Allen-Bradley

# SLC™ Servo Control Module

(Catalog No. 1746-HSRV)

User Manual

Rockwell Automation

Read this preface to familiarize yourself with the rest of the manual. This preface covers the following topics:

- who should use this manual
- purpose of this manual
- safety precautions
- contents of this manual
- related documentation
- conventions used in this manual
- receiving and storage information
- Allen-Bradley support

## Who Should Use this Manual

Use this manual if you are responsible for designing, installing, programming, or troubleshooting the SLC™ Servo Module (catalog number 1746-HSRV).

If you do not have a basic understanding of SLC 500™ products, understand programmable controllers or cannot interpret the ladder logic instructions required to control your application, contact your local Allen-Bradley representative for information on available training courses before using this product.

We recommend that you review one of the following before using the software:

| Publication | Publication Number |
|---|---|
| Getting Results with RSLogix 500 | 9399-RL50GR |
| AI Series Installation Guide | 9399-AIIG |

## Purpose of this Manual

This manual is a user guide for the SLC Servo Module (catalog number 1746-HSRV). It gives you an overview of the SLC Servo Module and describes the procedures you use to install, set up, use, and troubleshoot the SLC Servo Module.

## Safety Precautions

The following general precautions apply to the SLC Servo Control Module.

**ATTENTION**

Only those familiar with the SLC Servo Control Module and associated machinery should plan or implement the installation, start-up, and subsequent maintenance of the system. Failure to comply can result in personal injury and/or equipment damage.

This product contains stored energy devices. To avoid hazard of electrical shock, verify that all voltage on the capacitors has been discharged before attempting to service, repair, or remove this unit. You should only attempt the procedures in this manual if you are qualified to do so and familiar with solid-state control equipment and the safety procedures in publication NFPA 70E.

The system integrator is responsible for local safety and electrical codes.

**ATTENTION**

An incorrectly applied or installed controller can result in component damage or a reduction in product life. Wiring or application errors, such as undersizing the motor, incorrect or inadequate AC supply, or excessive ambient temperatures can result in malfunction of the drive.

This product contains ESD (Electrostatic Discharge) sensitive parts and assemblies. Static control precautions are required when installing, testing, servicing, or repairing this assembly. Component damage can result if ESD control procedures are not followed. If you are not familiar with static control procedures, refer to Allen-Bradley publication 8000-4.5.2, *Guarding Against Electrostatic Damage* or any other applicable ESD Protection Handbook.

## Contents of this Manual

This manual provides specific information relevant to the SLC Servo Module. The following table identifies the chapters, titles, and contents.

| Chapter | Title | Contents |
|---|---|---|
| 1 | Overview of the SLC Servo Module | Overview information about the product, its operation and hardware features. Describes interface selection, the module's use of inputs and outputs, and operating modes. |
| 2 | Selecting Power Supplies, Encoders and Drives | Information about selecting the hardware to support an SLC Servo Module. |
| 3 | Planning Hardware Installation | Interconnection diagrams for various hardware interfaces for communication with the SLC Servo Module. |
| 4 | Installing Your SLC Servo Module | Installation information. |
| 5 | Wiring the SLC Servo Module | Information about wiring fast inputs, outputs, Estop connections, power supplies, encoders and drive connections. |
| 6 | Testing Your SLC Servo Module Hardware | Information about powering up the SLC Servo Module, testing the Estop and the fast I/O, integrating the axis and testing the homing function. |
| 7 | Setting Up and Configuring Your SLC Servo Module | Information about applying power and configuring the SLC Servo Module using command parameters. |
| 8 | Programming the SLC Processor to Run the SLC Servo Module | Information about blend move profiles, module communication interface, command, and status information. Describes discrete bit and block commands from the SLC Servo Module. |
| 9 | Programming System Variables | Describes discrete block commands for programming position and online system variables from the SLC processor. Information to understand servo module and processor status information. |

| Chapter | Title | Contents |
|---|---|---|
| 10 | Troubleshooting | Information about troubleshooting and error handling. |
| Appendix A | Input/Output Quick Reference | A quick reference of parameters, commands, status specifications, and move profiles. |
| Appendix B | Cable Specifications | Specifications and wiring diagram for 1746-HCA cable. |
| Appendix C | Application Examples | Applications examples for constructing programs using the SLC processor. |
| Appendix D | Wiring Without the Termination Panel | Information you need to wire the SLC Servo Module without a termination panel. |

## Related Documentation

The following documents contain additional information concerning Allen-Bradley SLC Servo and SLC products. To obtain a copy, contact your local Allen-Bradley office or distributor.

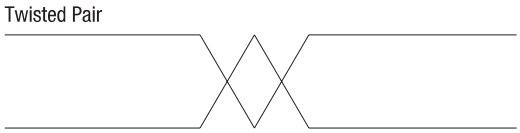
| For: | Read this Document: | Document Number: |
|---|---|---|
| An overview of the SLC 500 family of products | SLC 500 Controller System Overview | 1747-2.30 |
| A description of how to install and use your Modular SLC 500 programmable controller | SLC 500 Modular Hardware Style Installation & Operation Manual | 1747-6.2 |
| A description of how to install and use your Fixed SLC 500 programmable controller | SLC 500 Fixed Hardware Style Programmable Controllers Installation & Operation Manual | 1747-621 |
| A training and quick reference guide for APS | SLC 500 Software Programmer's Quick Reference Guide | ABT-1747-TSG001 |
| In-depth information on grounding and wiring Allen-Bradley programmable controllers | Industrial Automation Wiring and Grounding Guidelines | 1770-4.1 |
| An article on wire sizes and types for grounding electrical equipment | National Electrical Code | Published by the National Fire Protection Association of Boston, MA |
| A complete listing of current Allen-Bradley documentation, including ordering instructions. Also indicates whether the documents are available on CD-ROM or in multiple languages | Allen-Bradley Publication Index | SD499 |
| A glossary of industrial automation terms and abbreviations | Allen-Bradley Industrial Automation Glossary | AG-7.1 |

## Conventions Used in this Manual

The following conventions are used throughout this manual:

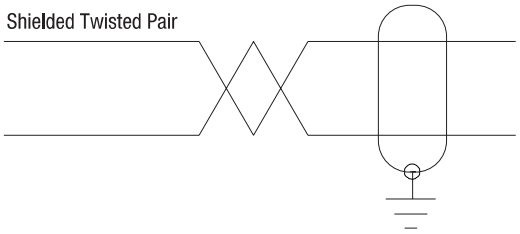
- Bulleted lists provide information, not procedural steps.
- Numbered lists provide sequential steps or hierarchical information.
- Words that you type or select appear in bold.
- Key names match the names shown and appear in capital letters.
- We use this symbol to represent a twisted pair:

**Figure 0.1 Twisted Pair Symbol**




- We use this symbol to represent a shielded twisted pair:

**Figure 0.2 Shielded Twisted Pair Symbol**




## Product Receiving and Storage Responsibility

You are responsible for thoroughly inspecting the equipment before accepting the shipment from the freight company. Check the item(s) you receive against your purchase order. If any items are obviously damaged, it is your responsibility to refuse delivery until the freight agent has noted the damage on the freight bill. Should you discover any concealed damage during unpacking, you are responsible for notifying the freight agent. Leave the shipping container intact and request that the freight agent make a visual inspection of the equipment.

Leave the product in its shipping container prior to installation. If you are not going to use the equipment for a period of time, store it:

- in a clean, dry location
- within an ambient temperature range of 0° to 65°C (32° to 149°F)
- within a relative humidity range of 5% to 95%, non-condensing
- in an area where it cannot be exposed to a corrosive atmosphere
- in a non-construction area

## Rockwell Automation Support

Rockwell Automation offers support services worldwide, with over 75 sales/support offices, 512 authorized distributors, and 260 authorized systems integrators located throughout the United States. In addition, Rockwell Automation representatives are located in every major country in the world.

### Local Product Support

Contact your local Rockwell Automation representative for:

- sales and order support
- product technical training
- warranty support
- support service agreements

### Technical Product Assistance

If you need to contact Rockwell Automation for technical assistance, please review the information in the *Troubleshooting* chapter first. Then call your local Rockwell Automation representative. For the quickest possible response, we recommend that you have the catalog number of your products available when you call. The Rockwell Automation Technical Support number is:

**1-603-443-5419**

## On the Web

For information about Allen-Bradley, visit the following World Wide Web site:

**http://www.ab.com/**

# Overview of the SLC Servo Module

This chapter explains the basic functions of the SLC Servo Module, and its hardware requirements. This chapter includes the following SLC Servo Module topics:

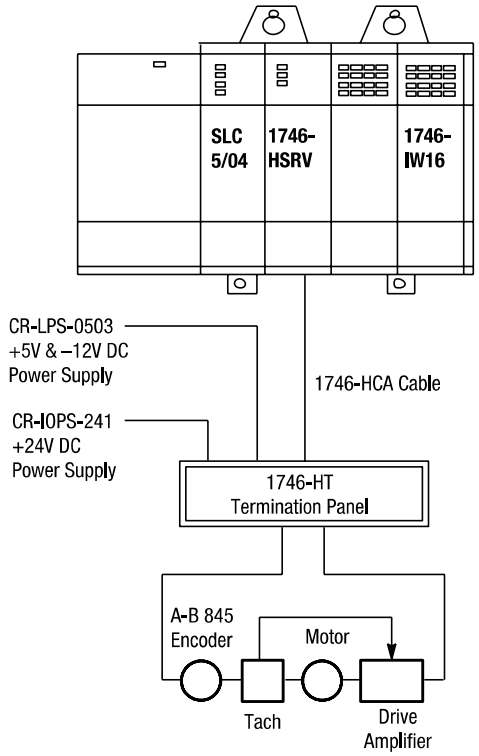
- Overview
- Operation
- Specifications and compatibility

## SLC Servo Module Overview

The SLC Servo Module (catalog number 1746-HSRV) is compatible with the SLC 500 family and only used with SLC 5/03™ FRN 5.0, SLC 5/04™, or SLC 5/05™ SLC Servo Modules. The SLC Servo Module is programmed for incremental, absolute or speed moves, depending on the application.

**IMPORTANT** Place the SLC Servo Module as close to the SLC processor as possible

**Figure 1.1 Example of an SLC Wiring**




## SLC Servo Module Operation

The SLC Servo Module, compatible with the SLC family, is used with SLC 5/03 FRN 5.0 (and above) processors using RSLogix 500, AI500 or APS (version 5.0 or higher) software. Once the SLC processor is initiated, the execution of the motion block is independent of the scan time of the processor. Blended motion allows for complicated move profiles consisting of two to thirty-two segments. The blended move profiles are stored in the SLC Servo Module's memory as a series of absolute moves and can be executed more than once. Other move or homing operations can be performed between blended move profiles.

The SLC Servo Module controls absolute position over a range of 32 bits. The SLC Servo Module performs an origin search (also called homing) and automatically resets the absolute position to the home position when the SLC processor requests a search function after detecting one of the following:

- Encoder marker
- Limit switch
- Limit switch and marker

The SLC Servo Module operates in two modes:

- Configuration
- Command

When operating in the configuration or the command mode, the status of the module is reported to the SLC processor.

## Configuration Mode Operation

You can enter configuration mode only if the system is in Estop. In the SLC Servo Module, you configure the SLC Servo Module by using M files containing data provided by the SLC 5/03 (or versions listed above) processors. All configuration parameters are internal to the SLC Servo Module and stored in non-battery backed RAM.

In configuration mode, you select the proper setup configuration to match the servo drive and motor without setting switches and without special software. If you do not set up your own configuration, the configuration is set to the default setting.

## Command Mode Operation

Motor operations are performed in command mode. To operate in this mode, set the mode flag (bit 15 in output word 0) to 0. In the command mode, the SLC processor issues commands and activates the following operations or moves:

- Absolute moves
- Incremental moves
- Speed moves
- Monitor moves
- Hold moves
- Unhold moves
- Blend moves
- Emergency stop operations
- Homing operations
- Preset operations
- Clear faults
- Alternate home moves

## SLC Servo Module Specifications and Compatibility

Selected specifications for the SLC Servo Module appear in the table below.

| SLC Servo Module | Specification |
|---|---|
| Class | 3 |
| Number of Input Words | 12 |
| Number of Output Words | 12 |
| Selection for Configuration | OTHER<br>(with 10114 as the number specified) |
| Configuration Mode | Uses M files |
| Recommended I/O Slot in SLC Rack | Slot 1 or the lowest numbered I/O slot for SLC applications using the module interrupt option.[1,2] |
| Number of HSRVs in one rack | 12<br>with proper power supply |

[1] There must not be other modules that generate module interrupts. Also, the STI and FAULT routines execute at a higher priority than the module interrupt routine that is linked to the SLC Servo Module interrupt.

[2] The SLC Servo Module does not function in a remote I/O rack.

The SLC Servo Module is compatible with:

- SLC 5/03 FRN 5.0 (and above) processors.
- RSLogix 500, AI500, or APS (version 5.0 or higher) software.

## Mounting the Termination Panel

Refer to the Figure 4.3 and Figure 4.4 when mounting the 1746HT termination panel.

To mount the 1746HT termination panel:

1. Snap the termination panel onto the DIN-type rail (1492-DR2).
2. Position an end anchor on either end of the termination panel.
3. Secure the panel by tightening the end anchor screws.

The end anchor prevents the termination panel from sliding in either direction on the DIN rail.

**Figure 4.3 Mounting the Termination Panel**