Ovation™ Compact Controller Model OCC100

Features

- Secure, reliable, and mission-critical control capability for remotely located plants or processes
- Modular I/O base design for flexible placement within space-constrained areas
- Optional configuration as a standalone system using an Ovation remote station
- Low power requirements
- Expanded operating temperature range
- Provides “bumpless,” automatic failover between redundant Controllers with optional non-redundant configuration
- Uses standard Ovation engineering tools for configuration and maintenance
- Includes wide area network communication capability that tolerates low bandwidth or intermittent networks
- Embedded communication protocol drivers provide connectivity with third-party devices without the need for extra hardware
- Compatible with all Ovation I/O modules including specialty versions for excitation control and machinery health monitoring as well as high-density modules with increased channel capacity

Introduction

Emerson’s Ovation™ distributed control system is renowned for delivering precision control with outstanding performance. That precision begins with the Ovation Controller.

The Ovation Compact Controller, model OCC100, cost-effectively expands Ovation’s portfolio of solutions to applications that benefit from direct control located near plant equipment.

Placing an Ovation OCC100 Controller close to field devices significantly lowers costs associated with field wiring, terminations, and circuit checking compared to traditional controllers located in a control room.

A wide operating temperature range allows the Compact Controller to safely function in challenging environments.

The OCC100's modular architecture with I/O layout options accommodates space-constrained settings without disrupting the existing infrastructure.

A datalink protocol suite, built into the OCC100, enables a direct interface to third-party I/O or other devices, such as programmable logic controllers (PLCs), programmable automation controllers (PACs), and real-time automation controllers (RTACs), without the need for extra hardware.

In addition to standard Ovation local area network connections, the OCC100 can also communicate through a wide area network. This option allows an Ovation Controller node to be placed in an area that cannot easily access an Ovation network.

The Controller communicates securely through an internet protocol (IP) connection using a wide variety of wired and wireless media options. Process control continues even if the connection to the host system is lost.

When paired with an Ovation remote station, the OCC100 can operate as a standalone control system.

Process Applications

The Ovation OCC100 Controller is designed to meet the demanding requirements of a broad range of process applications. Functions performed by this scalable Controller include:

- Continuous (PID) control
- Sequential function chart control
- Boolean logic
- Advanced control
- Special logic and timing functions
- Data acquisition
- Sequence of events processing
- Process point sensor/limit checking
- Process point alarm processing
- Process point conversion to engineering units
- Process point database storage
- Local and remote I/O interface
- Process point tagout

Standard Functions

Control Execution

Like the Ovation OCR1100 Controller model, the OCC100 executes simple to complex modulating, discrete, and sequential control strategies, and performs data acquisition and monitoring functions. The Controller can update the values of up to 10,000 points.

The OCC100 Controller simultaneously executes up to three process control tasks at loop speeds ranging from 10 milliseconds to 300 seconds. Each control task loop is comprised of the I/O process point input scan, control scheme execution, and an output scan. For Ovation systems operating with 3.5.1 or 3.6 software releases, two of the control tasks use predefined loop speeds of one second and 100 milliseconds. The third control task's loop speed is user-selectable, from 10 milliseconds to 300 seconds. Ovation systems with 3.7 and newer software releases, all three control task loop speeds are user-selectable in the same range.

Control Scheme

OCC100 functionality is defined by control sheets created from an extensive library of standard and advanced Ovation algorithms specifically designed for the power, water, and wastewater industries. Control sheets provide the basis for executing, documenting, and automatically creating control tuning diagrams used during commissioning and when adjusting control schemes. On average, the OCC100 Controller can execute more than 1,000 control sheets.

Sequence-of-Events

An integral sequence of events processing capability is provided using Ovation I/O and standard Controller software. With a resolution of one millisecond, the sequence of events subsystem records the sequence in which a set of user-defined digital input indications change state, providing a valuable troubleshooting and diagnostic tool for high-speed electrical systems. In addition to the higher resolution time tags, sequence-of-events points may be used in control schemes like any other I/O point, including limit checking and alarming.

Alarm Processing

The OCC100 processes limits and alarms based on each process point's database definition. These functions are performed regardless of whether the point is scanned for input to a control loop or for data acquisition/monitoring, separate from control functions. The alarm status of each point in the Controller is updated with each scan. The status may indicate whether a point value has:

- Exceeded the range of the sensor
- Exceeded the user-defined limits
- Changed state (discrete points)
- Passed an incremental limit

Alarm reporting can be delayed on a per-point basis for a user-specified period. The OCC100 generates alarms upon exceedance of:

- Five user-specified high limit values
- Highest limit value plus an integer times an incremental value
- Five user-specified low limit values
- Lowest limit value less an integer times an incremental value

Redundancy

The OCC100 Controller and I/O system support a full range of configurations from small-scale simplex, non-redundant layouts to full redundancy of control processors, power supplies, and communications network equipment.

Redundant configurations feature completely “bumpless” fail-over from the primary Controller to the backup Controller, regardless of the nature of the fault that disables the primary Controller.

Real-Time Operating System Functions

The OCC100 Controller processes data for real-time control and communication functions using a commercially available, multitasking, real-time operating system. It executes and coordinates the control of multiple application areas by using multi-tasking with pre-emptive priority scheduling.

The real-time operating system communicates with the Ovation network and other systems through TCP/IP-based protocols, provides basic routing functions, and offers general resource management within the Controller.

Footprint Options

The OCC100 Controller supports the full range of Ovation analog, digital, turbine, high density, interface, excitation, and machinery health monitor I/O modules to meet application needs. The modules plug directly into OCC100 I/O bases. Two Controller base and two I/O base footprint options are available, and both are ideal for fitting into space-constrained settings without disrupting the existing infrastructure.

The Compact Controller can be provided in either a simplex or redundant base configuration. The simplex base, equipped with a single I/O branch connector, accommodates applications that don’t require redundancy and have minimal I/O requirements.

The four-slot horizontal I/O base option fits into cabinets as narrow as 19 inches or can be bolted to a 19-inch rack-mounting bracket. Field wiring or wiring from existing terminal blocks is directly connected to screw terminal blocks beneath the I/O modules. For smaller footprints, the two-module I/O base can be placed side-by-side or in various other configurations within an existing cabinet with minimal changes. Field cabinet wiring is minimized by using pluggable screw terminal blocks located on the two-slot I/O base.

Emerson can supply standard or custom enclosures to accommodate specific requirements for plate sizes, cabinet sizes, construction materials, environmental ratings, cabinet interior, and exterior accessories, termination options, and marshaling.

Standalone Configuration

An Ovation standalone configuration can be implemented for applications that do not require a full Ovation architecture for operation. The independent system requires an OCC100 Controller with an Ovation remote station. I/O can be connected if required.

The remote station is a computer equipped with the Ovation software needed to operate as an independent, compact Ovation system. Included with the Ovation remote station is software for database server, engineering, operating, and domain controller functions.

Additional software for Historian, SCADA server, advanced applications, EDS feeder, OPC server, and cybersecurity functions can be provided as options.

The Ovation remote station is available on three hardware platforms:

- A panel PC with robust environmental specifications that can be located with the OCC100 Controller
- A rack-mount PC for placement in environments that require a wider operating temperature range than the available with the panel PC
- A desktop PC for controlled environments

Connectivity

The OCC100 includes embedded Ethernet link protocol drivers for communicating with intelligent electronic devices (IEDs) and other third-party devices equipped with embedded Controllers such as smart inverters, weather stations, protective relaying systems, or motor control centers.

The scalable Controller performs data acquisition functions by communicating with Ethernet-capable I/O systems available from numerous vendors and various types of PLCs, PACs, and RTACs using the onboard communication protocol drivers.

The OCC100 can acquire smart field device information for archiving to the Historian, displaying on a workstation connected to the Ovation network, or for use with asset management functions through Emerson's AMS Suite technologies or Ovation machine works software.

Network Options

The OCC100 uses two methods to communicate with the Ovation network. The first method is through a direct, local area network connection like the OCR1100 Controller model.

Optionally, the OCC100 can communicate over a wide area network, allowing an Ovation drop to operate in an area not readily accessible to the Ovation network. In this case, the OCC100 uses an Ethernet connection, such as a VPN or cellular network, to communicate with the host Ovation network. This method allows the control processes to continue at the remote location even if the connection to the host Ovation system is lost.

Each Compact Controller includes two network interface cards that support gigabit Ethernet communications per the IEEE 802.3-2008 standard.

Summary

The OCC100 Controller extends Ovation's reach to applications that benefit from control close to plant equipment.

The modular architecture provides cost-effective and scalable footprints for space-constrained areas. A wider temperature operating range allows the equipment to be placed in environmentally challenging locations.

Local and wide area networking options are available for connecting the OCC100 Controller and I/O subsystem to the Ovation network. When paired with an Ovation remote station, the OCC100 can operate as a standalone system.

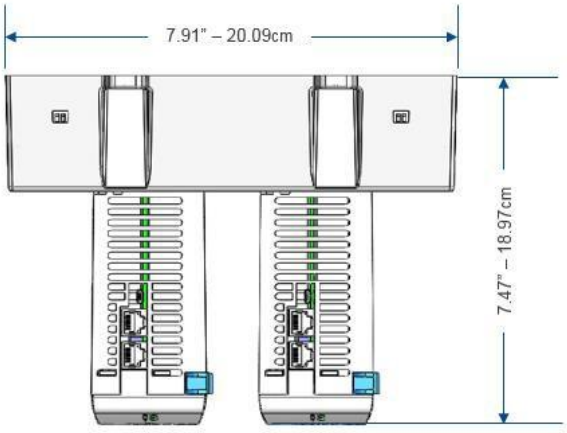
Controller and I/O Layouts

Compact Controller Base Options

Option 1 – Redundant Controller Base

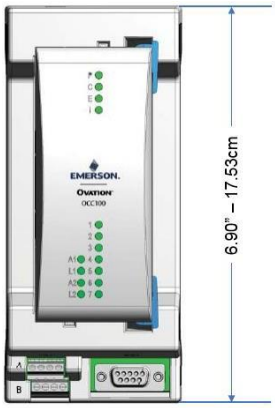
Front view

Top view

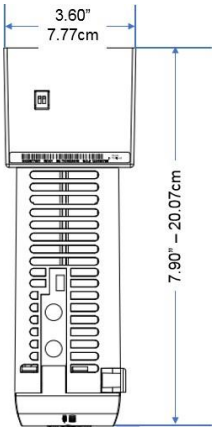


Option 2 – Simplex Controller Base

Front view



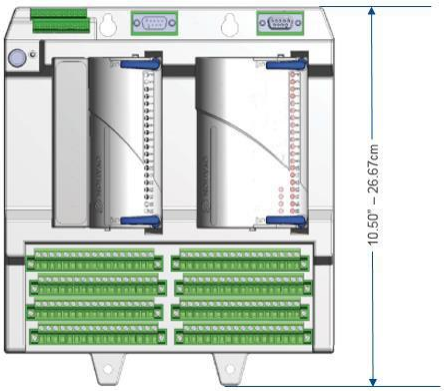
Top view



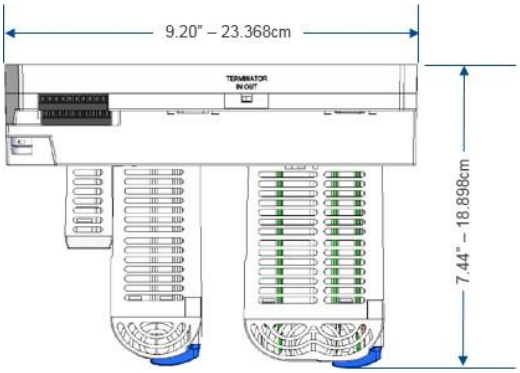
I/O Base Options

Option 1 – Two-Slot Horizontal I/O Base

Front view



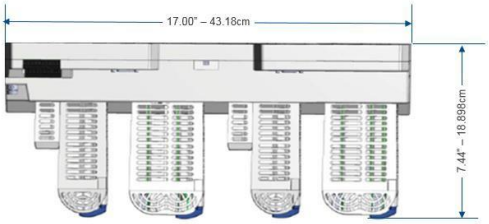
Top view



Option 2 – Four-Slot Horizontal I/O Base

Front view

Top view



Specifications

Solutions using an OCC100 Controller typically include Controller modules, Controller and I/O bases, power supply assemblies, and prefabricated cables for connecting the components.

Ovation Compact Controller OCC100 Specifications	
Controller module	▪ Xilinx Zynq SoC dual core 667 MHz Cortex A9 CPU ▪ 256 MB DDR3 SDRAM ▪ 1GB USB flash drive with onboard clear and format capability ▪ Hot-swappable ▪ Integrated module temperature monitoring
Simplex controller base	▪ 8-pin terminal block provides a flexible interface to power and power supply status ▪ One 9-pin D connector for 1 x 8-module branch of Ovation I/O ▪ DIN-rail mountable
Redundant controller base	▪ Supports simplex or redundant Controller configurations; single-connection redundancy ▪ 20-pin terminal block provides a flexible interface power and power supply status ▪ Three 9-pin D connectors for 3 x 8-module branches of Ovation I/O ▪ Non-volatile controller MAC address storage modules in the base support hot-swapping of controller modules ▪ DIN-rail mountable with an adapter
Two-position horizontal I/O base	▪ Horizontal form factor accommodating two Ovation I/O modules ▪ Cable-end plug-to-header connections for field signal cable marshaling ▪ Supports I/O base daisy chaining with an integral bus termination device and bypass switch ▪ 20-pinin terminal block for power supply ▪ Earth ground through a short 14 AWG jumper from a dedicated terminal on the terminal block 20th position
Four-position horizontal I/O base	▪ Horizontal form factor accommodating four Ovation I/O modules ▪ Heavy duty screw clamp signal cable terminations – no in-cabinet terminal strip required ▪ Supports I/O base daisy chaining with an integral bus termination device and bypass switch ▪ 20-pinin terminal block for power supply ▪ Earth ground through a short 14 AWG jumper from a dedicated terminal on the terminal block 20th position
Remote node interface	▪ Supports up to 16 Ovation remote node interface nodes; each node supports up to 64 Ovation I/O modules
I/O options	I/O licensing options available for simplex or redundant configurations: ▪ Tier 1 (0 - 25 I/O points) ▪ Tier 2 (26 - 50 I/O points) ▪ Tier 3 (51 - 100 I/O points) ▪ Tier 4 (101 - 250 I/O points) ▪ Tier 5 (unlimited I/O points)

Ovation Compact Controller OCC100 Specifications	
Supported Protocols	Refer to the Communication Protocol Software Compatibility Matrix data sheet for more information.
Operating temperature	-20°C to +70°C
Certifications	IEC61131-2 and CE Mark
Ethernet ports	2 Ethernet ports per controller module- 2 independent MACs on the redundant controller base,10/100/1000 Base T, RJ45 connectors
Simplex controller electronics module +24V main power	▪ 5.8W typical ▪ 6.4W maximum