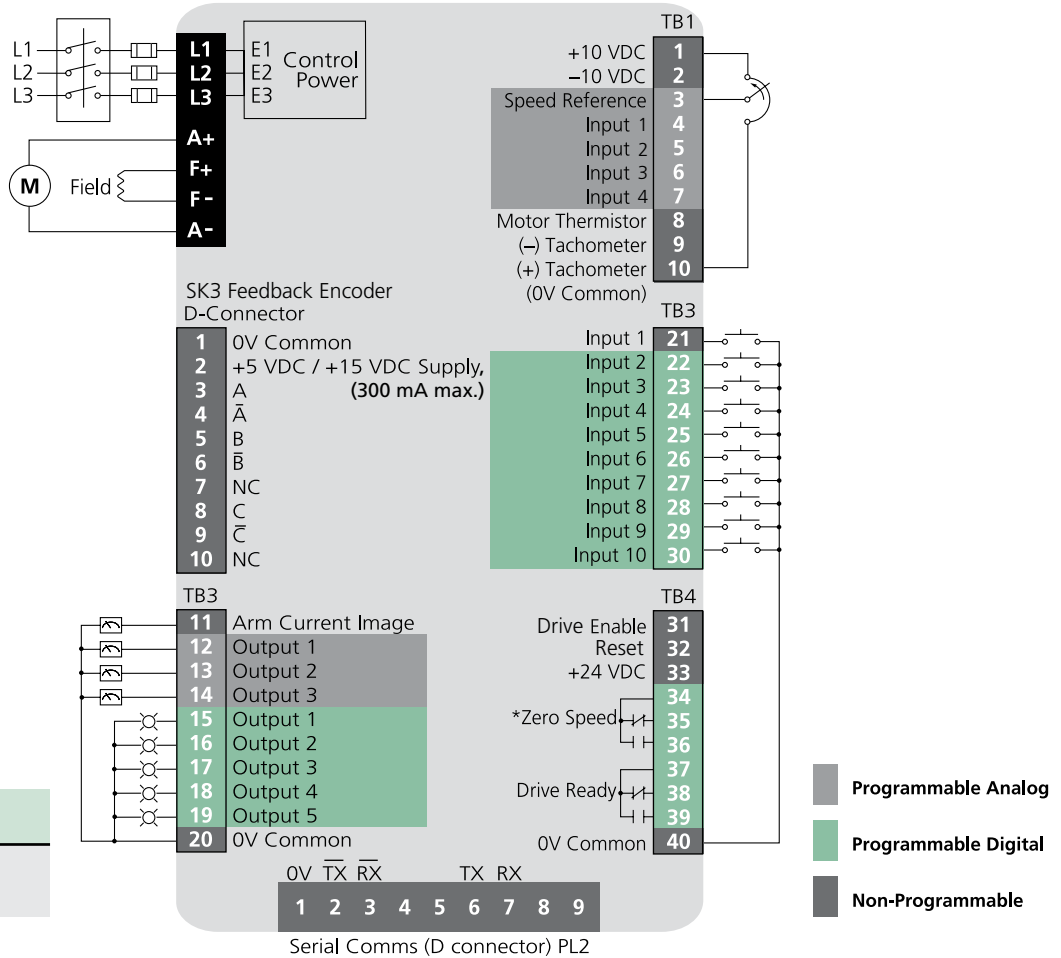
208 / 240 VAC					
Motor HP	Output Current (A) (@40°C)	Output Current (A) (@55°C)	Field Output Current	Non-Regen Order Code	Regen Order Code
3 - 7	25	20	8A Current Regulated	M25-14M	M25R-14M
7.5 - 10	45	38		M45-14M	M45R-14M
15	75	55		M75-14M	M75R-14M
20 - 35	105	89		M105-14M	M105R-14M
30	155	125		M155-14M	M155R-14M
40 - 50	210	172	10A Fixed Voltage ①	M210-14M	M210R-14M
75	350	255		M350-14M	M350R-14M
100	420	338		M420-14M	M420R-14M
125	550	428		M550-14M	M550R-14M
150	700	508		M700-14M	M700R-14M
200	825	675	20A Fixed Voltage ①	M825-14M	M825R-14M
250	900	820		M900-14M	M900R-14M
300 - 350	1200	1150		M1200-14M	M1200R-14M
400 - 500	1850	1620		M1850-14M	M1850R-14M

380 / 480 VAC					
Motor HP	Output Current (A) (@40°C)	Output Current (A) (@55°C)	Field Output Current	Non-Regen Order Code	Regen Order Code
5 - 10	25	20	8A Current Regulated	M25-14M	M25R-14M
15 - 20	45	38		M45-14M	M45R-14M
25 - 30	75	55		M75-14M	M75R-14M
40 - 50	105	89		M105-14M	M105R-14M
60 - 75	155	125		M155-14M	M155R-14M
100	210	172	10A Fixed Voltage ①	M210-14M	M210R-14M
150	350	255		M350-14M	M350R-14M
200	420	338		M420-14M	M420R-14M
250	550	428		M550-14M	M550R-14M
300	700	508		M700-14M	M700R-14M
400	825	675	20A Fixed Voltage ①	M825-14M	M825R-14M
500	900	820		M900-14M	M900R-14M
600 - 700	1200	1150		M1200-14M	M1200R-14M
800 - 1000	1850	1620		M1850-14M	M1850R-14M

① For field control, add external field regulator P/N 9500-9035.



TERMINAL DIAGRAM: MENTOR II



NOTE

* Zero Speed Relay Programmable.

Mentor II

Terminal Description

Pin#	Function	Type/Description	Notes
1	+10 VDC	Reference Supply	10 mA max
2	-10 VDC		
3	Speed Reference	Analog Input, 12 bit	± 10 VDC, 100 kOhms or 4-20 mA, 100 Ohms
4	Analog Input # 1	Analog Input Bi-polar, 10 bit + sign	± 10 VDC, 100 kOhms
5	# 2		
6	# 3		
7	# 4		
8	Motor Thermistor	Analog Input	3k Ohms trip point, 1.8k Ohm reset level
9	DC Tachometer (-)	Analog Input	
10	DC Tachometer (+)	Circuit Common	
11	Armature Current Image	Analog Output	6.6 VDC @ 150% current
12	Analog Output # 1	Analog Output Bi-polar, 10 bit + sign	± 10 VDC, 5 mA
13	# 2		
14	# 3		
15	Digital Output # 1	Digital Output Open Collector	+24 VDC, 100 mA
16	# 2		
17	# 3		
18	# 4		
19	# 5		

Pin#	Function	Type/Description	Notes
20	0V Common	Circuit Common	
21	F1 (Run Permit)	Digital Input	+24 VDC, 10 kOhms
22	F2 (Inch / Jog Reverse)	Digital Input	+24 VDC, 10 kOhms
23	F3 (Inch / Jog Forward)		
24	F4 (Run Reverse (latched))		
25	F5 (Run Forward (latched))		
26	Digital Input F6		
27	F7		
28	F8		
29	F9		
30	F10		
31	Drive Enable		
32	Reset	Digital Input	Fault Reset
33	+24 VDC Supply	User Supply	200 mA max
34	Form C Status Relay (Zero Speed)	Relay Common	110 VAC, 5A resistive
35		N. C. Contact	
36		N. O. Contact	
37	Form C Status Relay (Drive Ready)	Relay Common	110 VAC, 5A resistive
38		N. C. Contact	
39		N. O. Contact	
40	0V Common	Circuit Common	

Programmable Analog Programmable Digital All Analog I/O is scalable

SPECIFICATIONS: MENTOR II

Environment

Ambient Operating Temperature	0 to 40°C (32 to 104°F) Derate current 1.5% per °C to 55°C (32 to 131°F)
Cooling Method	Convection and forced convection, model dependent
Humidity	95% non-condensing at 40°C (104°F)
Storage Temperature	-40 to 55°C (-40 to 131°F)
Altitude	0 to 4000 m (13,120 ft). Derate 1% per 100 m (328 ft) between 1000 m (3,280 ft) and 4000 m (13,120 ft).
Enclosure	Chassis (IP00)

AC Supply Requirements

Voltage	208 to 480 VAC -5%, +10% 525/575/660 VAC ±10% (Optional M350 and above)
Phase	3Ø
Frequency	45 to 62 Hz
Efficiency	98%
Standard Field Output Voltage	Size 1 – 0.9 X input VAC (Regulated), Size 2-3 – .67 X input VAC (Non-Regulated) Non-Standard Field – Consult Factory
Armature Output Voltage	Non-Regen – 1.15 X input VAC, Regen – 1.05 X input VAC

Control

Feedback Methods	Armature Voltage (resolution .83 volts) DC Tachometer (resolution 0.1%) Encoder (resolution .01%)
Field Control	Current regulated 8 Amps max (M210/M210R and smaller) Voltage regulated .675 or .9 X Line-to-line voltage (M350/M350R and larger)
Analog Input Resolution	12-bit (Qty 1), 10-bit (Qty 4)
Serial Communications	4-wire RS422 or RS485, optically-isolated Protocol is ANSI x 3.28-2.5-A4 Baud rate is 4800 or 9600

Protection

AC Line Undervoltage Trip	180 VAC
MOV Voltage Transient Protection	Input transient suppression
Instantaneous Overcurrent Trip	300% armature current
Armature Open Circuit	Armature circuit is open
Drive Overload Trip	Inverse time, 150% for 30 seconds
Phase Loss Trip	Loss of input phase
Overtemperature Trip	Heatsink exceeds 100°C (212°F)
Motor Thermal Trip	Motor over-temp switch or Thermistor
Feedback Loss	Loss of motor feedback
Feedback Reversal	Tachometer or Encoder wired backwards
Field Loss	No field current
Field On	Field current during auto-tune
Field Overcurrent	Field current greater than field demand
Current Loop Loss	Loss of 4-20 mA reference
External Power Supply	Short circuit on +24 VDC user power supply
Power Supply	Internal power supply out of tolerance

Protection *continued*

Serial Communications Loss	Mode 3 serial comms data loss
Processor 1 Watchdog Trip	Main control processor fault
Processor 2 Watchdog Trip	Second control processor fault (MD29)
Hardware Fault	Hardware malfunction on control board
Memory Fault	Stored parameter checksum fault
External Trip	User interlock fault (programmed)
Software Fault (A29)	MD29 software fault

Approvals & Listings

UL, cUL	File #E58592 Vol. 5C Section 1 (M25 to M825 and M25R to M825R)
CE	Designed for marking

DIMENSIONS



Mentor II

Size	Order Code	Size* (in) H x W x D	Approx. Weight (lbs.)
1	M25-14M thru M75-14M	15 x 10 x 6	22
	M25R-14M thru M75R-14M	15 x 10 x 6	24
	M105-14M thru M210-14M	15 x 10 x 8	31
	M105R-14M thru M210R-14M	15 x 10 x 8	33
2	M350-14M thru M420-14M	16 x 18 x 11	48
	M350R-14M thru M420R-14M	16 x 18 x 11	51
	M550-14M thru M825-14M	17 x 18 x 11	59
	M550R-14M thru M825R-14M	17 x 18 x 11	66
3	M900-14M thru M1850-14M	41 x 18 x 20	154
	M900R-14M thru M1850R-14M	61 x 18 x 20	264

* Approximate, not to be used for construction purposes.

Quantum III

Compact DC Drive Package

The Quantum III delivers a DC drive package that integrates the intelligence of the Mentor II with a space saving design that incorporates many accessories typically required in the North American market.

Quantum III drives are ready to install and run DC motors. Like the Mentor II, they are easily configurable to control motor speed, voltage or current using standard internal settings. Set-up is convenient using the drive keypad, or MentorSoft, a Windows™-based drive configuration tool. These drives have powerful diagnostic and communication abilities.

The simple addition of the MD29 applications card enables users to incorporate custom or proprietary process control application programs to their drive. The Quantum III also provides extensive communication protocol options.

The powerful microprocessor based Mentor is the central component of the Quantum package. The integrated design includes fuses, a DC loop contactor, and 115 VAC interface logic control, making it an ideal choice for end users with space constraints. The Quantum III offers a compact DC package solution. You'll also find the Quantum III on OEM equipment and integrated systems.

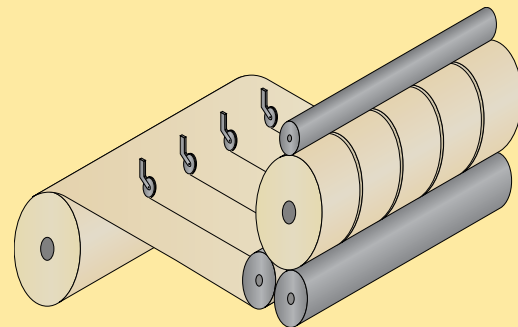
DC drive technology has proven to be extremely reliable and is ideally suited to web handling, winders, slitters, extruders, wire drawing, converting lines, and plastics production. The Quantum III meets the many requirements of these industries.

In addition to the features of the Mentor II, the Quantum III drive includes:

- High speed semiconductor fusing
- 115 VAC control interface
- DC loop contactor
(with DB pole up to 250 hp @ 480 VAC)
- Accepts AC or DC tachometer feedback, and encoder feedback
- DC output fuse on all regen models



—*Slitter*
—*DC Drive Package*



- Microprocessor Based Digital DC Drive
- 5 to 1000 hp, 3 phase,
208 / 230 / 380 / 480 VAC input
- Regenerative and non-regenerative models
- RS485 serial communications
- Extensive fieldbus communication capabilities
- Plug-in 32-bit application coprocessor card (MD29)
- MentorSoft, Windows-based drive configuration tool
- Complete Motor Solutions



Note: UL only available through 400 hp @ 460V and 200 hp @ 230V

FEATURE/PERFORMANCE ADVANTAGE

High-speed semiconductor fusing

Provides short circuit protection for SCRs

DC loop contactor (with DB pole up to 250 hp @ 480 VAC)

Enables easy addition of dynamic braking resistors

115 VAC control interface

Allows use with standard remote operator devices

Profibus-DP, Modbus Plus, Modbus RTU, Interbus-S, DeviceNet, and CTNet plug-in communication cards

Communicates on user's preferred network

Programmable threshold comparators

Expands application possibilities by providing a pair of independent numerical comparators with adjustable hysteresis

Extensive and configurable analog and digital I/O

Customizes drive to specific applications

Programmable boolean logic (AND, NAND, OR, NOR) gates with delay outputs

Assists with general system interface logic needs, expanding application possibilities

Built-in digital lock function for frequency following

Allows accurate master / follower applications

Accommodates AC or DC tachometer and encoder feedback

Enables precise speed control

Extensive diagnostics and fault indicators

Used for accurate drive system diagnosis

Accepts wide range of supply voltage (208 to 480 VAC)

Can be applied to worldwide voltages

Non-regen and regen models share the same footprint

Provides for common mechanical design and mounting

Special Field supply option

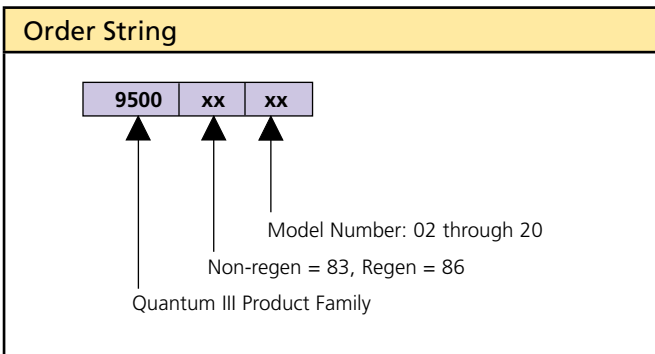
Three Phase Input (208-230 VAC)	Field Output (240 VDC)
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RATINGS: QUANTUM III

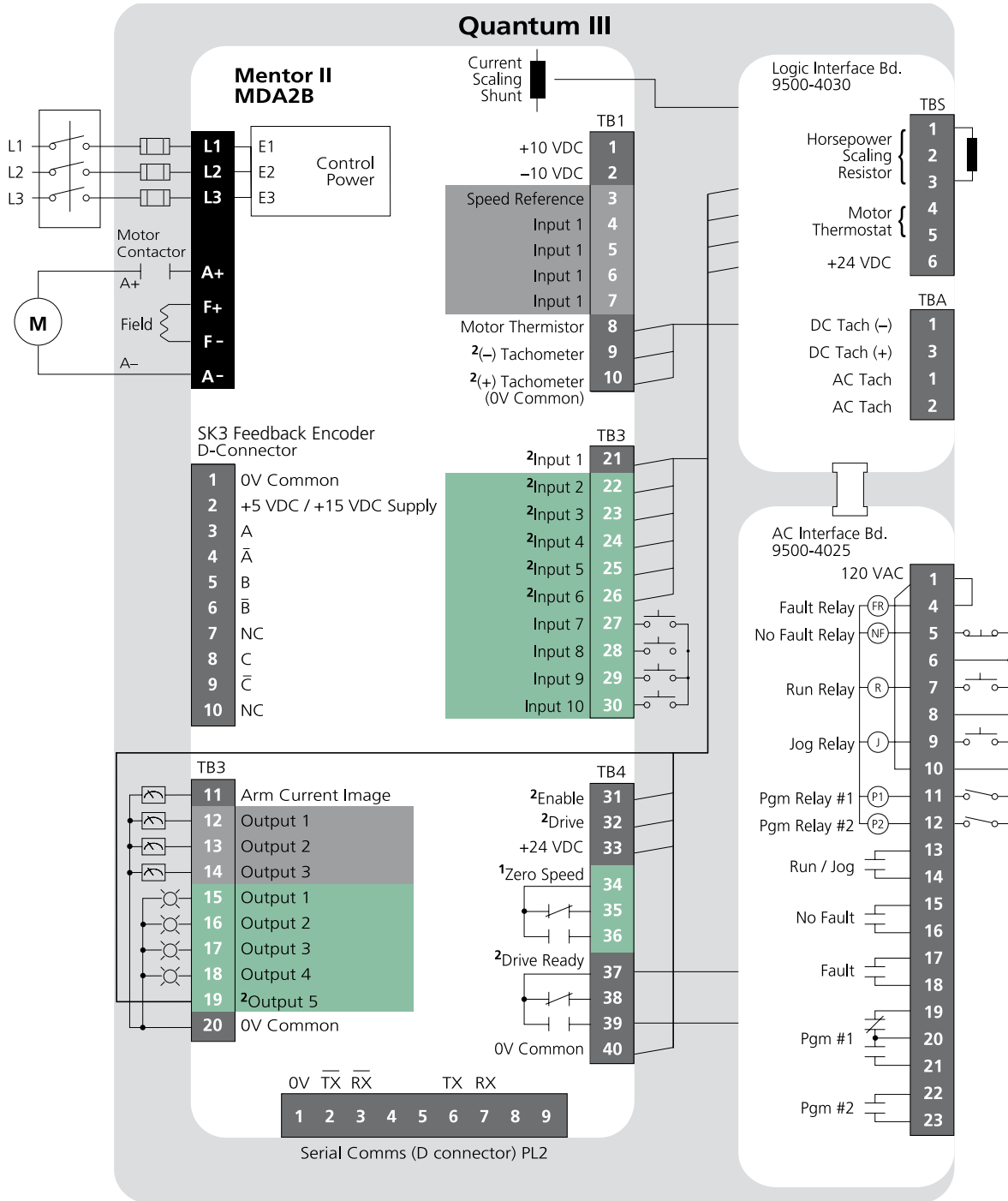
THREE PHASE INPUT	DC Arm Output	Field Output
3 to 500 hp (208-230 VAC)	(240 VDC)	(150 VDC)
5 to 1000 hp (380-460 VAC)	(500 VDC)	(300 VDC)

240 / 480 VAC					
Motor HP 240 VAC	Motor HP 480 VAC	Output Current ^③ (A)	Field Output Current	Non-Regen Order Code ^①	Regen Order Code ^①
3 to 10	5 to 20	38	8A Current Regulated	9500-8302	9500-8602
15	25 to 30	55		9500-8303	9500-8603
20 to 30	40 to 60	106		9500-8305	9500-8605
40 to 50	75 to 100	172		9500-8306	9500-8606
75	150	255	10A Fixed Voltage ②	9500-8307	9500-8607
100	200	338		9500-8308	9500-8608
125	250	428		9500-8309	9500-8609
150	300	508		9500-8310	9500-8610
200	400	675		9500-8311	9500-8611
250	500	820		9500-8315	9500-8615
300	600	985		9500-8316	9500-8616
-	700	1150		9500-8317	9500-8617
400	800	1250		9500-8318	9500-8618
-	900	1470		9500-8319	9500-8619
500	1000	1620	9500-8320	9500-8620	

- ① Drive includes DC loop contactor, input fuses and 120 VAC interface.
- ② For field control, add external field regulator P/N 9500-9035.
- ③ Ambient temperature is 55°C.



TERMINAL DIAGRAM: QUANTUM III



NOTE

- ¹ Zero Speed Relay Programmable.
- ² Denotes Programmable I/O used by Quantum III.

- Programmable Analog
- Programmable Digital
- Non-Programmable

LOGIC INTERFACE BOARD (9500-4030)

TBS			
Pin#	Function	Type/Description	Notes
1, 3	Shunt Resistor Connection	Horsepower Programming	Used up through 9500-8306 / 8606
2	No Internal Connection		
4, 5	Optional Motor Thermostat	Contact Input	Provides thermal trip
6	+24 VDC Supply	User Supply	100 mA max

TBA			
Pin#	Function	Type/Description	Notes
1	DC Tachometer Input (-)	Analog Input	300 VDC max
3	DC Tachometer Input (+)		
1, 2	AC Tachometer Input	Analog Input	200 VAC max

Mentor II Control board (MDA2B)			
Pin#	Function	Type/Description	Notes
1	+10 VDC	Reference Supply	10 mA max
2	-10 VDC	Reference Supply	10 mA max
3	Speed Reference	Analog Input, 12-bit	±10 VDC, 100 kOhms or 4 - 20 mA, 100 Ohms
4	Analog Input # 1	Analog Input Bi-polar, 10-bit + sign	±10 VDC, 100 kOhms
5	# 2		
6	# 3		
7	# 4		
8, 9, 10	For Internal Use		
11	Armature Current Image	Analog Output	6.6 VDC @ 150% current
12	Analog Output # 1	Analog Output Bi-polar, 10-bit + sign	±10 VDC, 5 mA
13	# 2		
14	# 3		
15	Digital Output # 1	Digital Output Open Collector	+24 VDC, 100 mA
16	# 2		
17	# 3		
18	# 4		
19	For Internal Use		
20	0V Common	Circuit Common	
21 to 26	For Internal Use		
27	Digital Input F7	Digital Input	+24 VDC, 10 kOhms
28	F8		
29	F9		
30	F10		
31	For Internal Use		
34	Form C Status Relay (Zero Speed)	Relay Common	110 VAC, 5A resistive
35		N.C. Contact	
36		N.O. Contact	
37, 38, 39	For Internal Use		
40	0V Common	Circuit Common	

Programmable Analog
Programmable Digital
All Analog I/O is scalable

Terminal Descriptions: Quantum III

120 VAC Interface Board (9500-4025)			
Pin#	Function	Type/Description	Notes
1	120 VAC high side (fused)	Power Supply	120 VAC
2, 3	Tie Point	No Internal Connection	Customer Use
4	External Trip / Motor Thermostat Input	120 VAC Input (Fault relay coil)	
5	120 VAC (when drive OK)	120 VAC Output	
6	Stop / Seal-in Input	Contact Input	For 3-wire Stop / Start control
7	Run Input	Input (Run relay coil)	120 VAC
8, 9	Jog Input	Input (Jog relay coil)	120 VAC
10	120 VAC high side (fused)	Power Supply	120 VAC
11	Input # 1 (Reverse)	Programmable Input (# 1 relay coil)	120 VAC
12	Input # 2 (Drive Reset)	Programmable Input (# 2 relay coil)	120 VAC
13, 14	Run / Jog Contact	N.O. Output Contact	120 VAC
15, 16	No Fault Contact	N.O. or N.C. Contact (selectable)	120 VAC
17, 18	Fault Relay Contact		
19	Programmable Form C	Common Connection (arm)	120 VAC
20		N.C. Connection	
21		N.O. Connection	
22, 23	Programmable Relay Contact # 2	N.O. or N.C. Contact (selectable)	120 VAC
24	Drive ON	Output	120 VAC, 6 VA max
25	120 VAC low side	120 VAC Common Connection	Earth ground

Quantum III



See the Packaged Drives and Engineered Systems section for details on our DC Packaged solutions.

SPECIFICATIONS: QUANTUM III

Environment

Ambient Operating Temperature	0 to 55°C (32 to 131°F)
Cooling Method	Convection and forced convection, model dependent
Humidity	95% non-condensing at 55°C (131°F)
Storage Temperature	-40 to 55°C (-40 to 131°F)
Altitude	0 to 4000 m (13,120 ft). Derate 1% per 100 m (328 ft) between 1000 m (3,280 ft) and 4000 m (13,120 ft).
Enclosure	Chassis (IP00)

AC Supply Requirements

Voltage	208 to 480 VAC -5%, +10%
Phase	3Ø
Frequency	45 to 62 Hz
Efficiency	98%
Standard Field Output Voltage	Size 1 – 0.9 X input VAC (Regulated), Size 2-3 – .67 X input VAC (Non-Regulated) Non-Standard Field – Consult Factory
Armature Output Voltage	Non-Regen – 1.15 X input VAC, Regen – 1.05 X input VAC

Control

Feedback Methods	Armature Voltage (resolution .83 volts) DC Tachometer (resolution 0.1%) Encoder (resolution .01%)
Field Control	Current regulated (9500-8306 / 8606 and smaller) Voltage Regulated (9500-8307 / 8607 and larger)
Analog Input Resolution	12-bit (Qty 1), 10-bit (Qty 4)
Serial Communications	4-wire RS422 or RS485, optically-isolated Protocol is ANSI x 3.28-2.5-A4 Baud rate is 4800 or 9600

Protection

AC Line Undervoltage Trip	180 VAC
MOV Voltage Transient Protection	Input transient suppression
Instantaneous Overcurrent Trip	300% armature current
Armature Open Circuit	Armature circuit is open
Drive Overload Trip	Inverse time, 150% for 30 seconds
Phase Loss Trip	Loss of input phase
Overtemperature Trip	Heatsink exceeds 100°C (212°F)
Motor Thermal Trip	Motor over-temp switch or Thermistor
Feedback Loss	Loss of motor feedback
Feedback Reversal	Tachometer or Encoder wired backwards
Field Loss	No field current
Field On	Field current during auto-tune
Field Overcurrent	Field current greater than field demand
Current Loop Loss	Loss of 4-20 mA reference
External Power Supply	Short circuit on +24 VDC user power supply
Power Supply	Internal power supply out of tolerance
Serial	Mode 3 serial comms data loss

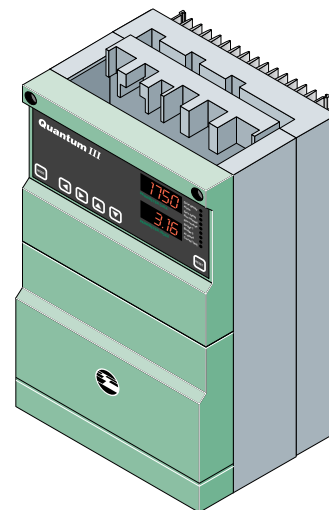
Protection continued

Communications Loss	
Processor 1 Watchdog Trip	Main control processor fault
Processor 2 Watchdog Trip	Second control processor fault (MD29)
Hardware Fault	Hardware malfunction on control board
Memory Fault	Stored parameter checksum fault
External Trip	User interlock fault (programmed)
Software Fault (A29)	MD29 software fault

Approvals & Listings

UL, cUL	File #E58592 Vol. 1 Section 19 (9500-8302 to 9500-8311 and 9500-8602 to 9500-8611)
CE	Designed for marking
ISO 9002	Certified Manufacturing Facility

Dimensions



Size	Order Code	Size* (in) H x W x D	Approx. Weight (lbs.)
1	9500-8302 thru 9500-8303	15 x 10 x 10.5	44
	9500-8602 thru 9500-8603	15 x 10 x 10.5	44
	9500-8305 thru 9500-8306	15 x 10 x 12.3	53
	9500-8605 thru 9500-8606	15 x 10 x 12.3	53
2	9500-8307 thru 9500-8309	35 x 20.3 x 12	110
	9500-8607 thru 9500-8609	35 x 20.3 x 12	110
	9500-8310 thru 9500-8311	36 x 20.3 x 14	155
	9500-8610 thru 9500-8611	36 x 20.3 x 14	155
3	9500-8315 thru 9500-8318	54 x 34 x 19	397
	9500-8615 thru 9500-8618	72 x 34 x 19	475
	9500-8319 thru 9500-8320	54 x 34 x 19	443
	9500-8619 thru 9500-8620	72 x 34 x 19	525

* Approximate, not to be used for construction purposes.