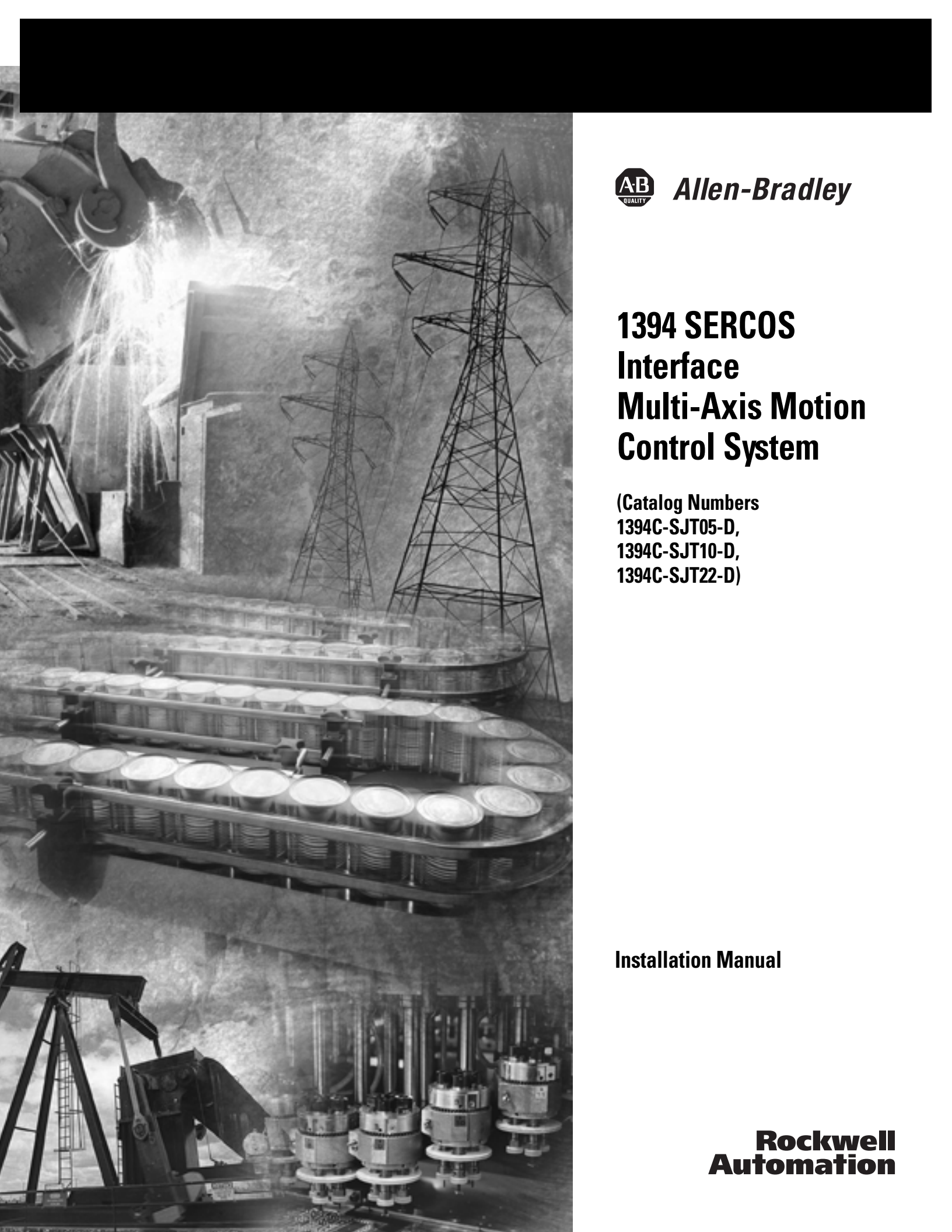




Allen-Bradley

1394 SERCOS Interface Multi-Axis Motion Control System

(Catalog Numbers
1394C-SJT05-D,
1394C-SJT10-D,
1394C-SJT22-D)

Installation Manual

**Rockwell
Automation**

- Install the 1394 SERCOS interface system inside an enclosure. Run input power wiring (grounded to the enclosure) in conduit outside of the enclosure. Separate signal and power cables as shown in *Planning Your Panel Layout* of this chapter.

Low Voltage Directive

These units are tested to meet Council Directive 73/23/EEC Low Voltage Directive. The *EN 50178-1 Electronic Equipment for Use in Power Installations* and *EN 60204-1 Safety of Machinery-Electrical Equipment of Machines, Part 1-Specification for General Requirements* standards apply in whole or in part.

Refer to *Appendix B* of this document for interconnect information.

1394 System Component Overview

This section provides an overview of the 1394 system components and a typical installation.

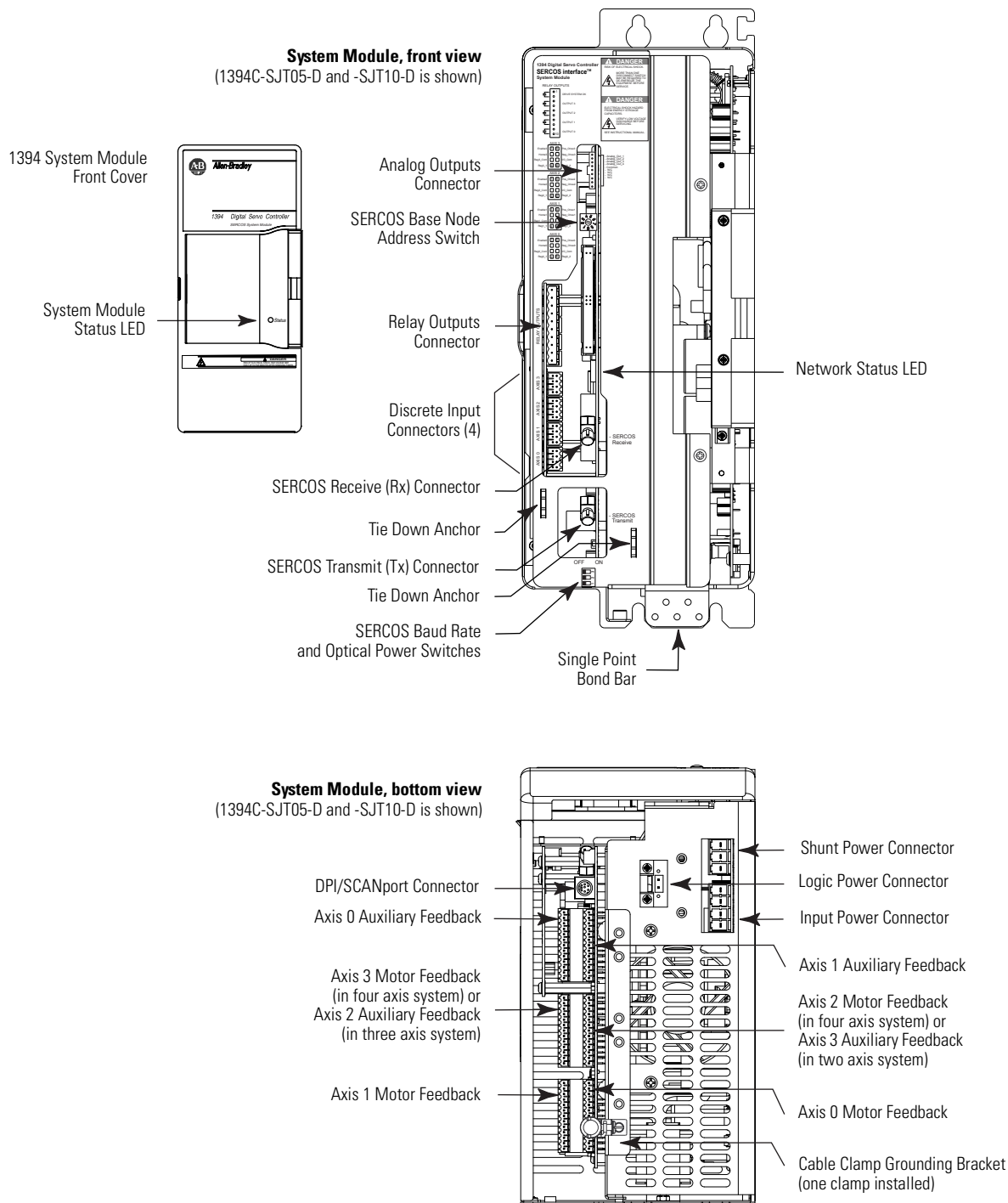
1394 Component:	Catalog Numbers:	Description:
System Module	1394C-SJTxx-D	The 1394 multi-axis System Modules are available with 5, 10, or 22 kW continuous output and 360V/480V ac input power. Each system module accommodates up to four axis modules.
Axis Module	1394C-AMxx	The 1394 Axis Modules are available with 2, 3, 5, 15.6, and 23.8 kW continuous output.
ControlLogix/ SoftLogix Platforms	1756-MxxSE module 1784-PM16SE PCI card	The SERCOS interface module/PCI card serves as a link between the ControlLogix/SoftLogix platform and 1394 system. The communication link uses the IEC 61491 SErIAL Real-time COmmunication System (SERCOS) protocol over a fiber-optic cable.
RSLogix™ 5000 software	9324-RLD300ENE	RSLogix 5000 provides support for programming, commissioning, and maintaining the Logix family of controllers.
Servo Motors	MP-Series, 1326AB, and 1326AS servo motors	The MP-Series (low inertia) 460V, 1326AB (M2L/S2L), and 1326AB (resolver) motors are available for use with the 1394 SERCOS interface system.
Cables	Motor Power, Feedback, and Brake cables	Motor power, feedback, and brake cables include integral molded, bayonet style, quick connect/quick-release connectors at the motor. Power and brake cables have flying leads on the drive end and straight connectors that connect to servo motors. Standard feedback cables have a straight connector on the motor end and flying leads that wire to a feedback connector on the drive end.
	Fiber-Optic cables	SERCOS fiber-optic cables are available in enclosure only, PVC, nylon, and glass with connectors at both ends.
AC Line Filters	SP-74102-006-01	The SP-74102-006-01 three-phase AC line filter is suitable for 1394C-SJT05-D system modules.
	SP-74102-006-02	The SP-74102-006-02 three-phase AC line filter is suitable for 1394C-SJT10-D system modules.
	SP-74102-006-03	The SP-74102-006-03 three-phase AC line filter is suitable for 1394C-SJT22-D system modules.
External Shunt Modules	1394-SR10A	The Bulletin 1394-SR10A external passive shunt resistor is available when the 1394C-SJT05/10-D internal shunt capability is exceeded.
	1394-SR-xxxx	One Bulletin 1394 external passive shunt module is required for each 1394C-SJT22-D system module.

Note: Refer to *Appendix C* for a complete list of catalog numbers for the 1394 components listed above.

Locating System Module Connectors and Indicators

Use the figure below to locate the 1394C-SJT05-D and -SJT10-D System Module connectors and indicators.

Figure 2.1
1394 System Modules (1394C-SJT05-D and -SJT10-D)



Note: Switch and LED locations are shown, however for switch and LED configuration, refer to the *1394 SERCOS Interface Integration Manual* (publication 1394-IN024x-EN-P).

System Module Connector Pin-outs

The System Module connectors are described in the table below. System Module connector pin-outs and signal descriptions follow.

System Module Connectors

Description	Connector	Present on this 1394 System Module
Main Input Power	4-position connector housing	1394C-SJT05-D / 1394C-SJT10-D
Logic Power	2-position connector housing	
Shunt Power	3-position connector housing	
Logic, Shunt, and Main Input Power Terminal Block	8-position terminal block	1394C-SJT22-D
Single Point Bond Bar	5-position grounding bar	1394C-SJT05-D, 1394C-SJT10-D, or 1394C-SJT22-D
Motor/Auxiliary Feedback	13-position connector housing	
Relay Outputs	10-position connector housing	
Analog Outputs	9-position connector housing	
Discrete Input	8-position connector housing (4)	
SERCOS Transmit and Receive	SERCOS fiber-optic (2)	
DPI/SCANport	DPI/SCANport	

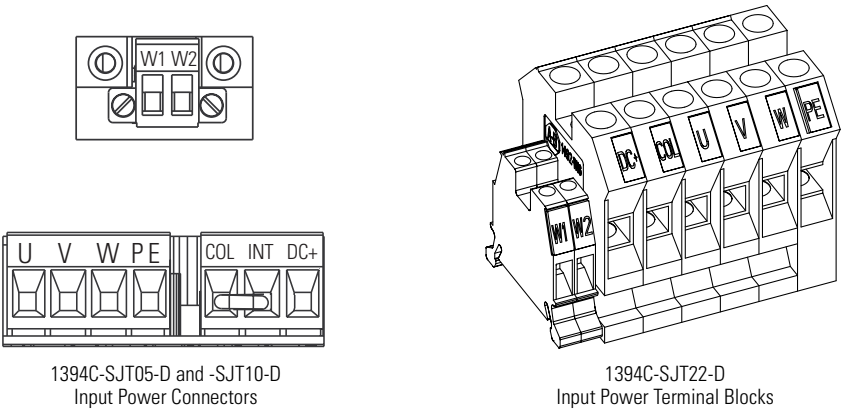
System Module Input Power Pin-outs

The following table provide the signal descriptions and pin-outs for the system module input power connections.

For the location of 1394C-SJT05-D and -SJT10-D input connectors, refer to Figure 2.1 on page 2-2. For the location of 1394C-SJT22-D input terminal block, refer to Figure 2.2 on page 2-3. Refer to *Logic Power Input Specifications* on page 2-20 for signal specifications.

Pin	Description	Signal
W1	Logic power input	W1
W2		W2
U	Three-phase main input power	U
V		V
W		W
PE	Chassis Ground	$\perp$
DC+	External Shunt Connections	DC+
INT		INT
COL		COL

Figure 2.7
1394C-SJTxx-D Input Power



SCANport Adapter

This port allows you to connect a SCANport device, such as a Human Interface Module (HIM), to the 1394 SERCOS Interface system. Refer to figures 2.1 and 2.2 for SCANport location. Refer to the *1394 SERCOS Interface Integration Manual* (publication 1394-IN024x-EN-P) for information on using the HIM.

Power Specifications

This section contains power specifications for the 1394 SERCOS interface system.

System Module Power Specifications

The:	For the 1394C-SJT05-D is:	For the 1394C-SJT10-D is:	For the 1394C-SJT22-D is:
Rated AC input voltage	324-528V AC, 50/60 Hz Three phase	324-528V AC, 50/60 Hz Three phase	324-528V AC, 50/60 Hz Three phase
AC input current (A_{rms})	6.5A	13.0A	28.6A
Peak inrush current ^{1, 2}	8A	8A	8A
Line loss ride through	20 ms	20 ms	20 ms
Nominal bus output voltage	530/680V dc	530/680V dc	530/680V dc
Continuous power output	4/5 kW	8/10 kW	17/22 kW
Peak power output ³	28 kW	28 kW	136 kW
Efficiency	99%	99%	98%
Weight	10.68 kg (23.5 lb)	10.68 kg (23.5 lb)	12.9 kg (28.5 lb)
Continuous current output (A_{dc})	7.36A	14.73A	33.8A
Intermittent current output (A_{dc})	15.0A	29.46A	200A
Capacitance	220 μ F	345 μ F	660 μ F
Inductance	1000 μ H	750 μ H	500 μ H
Internal shunt resistor	200W continuous, 40,000W peak (two second maximum on time)		No internal Shunt Resistor

¹ 1394C-SJT05-D, -SJT10-D, and -SJT22-D system modules are limited to four contactor cycles per minute.

² Peak inrush current is limited by an internal 80 ohm resistor. The 8A peak inrush current for all Series C system modules will experience no more than a 40A peak loss (less 1 ms).

³ The peak power output rating is based on a current limit of 105% of two times the rated continuous current output for 600ms or the rated peak power output for a duration equal to the equivalent watt-seconds.

Axis Module Power Specifications

The:	For the 1394x-AM03 is:	For the 1394x-AM04 is:	For the 1394x-AM07 is:	For the 1394x-AM50 and 1394C-AM50-IH is:	For the 1394x-AM75 and 1394C-AM75-IH is:
Speed Regulation ¹	0 to 0.05% of base speed with 100% torque disturbance	0 to 0.05% of base speed with 100% torque disturbance	0 to 0.05% of base speed with 100% torque disturbance	0 to 0.05% of base speed with 100% torque disturbance	0 to 0.05% of base speed with 100% torque disturbance
Static Gain (rms A/mV) ¹	1.28	2.6	4.9	22.8	22.8
Peak Current Limit Adjust	200%	200%	200%	143%	143%
Modulation Frequency	5 kHz ±10%	5 kHz ±10%	5 kHz ±10%	5 kHz ±10%	5 kHz ±10%
Drift	0.03 rpm/degree C	0.03 rpm/degree C	0.03 rpm/degree C	0.03 rpm/degree C	0.03 rpm/degree C
Nominal Input Voltage	530/680V dc	530/680V dc	530/680V dc	530/680V dc	530/680V dc
Continuous Current (rms)	3.0A	4.5A	7.5A	23.3A	35.0A
Peak Current (rms - 1 second)	6.0A	9.0A	15.0A	33.2A	50.0A
Continuous Power Out 360/460V nominal	1.6/2 kW	2.4/3 kW	4/5 kW	11.34/15.6 kW	17.8/23.8 kW
Efficiency	98%	98%	98%	98%	98%
Weight	5 kg (11.02 lb)	5 kg (11.02 lb)	5 kg (11.02 lb)	7 kg (15.44 lb) (-AM50) 6.73 kg (14.8 lb) (-AM50-IH)	7 kg (15.44 lb) (-AM75) 6.73 kg (14.8 lb) (-AM75-IH)
Capacitance	110 µF	110 µF	220 µF	465 µF	660 µF

¹ When used with the controller in the 1394x-SJTxx-x system module.

Axis Module Series Information

Axis Module Features	Feature Availability	
	Series C	Series A and B
Cable Clamp (strain relief, shield bond)	Yes	No
EMI filter ¹ (motor brake and thermal circuit)	Yes	No

¹ Voltage rating = 24V ac.

Note: Series A, B and C axis modules are physically interchangeable with each other.

Note: Series A axis modules (1394-AM03, -AM04, and -AM07) are not functionally compatible with the 1394C-SJTxx-D system module.

Circuit Breaker Specifications

While circuit breakers offer some convenience, there are limitations for their use. Circuit breakers do not handle high current inrush as well as fuses. The 1394 needs to be protected by a device having a short circuit interrupt current rating of the service capacity provided or a maximum of 100,000A.

If an upstream circuit protection device is rated for the overload current and short circuit rating, a supplementary circuit protection device (such as the 1492) can be used as the only 1394 branch circuit protection device. The upstream fully rated device let-through must be less than or equal to the 10 kA interrupt rating of the 1492.

The wiring interconnection in Figure A.1 and Figure A.2 provide examples of the needed protection and follows UL and NEC codes. Full compliance is dependent on final wiring design and installation.

Figure A.1
Circuit Protection under NEC 1999 110-10 (preferred fully rated devices)

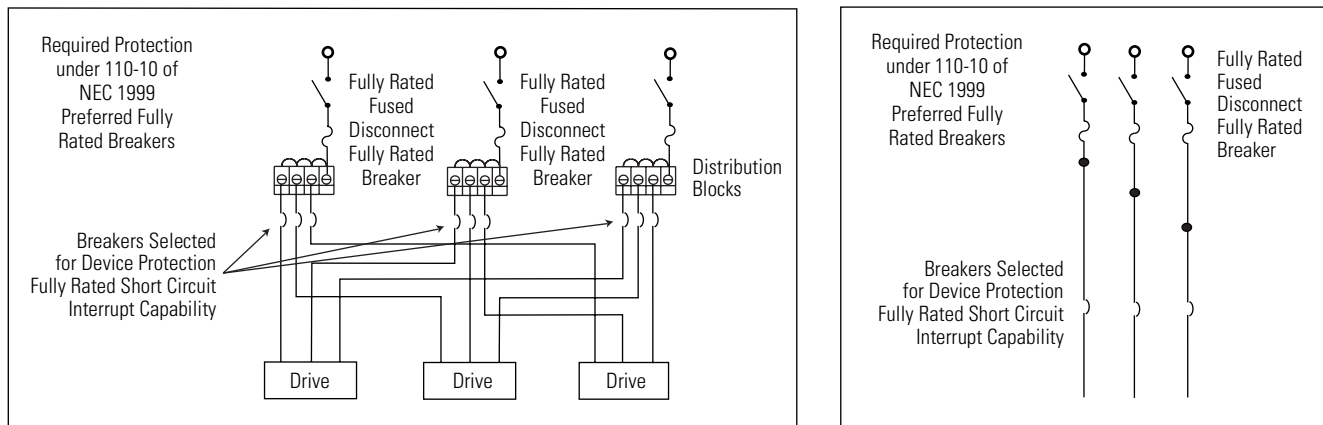
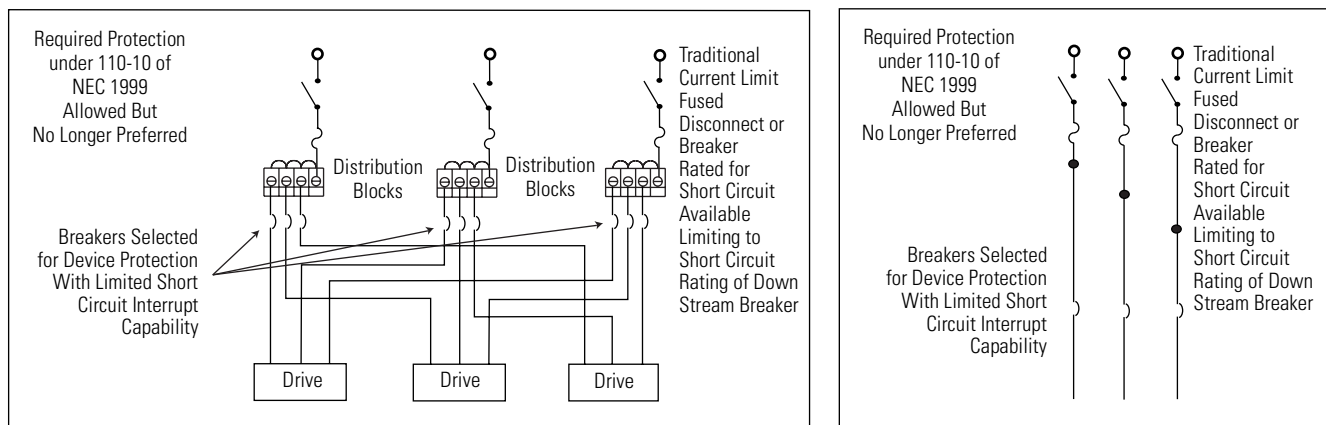


Figure A.2
Circuit Protection under NEC 1999 110-10 (allowed but no longer preferred)



To avoid nuisance tripping, refer to the following table and select the appropriate combination of system module, supplementary circuit protection device, and axis modules.

Use System Module:	With Supplementary Circuit Protection Device:	And Axis Module Combination:
1394C-SJT05-D	1492-CB3-H300	Any combination of AM03 and AM04 up to 4 axis modules. Any combination of AM03, AM04, and AM07 where no more than two AM07s are being used. Use of other combinations of axis modules with this system module may result in nuisance tripping on power up due to a higher inrush current.
	A 1492 device is not recommended for this option.	Other combinations of AM07, AM50, and AM75s. Some local electrical codes require that the circuit breaker rating not exceed 400% of the full load device current. The inrush current draw of the 1394 in some combinations exceeds the 30A breaker and will result in nuisance tripping.
1394C-SJT10-D	1492-CB3-H500	All
1394C-SJT22-D	1492-CB3-H500	All

Fuse Specifications

System		Fuse Description	Rating
1394-SJT05 systems	Series A and B	Bussmann® FRS-R-20A or equivalent	600V ac, 20A
1394C-SJT05 systems	Series C and D	Bussmann KTK-R-20 or equivalent	600V ac, 20A
		Bussmann LPJ-SP 20 or equivalent	600V ac, 20A
1394-SJT10 systems	Series A and B	Bussmann FRS-R-30A or equivalent	600V ac, 30A
1394C-SJT10 systems	Series C and D	Bussmann KTK-R-30 or equivalent	600V ac, 30A
		Bussmann LPJ-SP 30 or equivalent	600V ac, 30A
1394x-SJT22 systems		Bussmann FRS-R-35 or equivalent	600V ac, 35A
		Bussmann LPS-RK-SP 40 or equivalent	600V ac, 40A
		Bussmann LPJ-SP 45 or equivalent	600V ac, 45A

Contactor (M1) Specifications

Contactor		1394-SJT05 and -SJT10 (Series A and B)	1394C-SJT05 and -SJT10 (Series C and D)	1394x-SJT22
Rating		600V ac, 43A ¹	600V ac, 23A	600V ac, 37A
Recommended types:	AC Coil Operation	Allen-Bradley 100-C43x10 ^{2,3}	Allen-Bradley 100-C23x10 ^{2,3}	Allen-Bradley 100-C37x10 ^{2,3}
	DC Coil Operation	Allen-Bradley 100-C43Zx10 ²	Allen-Bradley 100-C23Zx10 ²	Allen-Bradley 100-C37Zx10 ²

¹ Consider using a 60A contactor when the total capacitance of the axis modules is greater than 880 µF.

² x indicates coil voltage.

³ A surge suppressor is required.

Relay Contact Specifications

1394C-SJTxx-D SERCOS Interface System	
Specification	Description
Drive System OK	115V AC/24V dc, 1A inductive
Relay Outputs 0-3	

24V Logic Input Power Specifications

24V Logic Input Voltage	Frequency	Current		Recommended Fuse	
		Axis	Maximum User-Supplied Power Supply		
19-28V ac RMS, single phase	50/60 Hz	1 axis	3.5A	Bussmann MDA-15 or equivalent	
		2 axis	4.4A		
18.75-31.25V dc		3 axis	5.2A		
		4 axis	6.0A		

Note: The power supply should be rated for 15A or greater inrush current upon power up.

Input Transformer Specifications for 24V Logic Power

Specification	Description	
	480V System	360V System
Input volt-amperes	200 to 259 VA	200 to 259 VA
Input voltage	480V RMS	360V RMS
Output voltage	24V RMS	24V RMS
Load regulation	2 to 5%	2 to 5%

Note: If the input volt-amperes is more than 350VA, adjust the load regulation to make the transformer leakage the same as or greater than the 250VA transformer with 2% regulation.

1394 System Power Dissipation Specifications

The following section contains the power dissipation characteristics of the 1394 system modules, axis modules, and internal shunt resistors.

IMPORTANT

Use the power dissipation figures shown below to calculate cumulative system heat dissipation to ensure that the ambient temperature inside the enclosure does not exceed 50° C (122° F). To calculate total power dissipation, add the dissipation of the system module to the dissipation of the axis module(s).

System Modules

Percentage of Rated Power Output	Power Dissipation Watts		
	1394x-SJT05-x	1394x-SJT10-x	1394x-SJT22-x
20	66	70	100
40	70	77	150
60	73	84	200
80	77	81	250
100	80	98	300

Axis Modules

Percentage of Rated Power Output	Power Dissipation Watts								
	Total					Inside Cabinet		Outside Cabinet	
	AM03	AM04	AM07	AM50 ¹ and AM50-IH ²	AM75 ¹ and AM75-IH ²	AM50 ¹	AM75 ¹	AM50 ¹	AM75 ¹
20	24	27	33	56	85	18	18	38	67
40	30	36	48	95	145	18	18	77	127
60	36	45	63	139	212	18	18	138	194
80	42	54	78	183	279	18	18	165	261
100	48	63	93	227	346	18	18	209	324

¹ The AM50/75 are designed to mount with the rear heat sink extended outside the customer-supplied enclosure. If the modules are mounted entirely inside the customer supplied enclosure, the full power dissipation is inside the cabinet (the sum of the inside/outside columns).

² The AM50/75-IH are designed to mount entirely inside the customer-supplied enclosure.

Internal Shunt Resistor

The 1394C-SJT05-D and -SJT10-D system modules include an internal shunt resistor. Shunt specifications are shown in the table below.

The:	Is:
Rating of the internal shunt resistor	200W continuous, 40,000W peak (two second maximum on time)
Resistance of the internal shunt resistor	16 ohms

Note: When the shunt resistor is active, some additional power will be dissipated at the system module. Its maximum dissipation is 200W. Most applications will use less than 10% of this capacity.

General Specifications

The following sections provide environmental, AC line filter, external shunt module, resistive brake module, maximum feedback cable lengths, and dedicated discrete I/O specifications for the 1394 SERCOS interface system.

Environmental Specifications

Specification	Description	
Ambient Operating Temperature: System Module	1394x-SJTxx-x	0° C to 50° C (32° F to 122° F)
Ambient Operating Temperature Axis Module	1394x-AM03, -AM04, -AM07, -AM50-IH, -AM75-IH (Inside Cabinet)	0° C to 50° C (32° F to 122° F)
	1394-AM50 or -AM75 (Inside Cabinet)	0° C to 50° C (32° F to 122° F)
	1394-AM50 or -AM75 (Outside Cabinet)	0° C to 40° C (32° F to 104° F)
Relative Humidity	5-95% noncondensing	
Altitude	1000 m (3300 ft) - Derate 3% per 300 m (984.3 ft) up to 3000 m (10,000 ft)	
Vibration	Operating:	1g
	Non-operating:	2.5g
Shock	Operating:	15g
	Non-operating:	30g

AC Line Filter Specifications

The following AC line filters are compatible with the 1394 drive family.

1394 System Modules	AC Line Filter Catalog Number	Specifications							
		Voltage	Phase	Current	Power Loss	Weight	Humidity	Vibration	Operating Temperature
1394x-SJT05-x	SP-74102-006-01	460V ac 50/60 Hz	Three	23A @ 50° C (122° F)	20W	1.6 kg (4.16 lb)	90% RH	10-200 Hz @ 1.8 g	-25 to 85° C (-13 to 185° F)
1394x-SJT10-x	SP-74102-006-02			30A @ 50° C (122° F)	38W	2.7 kg (7.02 lb)			
1394x-SJT22-x	SP-74102-006-03			75A @ 50° C (122° F)	57W	5.2 kg (13.52 lb)			

External Shunt Module/Resistor Specifications

The passive external shunt resistor kit (1394-SR10A) is available for 5 and 10 kW systems with regenerative loads that exceed the capacity of the internal 200W shunt resistor provided. Most 5 and 10 kW systems will not require an external shunt resistor kit.

All 22 kW 1394 system modules require an external shunt module (1394-SR9Ax or 1394-SR36Ax). Shunt modules with (rms) power output of 300, 900, 1800 and 3600W continuous, 160,000W peak are available for use with the smart power 22 kW system module. You must use one shunt module with each 22 kW smart power system module. Available in two sizes, each package contains an integral fuse and terminal block. The 3600W package is available with a 115/230V ac cooling fan. Choose your shunt module based on the shunt requirements from analysis using Motion Book v4.0 (or later).

1394 System Modules	Shunt Module Catalog Number	Specifications						Fuse Replacement
		Drive Voltage VAC	Resistance Ohms	Peak Power kW	Peak Current Amps	Continuous Power Watts	Weight kg (lbs)	
1394x-SJT05-x and -SJT10-x	1394-SR10A	460	16	40	40	1400	4.99 (11.0)	1394-SR10A-FUSE-A
1394x-SJT22-x	1394-SR9A		4	160	200	300	3.63 (8.0)	FWP-50A14F ¹
	1394-SR9AF					900	3.63 (8.0)	
	1394-SR36A					1800	8.6 (19.0)	
	1394-SR36AF					3600 (fan cooled)	9.0 (20.0)	

¹ Bussmann part number.

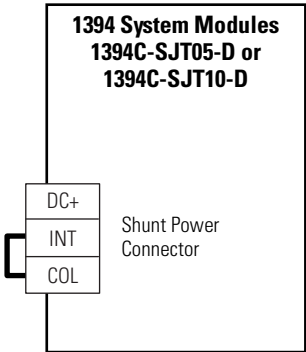
Note: CE marked and UL Listed to U.S. and Canadian safety standards.

Shunt Module Interconnect Diagrams

In the figure below, the 1394 system module is shown wired for internal shunt operation. This is the factory default jumper setting.

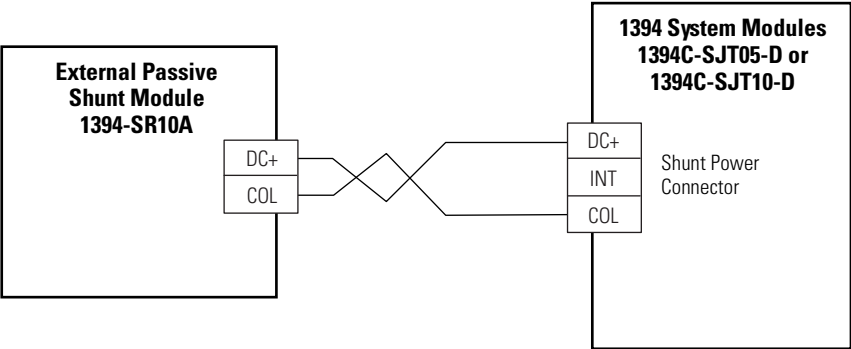
IMPORTANT Internal shunt operation is only present on the 1394 system modules listed in Figure B.3.

Figure B.3
Internal Shunt Interconnect Diagram



In the figure below, the 1394C-SJT05-D and -SJT10-D system modules are shown wired with the optional external shunt resistor.

Figure B.4
External Shunt Module Interconnect Diagram (optional)



Catalog Numbers and Accessories

Chapter Objectives

This appendix lists the 1394 system components and accessory items in tables by catalog number, providing detailed descriptions of each. This appendix describes catalog numbers for:

- 1394 System Modules
- 1394 Axis Modules
- RSLogix 5000 Software
- AC Line Filters
- External Shunt Modules
- Cables
- 1394 Accessories

Contact your local Allen-Bradley sales office for additional information. Refer to the *Motion Control Selection Guide* (publication GMC-SG001x-EN-P) for detailed information on products.

1394 System Modules

1394 system modules have power ratings of 5, 10, and 22 kW. Available 1394 system modules are listed in the table below.

Description	Catalog Number
System Module, 5 kW with SERCOS interface, Series C, controls up to four axes	1394C-SJT05-D
System Module, 10 kW with SERCOS interface, Series C, controls up to four axes	1394C-SJT10-D
System Module, 22 kW with SERCOS interface, Series C, controls up to four axes	1394C-SJT22-D