

User Manual



## 1768 CompactLogix Controllers

Catalog Numbers 1768-L43, 1768-L45

 Allen-Bradley • Rockwell Software**Rockwell  
Automation**

# Chapter 1

## 1768 CompactLogix Overview

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### About the 1768 CompactLogix Controllers

The CompactLogix system is designed to provide a solution for machine-level control applications with I/O, motion, and network requirements.

The 1768-L43 and 1768-L45 controllers offer one built-in serial port and have a key on the front panel so that you can change controller modes.

**TIP** If you need replacement keys, use part number 1768-KY1.

Table 1 - CompactLogix Chassis

| CompactLogix Controller | Available 1768 Slots | Number of 1768 Communication Modules, Max | Type of Communication Modules | Number of 1768-M04SE Modules, Max | Number of Connections Supported, Max |
|-------------------------|----------------------|-------------------------------------------|-------------------------------|-----------------------------------|--------------------------------------|
| 1768-L43                | 2                    | 2                                         | 1768-ENBT                     | 2                                 | 250                                  |
|                         |                      |                                           | 1768-EWEB                     |                                   |                                      |
| 1768-L45                | 4                    | 2                                         | 1768-CNB                      | 4                                 |                                      |
|                         |                      |                                           | 1768-CNBR                     |                                   |                                      |

Table 2 - CompactLogix Communication Modules

| Communication Module   | Function                                                                                            |
|------------------------|-----------------------------------------------------------------------------------------------------|
| 1768-ENBT              | Module for Ethernet/IP communication                                                                |
| 1768-EWEB              | Web server module for the remote monitoring and modification of data via an XML web page raw socket |
| 1768-CNB and 1768-CNBR | Modules for ControlNet communication                                                                |

## Software and Firmware Compatibility

- IMPORTANT** Attempting to use controllers with incompatible software and firmware revisions can result in the following:
- An inability to connect to the controller
  - Unsuccessful firmware upgrades in ControlFLASH™ or AutoFlash utilities

This table shows the compatible pairs of software versions and controller firmware revisions.

| Controller | RSLogix 5000 Software Version or Later | Controller Firmware Revision or Later |
|------------|----------------------------------------|---------------------------------------|
| 1768-L43   | 16.00.00                               | 16.025                                |
| 1768-L45   | 16.03.00                               | 16.025                                |
| 1768-L43   | 17.01.02                               | 17.012                                |
| or         | 19.01.00                               | 19.015                                |
| 1768-L45   | 20.01.00                               | 20.013                                |

## Design a System

When designing a CompactLogix system, determine the network configuration and the placement of components in each location. You need to do the following:

- Select I/O devices for your DIN-rail or panel-mounted system.
- Establish motion control and drives requirements.
- Select communication modules.
- Select controllers.
- Select power supplies.
- Mount the system.
- Select software.



#### ATTENTION: Prevent Electrostatic Discharge

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

## Verify Compatibility

- IMPORTANT** Attempting to use controllers with incompatible software and firmware revisions can result in the following:
- An inability to connect to the controller
  - Unsuccessful firmware upgrades in ControlFLASH or AutoFlash utilities

This table shows the compatible pairs of software versions and controller firmware revisions.

| Controller                 | RSLogix 5000 Software Version or Later | Controller Firmware Revision or Later |
|----------------------------|----------------------------------------|---------------------------------------|
| 1768-L43                   | 16.00.00                               | 16.025                                |
| 1768-L45                   | 16.03.00                               | 16.025                                |
| 1768-L43<br>or<br>1768-L45 | 17.01.02                               | 17.012                                |
|                            | 19.01.00                               | 19.015                                |
|                            | 20.01.00                               | 20.013                                |

## Required System Components

You need these parts when installing your controller:

- 1768-L43 or 1768-L45 CompactLogix controller
- 1768-PA3 or 1768-PB3 power supply
- 1769-ECR end cap
- Mounting screws (M4 or #8 panhead) or one of these EN 50 022 DIN rails:
  - 35 x 7.5 mm (1.38 x 0.30 in.)
  - 35 x 15 mm (1.38 x 0.59 in.)
- 1756-CP3 serial cable (or make your own)

Follow these requirements to determine proper placement of your 1768 controller, power supply, 1768 I/O modules, and 1769 I/O modules:

- Place the 1768-L4xx controller so that it is the last module (furthest away from the power supply) in the 1768 backplane.
- The 1768 CompactLogix power supply distributes power from the right side of the supply and must be the leftmost module in the system.
- Up to eight 1769 I/O modules can reside in the local bank.
- The local bank is powered by a 1768 power supply.
- Up to two remote banks of 1769 I/O modules may be connected by using 1769-CRLx extension cables.
- Remote banks are powered by a standard 1769 power supply.
- Up to eight 1769 Compact I/O modules can reside on each side of a 1769 power supply in a remote bank. Consult the module's specifications for its distance rating.

**IMPORTANT** Never place a 1769 power supply in a local bank with a 1768 controller or a major fault will occur.

- The type of controller determines the maximum number of 1768 modules that can reside in the local bank and the maximum number of 1769 I/O modules that can reside in one local and up to two remote banks.

| Controller | Max Local 1768 Modules | Max 1769 I/O Modules (local and remote) |
|------------|------------------------|-----------------------------------------|
| 1768-L43   | 2                      | 16                                      |
| 1768-L45   | 4                      | 30                                      |

## Installation Summary

Follow these steps to install your controller.

1. Mount the controller to a panel or on a DIN rail.

**IMPORTANT** Do not use screws if using a DIN rail to mount the controller. You can break the mounting tabs if you screw the controller to a panel while it is on a DIN rail.

2. Confirm the installation.
3. Connect the controller.
4. Configure a serial or Ethernet driver.
5. Install a CompactFlash card (optional).
6. Download and install controller firmware.

## Chapter 6

### Place 1768 and 1769 Modules

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The 1768 CompactLogix controllers combine a 1768 backplane with a 1769 backplane. This combination includes the advantages of the 1768 architecture while retaining the advantages of 1769 I/O support.

#### 1768 Module Placement

Follow these guidelines as you place modules in the 1768 backplane.

| 1768 CompactLogix Controller | Guidelines                                                                                                                                                                                                                                                                                                                         |
|------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1768-L43 and 1768-L45        | The 1768 power supply must be the leftmost module in the 1768 backplane.                                                                                                                                                                                                                                                           |
|                              | The controller must be the rightmost module in the 1768 backplane.                                                                                                                                                                                                                                                                 |
|                              | Up to two 1768 communication modules can reside between the controller and power supply in any one of these combinations: <ul style="list-style-type: none"> <li>• 1768-ENBT or 1768-EWEB for EtherNet/IP communication (maximum of two)</li> <li>• 1768-CNB or 1768-CNBR for ControlNet communication (maximum of two)</li> </ul> |
| 1768-L43                     | Two chassis slots are available.                                                                                                                                                                                                                                                                                                   |
|                              | The controller supports a maximum of 3 banks for a total of 16 modules.                                                                                                                                                                                                                                                            |
| 1768-L45                     | Four chassis slots are available.                                                                                                                                                                                                                                                                                                  |
|                              | The controller supports a maximum of 3 banks for a maximum of 30 modules.                                                                                                                                                                                                                                                          |
|                              | Up to four 1768-M04SE for SERCOS motion control modules can be used.                                                                                                                                                                                                                                                               |

## 1769 Module Placement

The CompactLogix controllers support the following:

- 1768-L43, a maximum of 16 local 1769 I/O modules
- 1768-L45, a maximum of 30 local 1769 I/O modules

Follow these guidelines as you place 1769 modules to the right of the 1768 controller:

- Up to eight 1769 modules can be attached to the right of the 1768 system.
- The 1769 I/O modules connected directly to the 1768 controller do not need a 1769 power supply.

---

**IMPORTANT** Never put a 1769 power supply in the 1768 backplane. A 1769 power supply in the 1768 backplane causes the controller to generate a major fault that cannot be cleared until you remove the 1769 power supply.

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- Additional 1769 modules must be in additional I/O banks.
- Each additional I/O bank must have its own power supply. Use any 1769 power supply.
- Each 1769 module also has a power supply distance rating, which is the number of modules from the power supply.

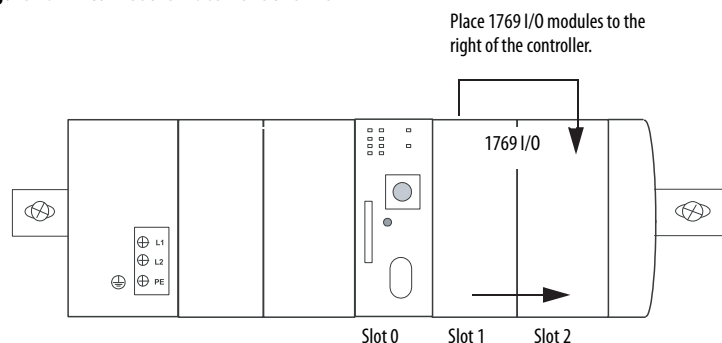
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**IMPORTANT** Each module must be within its distance rating. See the specifications for the module to determine its distance rating.

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- Place up to eight 1769 I/O modules to the left or the right of the 1769 power supply.
- Each additional I/O bank must connect to the main rack by using standard 1769-CRLx extension cables.

**Figure 10 - 1769 Module Placement Overview**



The 1769 slots are numbered left to right, starting with the controller as slot 0.

## Define Tasks

A task provides scheduling and priority information for a set of one or more programs. You can configure tasks as continuous, periodic, or event.

**Table 24 - Types of Logix5000 Controller Tasks**

| Task Execution                                                                                      | Task Type  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| All of the time                                                                                     | Continuous | <p>The continuous task runs in the background. Any CPU time not allocated to other operations, such as motion, communication, and other tasks, is used to execute the programs in the continuous task:</p> <ul style="list-style-type: none"> <li>The continuous task runs constantly. When the continuous task completes a full scan, it restarts immediately.</li> <li>A project does not require a continuous task. If used, there can be only one continuous task.</li> </ul>                                                                                         |
| At a set interval, such as every 100 ms<br>or<br>Multiple times within the scan of your other logic | Periodic   | <p>A periodic task performs a function at a specific interval:</p> <ul style="list-style-type: none"> <li>Whenever the time for the periodic task expires, the task interrupts any lower priority tasks, executes once, and then returns control to where the previous task left off.</li> <li>You can configure the time period from 0.1...2000 <math>\mu</math>s. The default is 10 ms. It is also controller and configuration dependent.</li> <li>The performance of a periodic task depends on the type of Logix controller and on the logic in the task.</li> </ul> |
| Immediately when an event occurs                                                                    | Event      | <p>An event task performs a function only when a specific event (trigger) occurs. In a 1768 CompactLogix controller, the trigger for the event task can be any of the following:</p> <ul style="list-style-type: none"> <li>Consumed tag trigger</li> <li>EVENT instruction</li> <li>Axis trigger</li> <li>Motion event trigger</li> </ul>                                                                                                                                                                                                                                |

- The 1768-L43 controller supports 16 tasks, only 1 of which can be continuous.
- The 1768-L45 controller supports 30 tasks, only 1 of which can be continuous.

A task can have as many as 32 separate programs, each with its own executable routines and program-scoped tags. Once a task is triggered (activated), all of the programs assigned to the task execute in the order in which they are grouped. A program can appear only once in the Controller Organizer and cannot be shared by multiple tasks.

## Chapter 9

### Develop Motion Applications

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The CompactLogix L4x controllers utilize the 1768-M04SE SERCOS modules for motion control. Each 1768-M04SE module supports up to 4 axis. The following table describes motion capability.

**Table 26 - 1768 CompactLogix Controller Motion Support**

| Controller | SERCOS modules | Axes | Kinetix Drives | Motors Axes | Feedback Axes | Virtual Axes |
|------------|----------------|------|----------------|-------------|---------------|--------------|
| 1768-L43   | 2              | 4    | 4              | 4           | 2             | 6            |
| 1768-L45   | 4              | 8    | 8              | 8           | 4             | 6            |

If your solution requires more than eight Kinetix® drives, consider the ControlLogix platform.

## Chapter 11

### Use a CompactFlash Card

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CompactLogix controllers only support nonvolatile storage through CompactFlash memory cards.

#### Use a CompactFlash Card to Store a Project

You can load a project from the nonvolatile memory of a CompactFlash card to the user memory of a controller at these times:

- On every power-up
- On corrupt memory
- Anytime through RSLogix 5000 software



**ATTENTION:** Fault conditions can occur if the controller types do not match. For example, if the project on the CompactFlash card and the controller firmware were created for a 1768-L43 controller, and then an attempt was made to load that program and/or firmware into a 1768-L45 controller.

#### IMPORTANT

The project and firmware version on the CompactFlash card is loaded into the controller. If the contents of the CompactFlash card are a different revision than the revision that is on the controller, then the controller will be updated to the revision on the CompactFlash card.



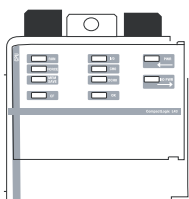
**ATTENTION:** Do not remove the CompactFlash card while the controller is reading from or writing to the card, as indicated by a flashing green CF status indicator. Doing so could corrupt the data on the card or in the controller, as well as corrupt the latest firmware in the controller.

## Appendix A

### Status Indicators

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#### CompactLogix Controller Status Indicators



The following table describes the CompactLogix controller status indicators. The table also provides controller behavior interpretations and offers you recommended actions.

**Table 35 - Status Indicators**

| Indicator | Status         | Description                                                                                                                                                                                         | Recommended Actions                      |
|-----------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------|
| RUN       | Off            | The controller is in Program or Test mode.                                                                                                                                                          |                                          |
|           | Green          | The controller is in Run mode.                                                                                                                                                                      |                                          |
| FORCE     | Off            | <ul style="list-style-type: none"> <li>No tags contain I/O force values.</li> <li>I/O forces are inactive (disabled).</li> </ul>                                                                    | Normal operation. No action is required. |
|           | Steady amber   | <ul style="list-style-type: none"> <li>I/O forces are active (enabled).</li> <li>I/O force values may or may not exist.</li> </ul>                                                                  |                                          |
|           | Flashing amber | One or more input or output addresses have been forced to an On or Off state, but the forces have not been enabled.                                                                                 |                                          |
| MEM SAVE  | Off            | The user program and configuration data are not actively being saved to flash memory.                                                                                                               |                                          |
|           | Green          | The user program and configuration data are being saved to flash memory.                                                                                                                            |                                          |
| I/O       | Off            | <ul style="list-style-type: none"> <li>There are no devices in the I/O configuration of the controller.</li> <li>The controller does not contain a project (controller memory is empty).</li> </ul> | Normal operation. No action is required. |
|           | Steady green   | The controller is communicating with all of the devices in its I/O configuration.                                                                                                                   |                                          |

**Table 35 - Status Indicators (Continued)**

| Indicator | Status       | Description                                                                                                                                                                                                         | Recommended Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| I/O PWR   | Off          | Either the controller or the power supply is not operating properly.                                                                                                                                                | To recover from this fault, perform this procedure.<br>1. Make sure all modules in the system are installed properly and fully engaged with each other.<br>If the controller PWR status indicator remains off, proceed to the next step.<br>2. Disconnect any 1768 communication or motion modules from the system.<br>3. Reinstall the controller directly next to the power supply and reapply power.<br>4. If the controller PWR status indicator remains off, replace the controller.<br>5. If the controller PWR status indicator on the new controller remains off, replace the power supply. |
|           | Steady green | The controller is sending power to the 1768 modules as it should.                                                                                                                                                   | Normal operation. No action is required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|           | Steady red   | <ul style="list-style-type: none"> <li>The controller needs to be replaced.</li> <li>If 1768 communication and motion modules are installed in the system, one of the 1768 modules needs to be replaced.</li> </ul> | Perform this procedure.<br>1. Disconnect all of the 1768 communication and motion modules from the system.<br>2. Reapply power.<br>3. Check the controller PWR status indicator.<br>a. If the status indicator is green, the controller is operating properly and one of the other 1768 modules needs to be replaced.<br>b. To troubleshoot the 1768 modules, see their respective installation instructions.<br>c. If the status indicator remains red, replace the controller.                                                                                                                    |

## CompactFlash Card Status Indicator



**ATTENTION:** Do not remove the CompactFlash card while the controller is reading from or writing to the card, as indicated by a flashing green CF status. This could corrupt the data on the card or in the controller, as well as corrupt the latest firmware in the controller.

| Indicator | Condition      | Description                                                         |
|-----------|----------------|---------------------------------------------------------------------|
| CF        | Off            | No activity.                                                        |
|           | Flashing green | The controller is reading from or writing to the CompactFlash card. |
|           | Flashing red   | CompactFlash card does not have a valid file system.                |

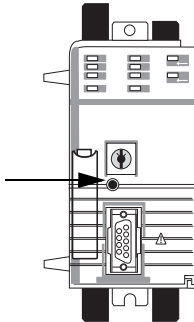
## RS-232 Serial Port Status Indicators

The RS-232 serial port has two status indicators.

| Indicator | Condition      | Description                                                                |
|-----------|----------------|----------------------------------------------------------------------------|
| DCH0      | Off            | Channel 0 is configured differently than the default serial configuration. |
|           | Steady green   | Channel 0 has the default serial configuration.                            |
| CH0       | Off            | There is no RS-232 activity.                                               |
|           | Flashing green | There is RS-232 activity. No action is required.                           |

## Appendix A Status Indicators

### Faceplate Push Button



On the faceplate of the controller, there is a recessed push button.

**Table 36 - Push Button Actions**

| If you access the push button            | The action                                              |
|------------------------------------------|---------------------------------------------------------|
| After power is applied to the controller | Resets the RS-232 configuration setting to the defaults |
| While the controller is powering up      | Clears the user program from controller memory          |



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