The 1394 Family: There's a Fit for Your Application

Significant Benefits of the Integrated Design

The unique integrated design of the Allen-Bradley 1394 platform offers the ideal multi-axis motion solution: a very cost-effective system that is easy to install, integrate and operate. Whether your application calls for the integration with Logix that a SERCOS™ interface motion module provides, the easy-to-use networking that links PLC® and SLC™ platforms to the 1394 motion controller, or a stand-alone 1394 servo drive, there is a 1394 configuration to meet your needs.

All 1394 systems share these significant benefits:

- The 1394 design features a slide-and-lock connection that eliminates up to 100 individual wire terminations between modules.
- Independent selection of the system power supply and axis drive power rating allows a customized fit for the application.
- Upgraded design of the system power supply provides increased reliability with fewer components.
- Flexible module configuration. Select the automation system architecture you need:
  - SERCOS interface, compatible with the ControlLogix™ SERCOS interface motion card
  - Embedded motion controller in the servo drive
  - Analog servo interface

1394 system with SERCOS interface motion module

The 1394 drive system using the SERCOS (SErial Real-time COmmunications System) interface motion module provides a state-of-the art motion solution with these important advantages:

- Compatible with the ControlLogix SERCOS interface motion module. ControlLogix provides the ultimate in integration of high performance, sequential and motion control. It allows you to replace two separate controllers (sequential and motion) with one (Logix), saving programming and commissioning time.

- RSLogix 5000 provides complete motion programming and configuration support of ControlLogix, and configuration support of the 1394 SERCOS interface drive, eliminating the need for multiple program packages.
- Multiple feedback options provide the flexibility to handle a wide range of applications. Feedback options include support for absolute high resolution (over two million counts per turn) multi-turn and single turn encoder feedback, and resolver.
- Using remote diagnostics, detailed 1394 drive status information is displayed in RSLogix 5000 and can be accessed in the ControlLogix application program.
- When combined with the 1394, the ControLogix SERCOS interface motion module uses a single fiber optic cable to replace the 18 wires per axis/drive required with an analog interface. Up to eight axes can be supported per SERCOS interface motion module, 32 per controller.
- Fiber optics provide noise immunity, and provide for distribution of the 1394 SERCOS interface drive – up to 32 meters with plastic fiber and 200 meters with glass fiber.

Digital Servo Power and Flexibility

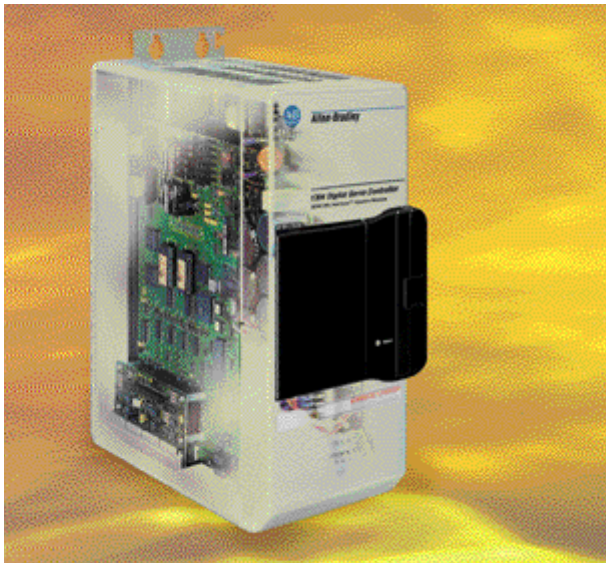
Power Technology

Flexibility: Up to four snap-on axis power conversion modules can be used with the 1394. The slide-and-lock design provides all control and power connections without bus bars and wiring harnesses. Digital power switching uses IGBT technology, providing faster, more efficient operation. Support circuitry, embedded in the power transistor, eliminates 55 discrete devices. With the 1394-DCLM DC link module, two 1394 systems can share bus power and improve efficiency.

Performance: The 1394 power structure provides extremely high performance output. A high bandwidth current loop (750-1000 Hz) and synchronous current loops ensure maximum utilization of the high-voltage DC bus.

Compact Enclosure and Efficient Packaging

Using a patented power design, the 1394C-AM50 and -AM75 axis modules can dissipate up to 92 percent of their heat outside the control cabinet. The 1394C-AM50(-IH) and 1394C-AM75(-IH) axis modules have internally mounted heatsinks.



The system module is the heart of the 1394 system – a single intelligent unit providing both power conversion and motion control in your choice of configurations.

System Modules

	5kW System Module	10kW System Module	22kW System Module
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	6.5A	13.0A	28.6A
Peak inrush current [1] (Series C)	8A < 1µs	8A < 1µs	8A < 1µs
Line loss ride through	20 ms	20 ms	20 ms
Nominal bus output voltage 380/460V	530/680V DC	530/680V DC	530/680V DC
Continuous power output 380/460V	4/5 kW	8/10 kW	17/22 kW
Peak power output	28 kW	28 kW	136 kW
Efficiency	99%	99%	98%
Continuous current output	7.36A	14.73A	33.8A
Peak current output	15.0A	29.46A	200A

1. 8A linear charging with a worst case 40A peak for less than 1µs. See Motion Control Selection Guide for more details: Publication # GMC-SG001*x*.

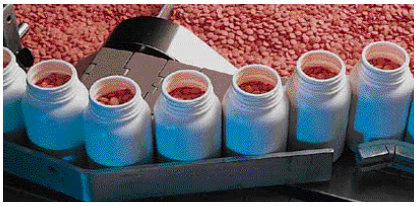
Axis Modules

RATING	1394x-AM03	1394x-AM04	1394x-AM07	1394x-AM50(-IH)	1394x-AM75(-IH)
Speed regulation	0 to 0.05% of base speed with 100% torque disturbance				
Static gain (rms A/mV)	1.28	2.6	4.9	22.8	22.8
Nominal input voltage 380/460V	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 sec)	6.0A	9.0A	15.0A	33.2A	50.0A
Continuous power 380/460V	1.6/2 kW	2.4/3 kW	4/5 kW	11.34/15.6 kW	17.8/23.8 kW
Peak power 380/460V	3.2/4 kW	4.8/6 kW	8/10 kW	16.1/22.2 kW	25.4/34 kW
Efficiency	98%	98%	98%	98%	98%
Capacitance	110µF	110µF	220µF	465µF	660µF

A Custom Fit for Your Application

Realize the Benefits of ControlLogix and 1394 with SERCOS Interface

The 1394 family offers a choice of several different configurations, all offering full-featured motion control to meet the needs of even the most demanding applications.

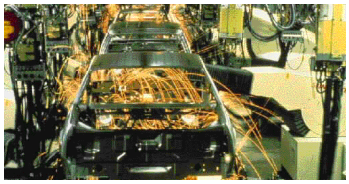


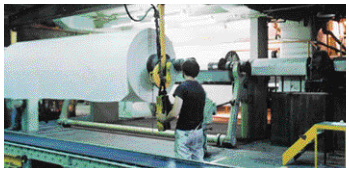
1394 Drive System and Logix

Simplify integration and increase performance with the 1394 multi-axis drive system using ControlLogix and a SERCOS interface motion module. It's ideal for packaging, material handling, converting, PowerTrain and other motion-intensive applications. With this system, up to eight axes of motion can be controlled from one 1756-M08SE motion card, lowering costs and simplifying integration and commissioning. Enhanced tools built into RSLogix 5000 software allow you to quickly and easily configure and commission each axis of motion including the drive and motor. And, because RSLogix 5000 is used consistently for all Logix programming, no additional application software investment is required.

This unique system uses a SERCOS interface motion module to more easily configure, commission, manage and maintain a system. A single fiber optic ring serves as the sole interface between control and drive. This interface replaces costly command and feedback wiring, reducing both installation time and wiring costs. These cables can be up to 32 meters in length using economical plastic fiber or up to 200 meters using glass fiber, so you can mount the controller in a central location, then distribute the drives conveniently on the application.

Even troubleshooting this motion control system is much simpler since diagnostic information is communicated directly from the servo drive to the Logix controller and can be viewed with RSLogix 5000. This allows you to remotely manage applications from one central location.





Embedded Motion: 1394 GMC and GMC Turbo Systems

A full-featured general motion controller integrated with the modular, 1394 digital, AC servo drive provides a single compact package. The 1394 GMC system provides up to four axes of motion control.

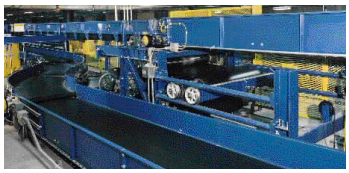
Drive-Embedded Motion Control

The GMC Turbo provides more GML (Graphical Motion Language) application program memory and executes programs faster.

GML™ (Graphical Motion Language)

The GMC versions of the 1394 use GML to quickly program motion applications by simply diagramming the desired motion functions. Just use the pre-defined graphical icons to string together a complete motion sequence.

Stand-Alone Servo Drive



Stand-Alone Servo Drive

The 1394 digital stand-alone drive system is configurable from one to four axes via SCANport™ or traditional ±10V DC analog interface, and can be used with a ControlLogix 1756-M02AE or SoftLogix 1784-PM02AE analog output card. It can be used as a velocity or torque (current) loop-control system. Auto-tuning and startup prompting allow quick commissioning via the Allen-Bradley Bulletin 1201 HIM (Human Interface Module).

Smart Motor Technology

Available with Logix using the SERCOS Interface Motion Module

Put smart motor technology to work with the 1394 drive system using ControlLogix with SERCOS interface. Get these benefits on a full range of servo motors including the Allen-Bradley MP-Series and 1326AB motors:

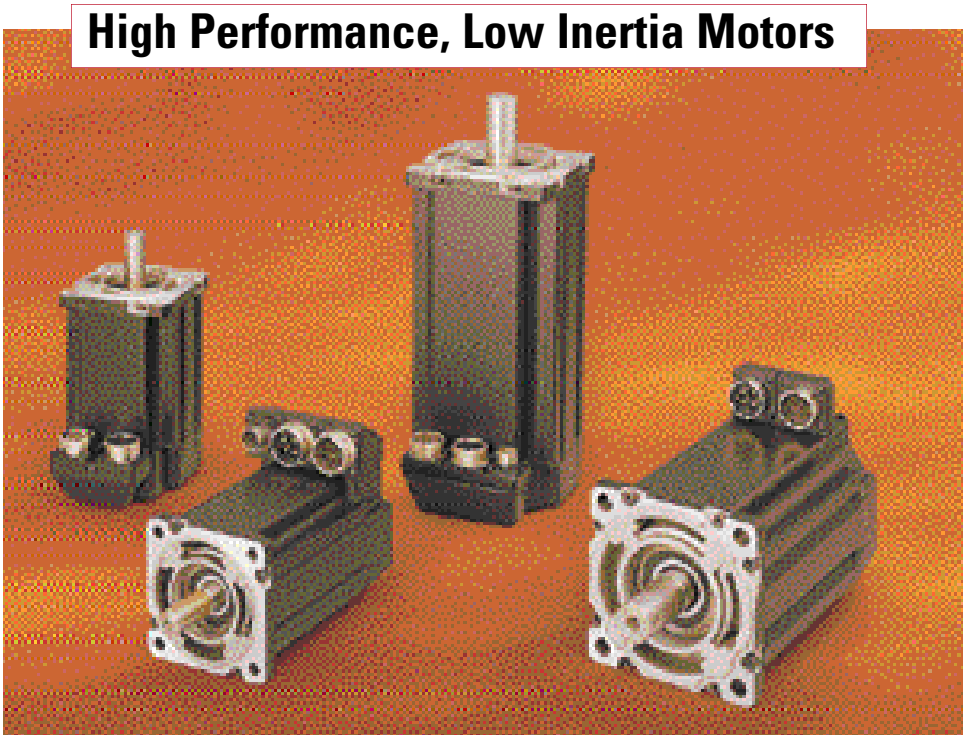
- Identification of the motor by the system reduces commissioning time and safeguards against incorrect motor replacement.
- High-resolution feedback improves positioning accuracy and velocity loop control.
- Absolute feedback (without batteries) increases machine availability by reducing startup time and eliminating the need for a home limit switch.
- Motor parameter verification eliminates the time required to set parameters such as maximum speed and inertia.

MP-Series Motors

Today's demanding applications require maximum motor efficiency.
The MP-Series 460V servo motor design is unequaled in the industry:

- A segmented core stator design that allows for the maximum amount of copper winding material in a smaller area for more output with a given input.
- Advanced winding encapsulation material for enhanced thermal management and heat transfer, resulting in higher performance.
- High-energy neodymium (NeFeB) magnets for a maximum torque-to-inertia ratio and, consequently, quicker motor acceleration and deceleration.
- Motor connectors are easily reversible. They can point either toward the motor shaft or away from it, depending upon which setup is most convenient for the application.
- IP-66 rating for an environmentally rugged motor with shaft seal installed. (No motor disassembly required.)
- Multiple feedback options are available: high resolution single, multi-turn absolute, and resolver. (High resolution single and multi-turn absolute are only available with the 1394 digital servo drive using a SERCOS interface motion module.)

High Performance, Low Inertia Motors



MP-Series Motors

Rating	MPL-B310P	MPL-B320P	MPL-B330P	MPL-B420P	MPL-B430P	MPL-B4520P	MPL-B4530K	MPL-B4540F
Rated Torque N-m (lb.-in.)	1.58 (14)	2.94 (26)	4.18 (37)	4.74 (42)	6.55 (58)	6.1 (54)	8.36 (74)	10.2 (90)
Peak Torque (Thermostat-Protected) N-m (lb.-in.)	2.48 (22)	4.52 (40)	6.55 (58)	8.59 (76)	11.8 (105)	13.5 (120)	18.6 (165)	23.7 (210)
Peak Torque (Timed Rating) N-m (lb.-in.)	3.61 (32)[1]	7.34 (65)[1]	11.1 (98)[1]	13.5 (120)[2]	19.8 (175)[2]	[3]	20.3 (180)[4]	27.1 (240)[4]
Rated Speed rpm	5000	5000	5000	5000	5000	5000	4000	3000
Rated Power kW Inertia (no brake)	0.72	1.3	1.7	1.9	2.4	2.5	2.6	3.0
Kg-m2 (lb.-in.-s2)	0.000064 (0.00056)	0.000098 (0.00087)	0.00014 (0.0012)	0.00028 (0.0025)	0.00040 (0.0035)	0.00027 (0.0024)	0.00042 (0.0037)	0.00054 (0.0048)
Inertia (brake) Kg-m2 (lb.-in.-s2)	0.000077 (0.00068)	0.00011 (0.00099)	0.00015 (0.0013)	0.00033 (0.0029)	0.00044 (0.0039)	0.00032 (0.0028)	0.00047 (0.0041)	0.00059 (0.0052)

1. Two-Second rating. 2. Five-Second rating. 3. No timed rating. 4. 20-Second rating.
Note: Inertias may vary slightly depending on feedback device.

Medium Inertia Motors

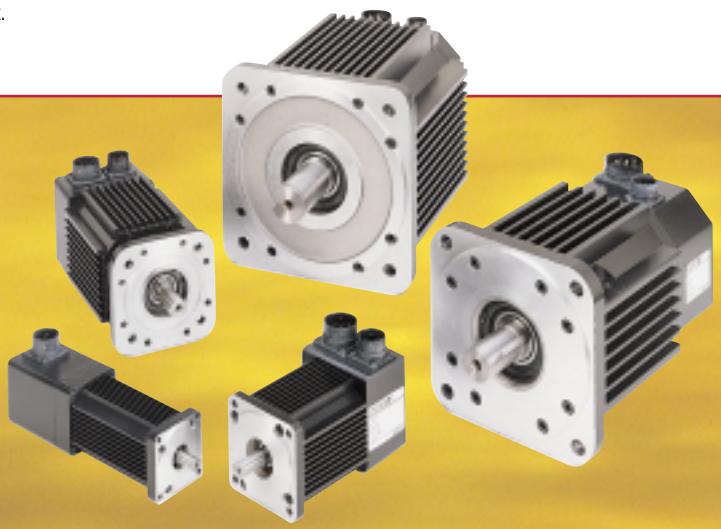
RATING	B410G	B410J	B420H	B420E	B430G	B430E	B515G	B515E	B520F	B520E	B530E	B720E	B720F	B730E	B740C	B740E
Rated Torque N-m (lb.-in.)	2.7 (24)	2.7 (24)	5.1 (45)	5.0 (44)	6.4 (57)	6.6 (58)	10.4 (92)	10.4 (92)	13.1 (116)	13.0 (115)	18.0 (160)	30.9 (273)	31.8 (281.7)	39.0 (345)	53.0 (469)	50.8 (450)
Peak Torque N-m (lb.-in.)	8.1 (72)	8.1 (72)	14 (124)	14.9 (132)	17.2 (153)	19.7 (174)	31.2 (276)	31.2 (276)	39.3 (348)	39 (345)	54.2 (480)	88.1 (780)	56 (495)	85.4 (756)	126.8 (1122)	79.4 (702)
Rated Speed (rpm)																
460V	5000	7250	6000	3000	5000	3000	5000	3000	3500	3000	3000	3500	5000	3350	2200	3400
380V	4000	6000	5000	2500	4000	2500	4000	2500	3000	2500	2500	3000	4100	2800	1800	2800
Rated Power (kW)	1.0	1.4	2.2	1.1	2.3	1.4	2.9	2.3	2.9	2.9	4.2	6.8	11.7	9.6	8.7	12.7
Inertia kg–m² (lb.-in.–s²)	0.0005 (0.004)	0.0005 (0.004)	0.0008 (0.007)	0.0008 (0.007)	0.001 (0.01)	0.001 (0.01)	0.0043 (0.038)	0.0043 (0.038)	0.005 (0.04)	0.005 (0.04)	0.007 (0.06)	0.017 (0.15)	0.0173 (0.153)	0.025 (0.23)	0.034 (0.30)	0.034 (0.30)

1326AB Motors

1326AS Motors

RATING	B310H	B330H	B420G	B440G	B460F	B630F	B660E	B690E	B840E	B860C
Rated Torque N-m (lb.-in.)	0.7 (6.1)	2.0 (18.0)	3.2 (28.0)	6.4 (56.0)	9.0 (80.0)	10.7 (95.0)	21.5 (190)	36.4 (322)	37.6 (333)	49.3 (436)
Peak Torque N-m (lb.-in.)	2.1 (18)	5.6 (50)	9.6(84)	19.0 (168)	27.1 (240)	25.4 (225)	54.2 (480)	79.1 (700)	70.0 (620)	124.0 (1100)
Rated Speed (rpm)										
460V	6200	6500	5250	5250	4300	4500	3000	3000	3000	2000
380V	5120	5370	4340	4340	3550	3720	2480	2480	2480	1650
Rated Power (kW)	0.3	0.9	1.2	2.0	2.8	2.4	3.4	5.0	4.7	6.0
Inertia kg–m2 (lb.-in.–s2)	0.000045 (0.0004)	0.00009 (0.0008)	0.0003 (0.0027)	0.0005 (0.0046)	0.0007 (0.0066)	0.0014 (0.012)	0.0025 (0.022)	0.0036 (0.032)	0.0063 (0.056)	0.0094 (0.083)

*All ratings are for 40° C motor ambient, 100° C case and 50° C amplifier ambient.
For extended ratings at lower ambient temperatures, contact Allen-Bradley.

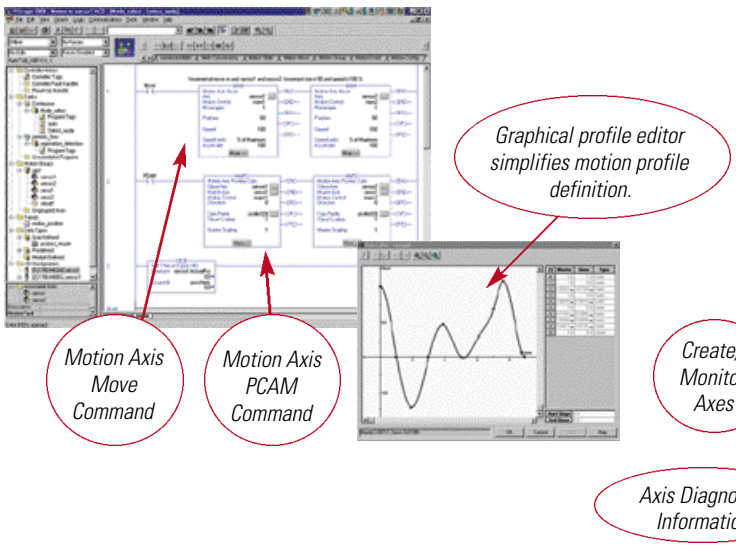


Low Inertia Motors

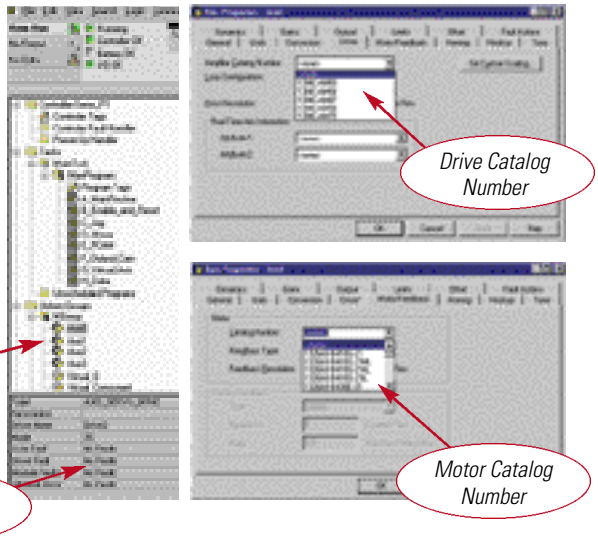
Powerful Software for Motion Control

RSLogix 5000 is the only software necessary for all your Logix-based motion and sequential control applications, eliminating the need for multiple programming tools. Just add and configure motion axes and drives using the wizard-based configuration tools, insert any of the 32 motion instructions in the ladder application program, and create simple or complex motion profiles with the advanced graphical motion profile editor. RSLogix 5000 provides the power you need in an easy-to-use format.

RSLogix 5000 Motion Programming



RSLogix 5000 Axis and Drive Configuration



RSLogix 5000 Motion Features

- 32 motion instructions are available to handle even the most demanding motion applications.
- Graphical editor simplifies creation of complex motion profiles.
- Graphical data capture and display allow motion performance to be monitored.
- Create motion axes with a simple click of the computer mouse.
- Wizard-based axis and drive configuration for easy-to-use programming.
- On-line program and configuration editing support.

Adopt the Logix approach at the pace you choose and extend your current system's life cycle as you take advantage of this new approach to control. RSLogix 5000 is part of the RSLogix family of products that share:

- A common user interface and feature set
- Flexible, easy-to-use editors
- Powerful database editor
- Point-and-click I/O configuration
- Diagnostic and troubleshooting tool
- Dependable communications

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