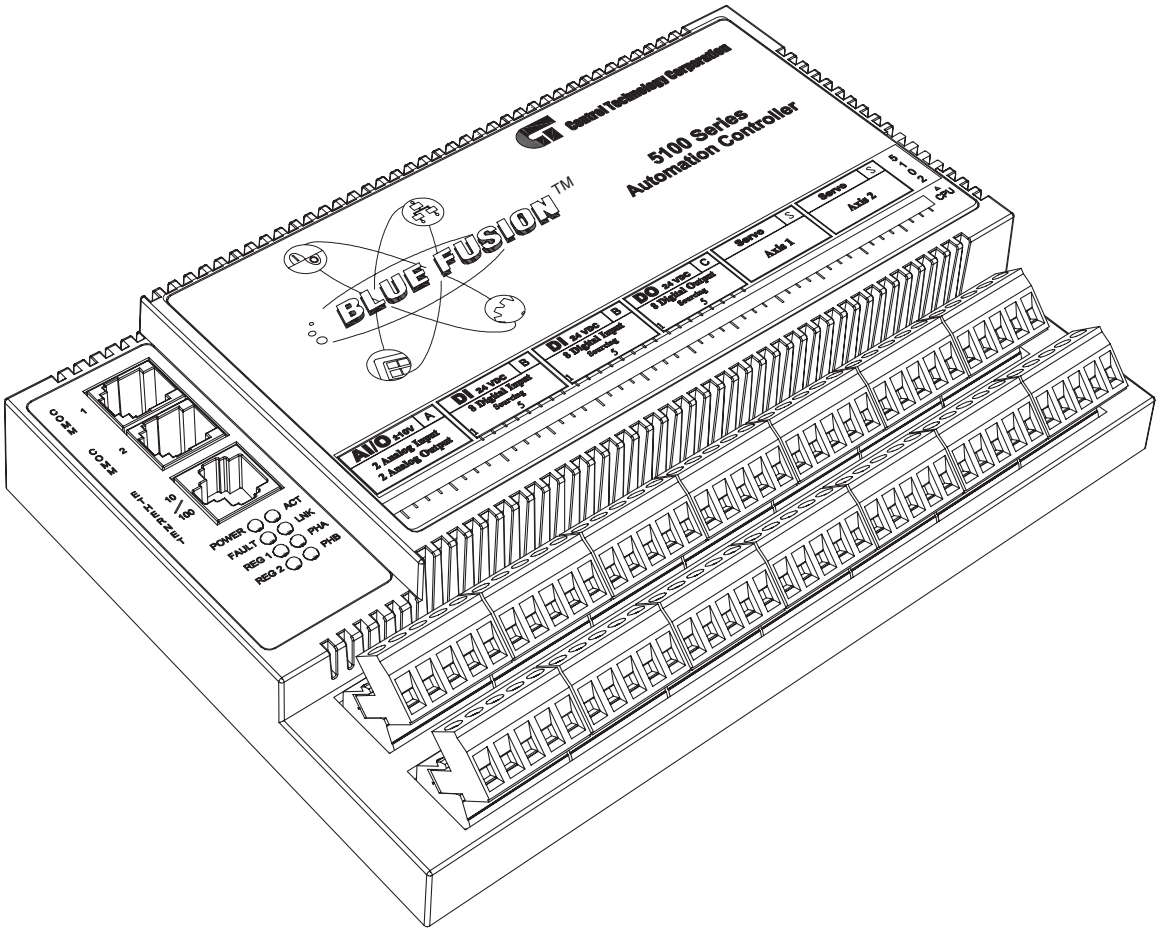
Model 5100 Series Automation Controller Quick Reference Guide



Doc. No. 5100QRG
Revision C
October 2007

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Model 5100 Quick Reference Guide

Product Overview

This section shows the Model 5100's dimensions and provides details about its faceplate.

Figure 1. Model 5100 Dimensions (1 of 2)

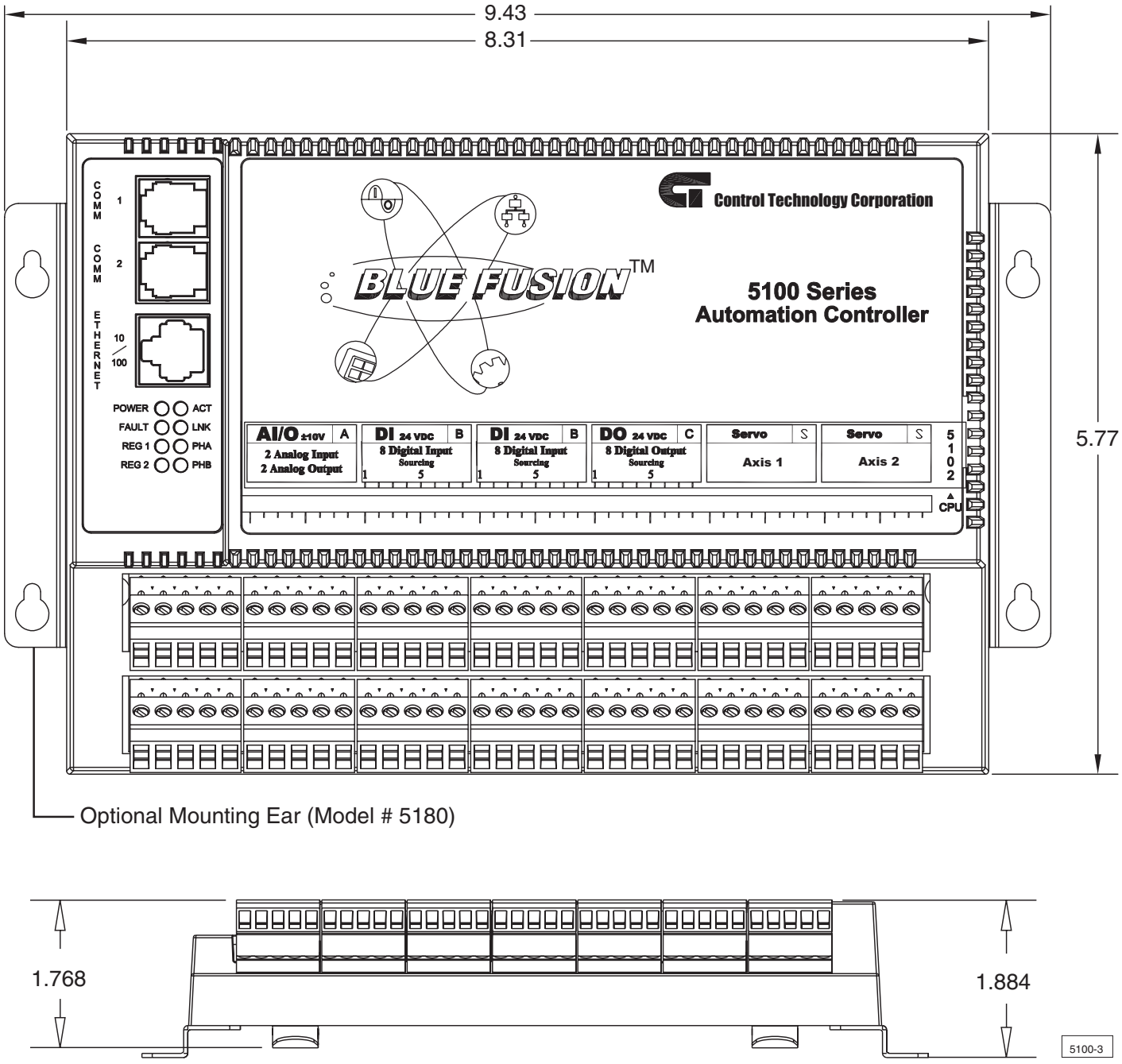

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Figure 2. Model 5100 Dimensions (2 of 2)

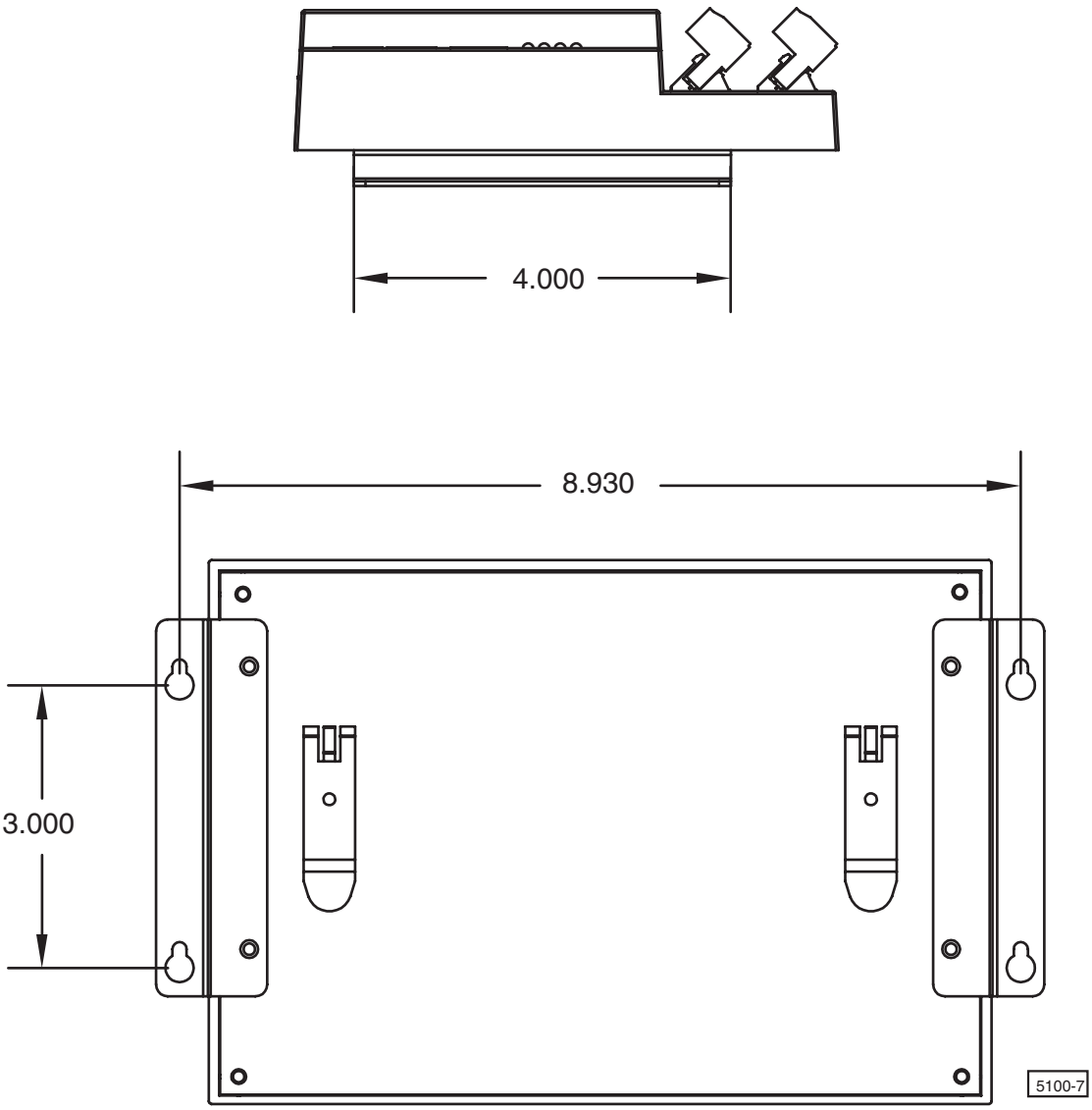

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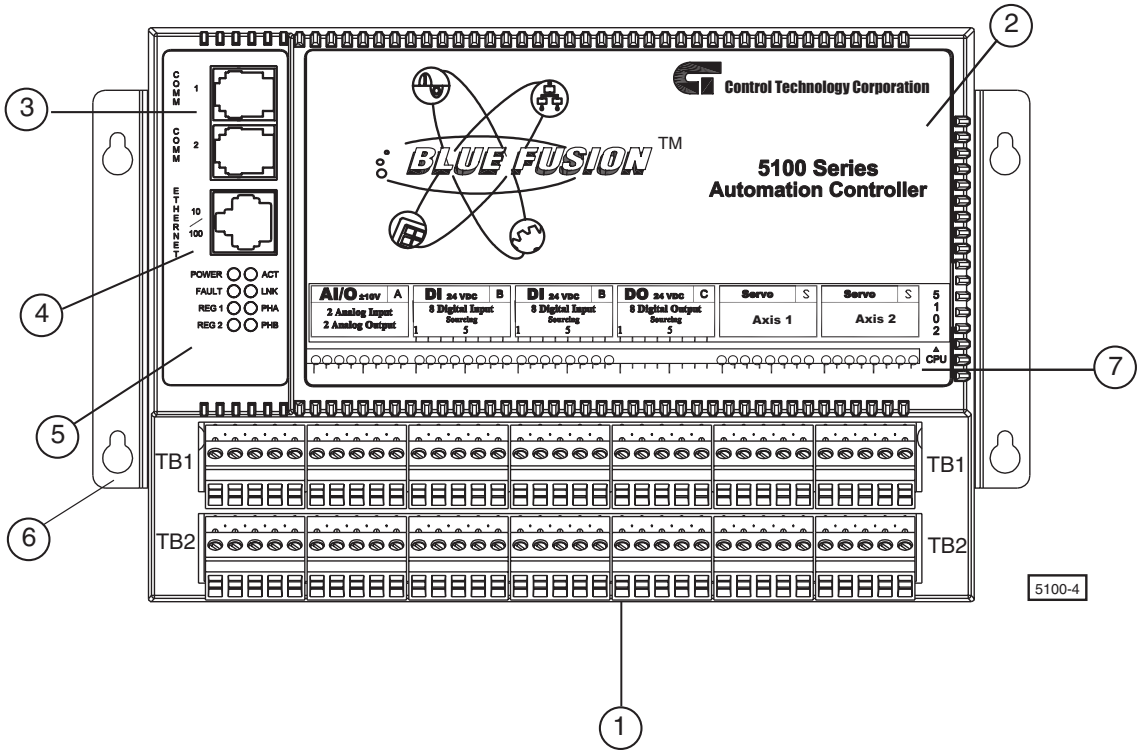
Figure 3. Model 5100 Faceplate



Callout Number	Description
1	**Terminal block interface**: Removable terminal blocks connect to the controller's internal module bays and eliminate the need for cables and breakout blocks. The top terminal block is TB1 and the bottom block is TB2 for each location.
2	**Internal module bays**: There are 6 internal module bays that can hold any combination of I/O and Motion Control modules. I/O modules occupy 1 bay and Motion Control modules occupy 2 bays.
3	**Dual RS-232 ports**: Provides both programming and data communications with a PC by using Quickstep and CTCMON; compatible with CTC's 2881-2883 communications cables and with the cable supplied with Quickstep. Refer to the RS-232 pinout diagram in *Wiring Diagrams* for more information.
4	**10/100Base-T connector**: Provides Ethernet communications and contains auto-sensing circuitry that automatically detects the speed of an Ethernet network when a cable is plugged into it.
5	**CPU status LEDs**: Provide quick diagnostics for the master encoder, Ethernet, and high-speed inputs; indicate when power is applied to the controller; display a hardware or software fault.
6	**Optional Mounting Ear (Model # 5180):** Alternative method of mounting the controller that allows you to install the controller on a flat surface such as a NEMA-rated enclosure.
7	**Module I/O status LEDs**: Provide visual I/O indicators at each connection point.

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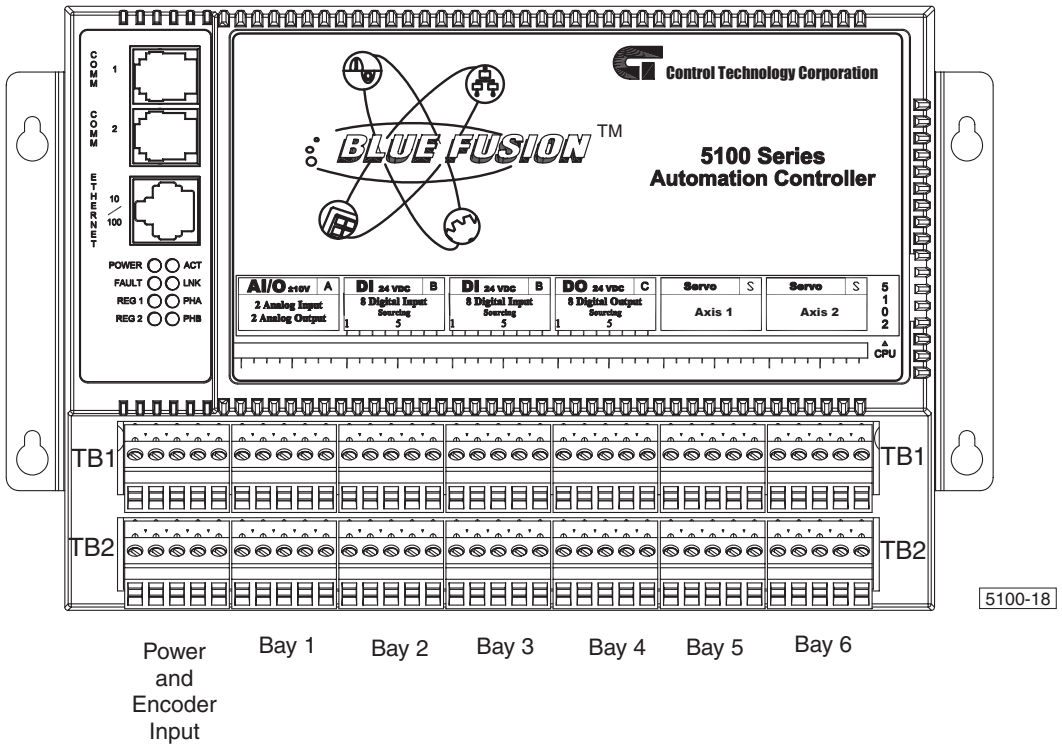
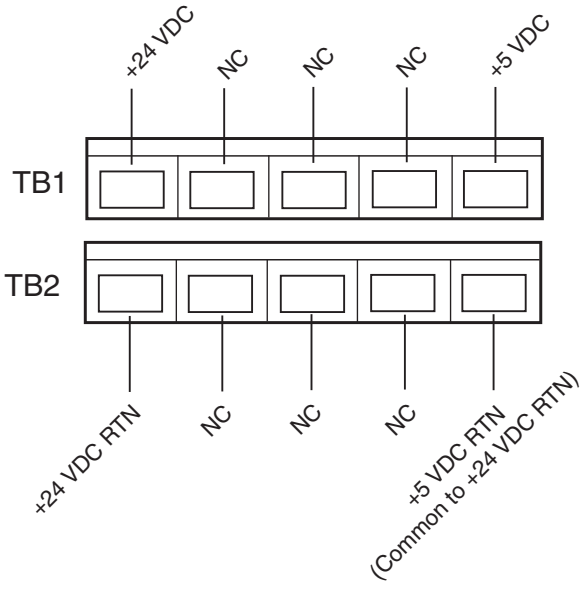
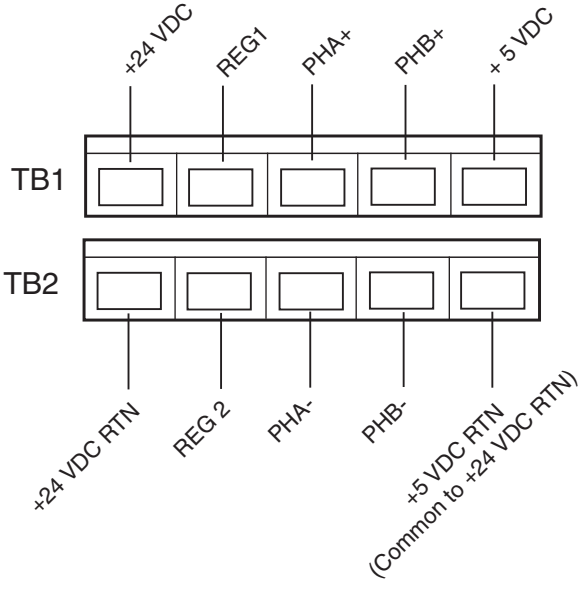
Wiring Diagrams



Power Input Connector (Model 5101)



Power Input / Encoder Connector (Model 5102)



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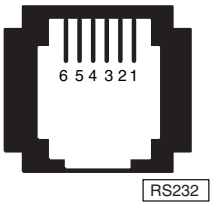
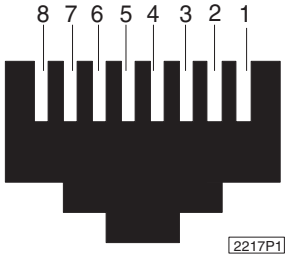
Power Input Connections (Model 5101)

Signal Name	LED Name	Terminal Block #	Signal Name	LED Name	Terminal Block #
+24 VDC		TB1-1	NC		TB2-3
+24 VDC Return		TB2-1	NC		TB1-4
NC		TB1-2	NC		TB2-4
NC		TB2-2	NC		TB1-5
NC		TB1-3	NC		TB2-5

Power Input / Encoder Connections (Model 5102)

Signal Name	LED Name	Terminal Block #	Signal Name	LED Name	Terminal Block #
+24 VDC		TB1-1	PHA-	PHA	TB2-3
+24 VDC Return		TB2-1	PHB+	PHB	TB1-4
REG1	REG 1	TB1-2	PHB-	PHB	TB2-4
REG2	REG 2	TB2-2	+5 VDC		TB1-5
PHA+	PHA	TB1-3	+5 VDC Return		TB2-5

RS-232 Drawing	Pin #	Signal
	1	Not Used
	2	TxD Outbound
	3	Common
	4	Common
	5	RxD Outbound
	6	Common

10/100Base-T Connector	Pin #	Signal
	1	TX0+
	2	TX0-
	3	RX1+
	4	NC
	5	NC
	6	RX1-
	7	NC
	8	NC

Note

Modle 51xx controllers ship with a default IP address of 192.168.1.51.

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Controller Specifications

Note

All specifications are at 25°C unless otherwise specified.

Description	Min.	Typical	Max.	Units
Absolute Maximum Ratings				
Ambient Temperature				
Operating	0		+50	°C
Storage	-20		+80	°C
Applied input voltage	18.0	24.0	27.0	VDC
Applied output voltage	0		24.0	VDC
Current requirement (5 V)		0.4	0.6	A
Digital Input Specifications				
Input off voltage (I_i = 0 mA)	0			VDC
Input on current (V_i = 24 V) [1]		1.2	1.5	mA DC
Input on current threshold (V_i = 16 V typical)		.8	.9	mA DC
Input off current (typical leakage current allowable)			250	µA DC
Digital Output Specifications				
Output on voltage (I_o = 350 mA) [2]		22.8	23.0	VDC
Output current			350	mA DC
Total limit per controller			3	A DC
Output off leakage (applied voltage = 24 VDC) [3]		1.0	100.0	µA DC
Analog Input Specifications				
Differential input range (full scale)	-10.000		+10.000	VDC
Common mode voltage range	-10		+10	VDC
Input resistance	10			MΩ
Input resolution (13-bit)		.0061	.012	%FS
Input accuracy (25°C, 8-sample filtering)		.0061	.012	%FS

1. Under normal operation, no external input voltage is applied. Inputs should be externally switched to the input common.
2. An on-board protection diode returns to +24 V from each output.
3. In the off state, unconnected outputs are internally pulled to +5 V through a diode and an LED indicator.

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Description	Min.	Typical	Max.	Units
Input settling time				
1 least significant bit		1.64		ms
-10 V to +10 V			52.5	ms
Analog Output Specifications				
Output voltage range	-10.000		+10.000	VDC
Output resolution		2.44		mV
Output settling time				
-10.000 to +10.000 V			3.28	ms
0 to +5.000 V			1.64	ms
Controller Characteristics				
User memory capacity (4 years unpowered lithium-cell RAM) *The main CPU is an Hitachi SH2 processor running at 24.576 MHz.*		128K		Bytes
Communications Characteristics				
RS-232 transmitters		± 5	± 10	VDC
RS-232 receivers	± 3		± 10	VDC
Common mode voltage range	-10		+10	VDC
Ethernet Transceivers (10/100 Megabits/sec) [4]			1.5	VAC PP
Encoder Specifications				
Encoder supply voltage	0.0	5.0	5.25	VDC
Encoder supply output current			150	mA
Differential encoder input				
Nominal input range	0.0	5.0		VDC
Open circuit voltage (I_i = 0 mA)		5.0	5.38	VDC
Logic low current (V_i = 0 V)		1.1	1.2	mA
Maximum on-board data rate			3	MHz

4. This conforms to IEEE Standard 802.3.

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Description	Min.	Typical	Max.	Units
Registration Input Specifications				
Off voltage (I_i = 0 mA)		0		VDC
On current (V_i = 24 V)		1.2		mA
Threshold				
low-to-high		16		VDC
high-to-low		15		VDC
Servo Specifications [5]				
Command outputs				
Nominal voltage range	-10		+10.0	VDC
Resolution (16-bit)		305		µV
Maximum velocity setting	1		6,000,000	pulses/s
Resolution of maximum velocity	1			pulses/s
Acceleration and deceleration settings	1		130,000,000	pulses/s^2
Resolution of acceleration and deceleration settings	1			pulses/s^2
Position range (absolute mode)	-2,147,483,648		2,147,483,647	steps
Relative motion command range	-2,147,483,648		2,147,483,647	steps
Controller Resource Summary				
Multi-tasking (tasks)			84	
Volatile registers (32-bit)			500	
Non-volatile registers (32-bit)			4500	
Data table elements (16-bit, non-volatile)			16000	
Input-linkable counters			8	
Flags			32	
Program steps			4096	

5. The term *step* refers to one edge transition on either encoder input for that axis.

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Description	Min.	Typical	Max.	Units
Controller Capacities (5101) [6]				
Module slot capacity			6	
Digital inputs			48	
Digital outputs			48	
Analog inputs			24	
Analog outputs			48	
Servo motor axes			6	
Ethernet ports			1	
RS-232 channels			2	
Master encoders			0	
Controller Capacities (5102) [6]				
Module slot capacity			6	
Digital inputs			50	
Digital outputs			48	
Analog inputs			24	
Analog outputs			48	
Servo motor axes			6.5	
Ethernet ports			1	
RS-232 channels			2	
Master encoders			1	

6. Controller capacities are not mutually inclusive. You cannot operate resources at full capacity at the same time.

Hardware / Firmware Revision Levels

Model Numbers	Hardware Revision Level	Firmware Revision Level [1] [2]
5100	0 or greater	4.0

1. You can confirm firmware revision levels by doing a register read in Quickstep's monitor program. Use register 13003 to confirm the firmware revision in a MultiPro controller.
2. Firmware revision levels are not equivalent to standard decimal numbers. For example, firmware revision level 2.10 translates to:

   Major Revision Level 2
   Minor Revision Level 10

   If this value changes to 2.20, it translates to:

   Major Revision Level 2
   Minor Revision Level 20 (not revision level 2)

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