Ovation™ Controller Model OCR3000

Features

- Quad-core processor system-on-a-chip architecture

- Parallel scan support for 16 I/O branches

- Single module solution for the Ovation Controller and I/O interface

- Controller and network redundancy support

- Compatible with all Ovation I/O modules

- Application compatible with the OCR1100 Controller

- Copper and Small Form-factor Pluggable (SFP)-based Ethernet connections

- Integrated backplane communications between primary and backup Controllers

- Cryptographic signing of all Controller firmware files

- CE Mark certified

- IEC 61131-2 compliant

Introduction

Emerson's Ovation™ distributed control system is renowned for delivering precision control with outstanding performance. The Ovation Controller is designed specifically for mission-critical operations in power and water/wastewater applications.

The OCR3000 model of the Ovation Controller series is the successor to the Ovation OCR1100 Controller. The OCR3000 combines the processor and the IOIC modules into a single module. The Ovation OCR3000 Controller provides an interface for up to 16 branches of local I/O. The I/O interface remains identical to all previous models of Ovation OCR Controllers. The OCR3000 Controller scans all 16 I/O branches in parallel providing a significant performance increase.

Process Applications

The OCR3000 Controller is designed to meet the demanding requirements of a broad range of process applications, which include:

- Continuous PID (proportional–integral–derivative) control
- Sequential function chart control

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- Boolean logic
- Advanced control
- Model Predictive Control
- Fuzzy logic
- Neural Network
- 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

Control Execution

Like the Ovation OCR1100 Controller model, the OCR3000 executes complex modulating, discrete, sequential control strategies, as well as performing data acquisition and monitoring functions. The OCR3000 Controller can originate a maximum of 64,000 points.

With the quad core processor, the OCR3000 Controller supports up to five control tasks at loop speeds ranging from 10 milliseconds to 300 seconds. Each control task is comprised of the I/O process point input scan, control scheme execution, and an output scan.

All five control tasks have user-selectable loop speeds. Each of these five control tasks can range from 10 milliseconds to 300 seconds.

Standard Functions

Comparing Standard Functions of Ovation Controller Model OCR3000 and OCR1100			
Function	**OCR1100**	**OCR3000**	**Notes**
Functionality defined by control sheets created from an extensive library of standard and advanced Ovation algorithms	X	X	
Local I/O interface	X	X	
Remote Node Interface (RNI)	X	X	
Remote Node Controller (RNC) ** RNC compatibility is scheduled for a later release of the OCR3000 Controller.	X	X	With the use of the new MAU assembly
Sequence of events processing	X	X	
Automatic Failover Control	X	X	

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Comparing Standard Functions of Ovation Controller Model OCR3000 and OCR1100			
Function	**OCR1100**	**OCR3000**	**Notes**
Watchdog detection	X	X	
Ability to pass smart field device information to any workstation on the Ovation network.	X	X	
Supported standard and specialty Ovation I/O	X	X	
Operator interface processing based on the database configuration for each point: • Sensor/limit checking • Alarm processing • Point conversion to engineering units • Point tagout	X	X	
Meets the requirements of process applications: • Continuous (PID) control • Boolean logic • Advanced control • Special logic and timing functions • Data acquisition • Cold junction compensation	X	X	
Can be expanded with add-on software licenses for simulation, virtual control, and advanced control.	X	X	
Utilize integrated backplane interface for redundancy communication between Primary and Backup Controller.		X	The backplane interface provides an "Ethernet like" interface that does not require a physical Ethernet connection between the two Controllers.
Supported formatting of the onboard compact flash		X	
Control mode and backup mode	X	X	
Redundancy	X	X	
Compliant to CE Mark requirements	X	X	
Meets IEC 61131-2 standard	X	X	

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Controller Backplane

The OCR3000 Controller backplane introduces several new features and enhancements that are not found in previous generations of Ovation Controllers. The backplane includes the necessary connections to support up to two nodes (16 branches) of local Ovation I/O, the redundancy communications channel between primary and backup Controller as well as the Network Interface Connectors (NICs).

There are two versions of the OCR3000 backplane depending on the required Ethernet media type:

- 4 Copper RJ45 ports per Controller
- 2 Copper RJ45 ports and 2 SFP ports per Controller

Redundancy

The OCR3000 supports both Controller and network redundancy. The Ovation OCR3000 Controller incorporates numerous I/O interface modules within an integrated redundant Controller architecture. Local Ovation I/O is located close to the Controller and connected through copper cabling. The Ovation OCR3000 Controller is a fully redundant system comprised of redundant Controller modules and a backplane. Redundant Ovation network connections can be made by UTP or SFP connections on the backplane to each respective Controller in the pair. Redundant 24V powering is connected to each of the Controllers in the redundant pair.

The integrated backplane communications channel provides a high-speed communication link between the two Controllers in a redundant pair. This eliminates the need for a dedicated Ethernet cable and port between the primary and backup Controller for redundancy purposes.

Ovation Controller Cabinets

Ovation Controllers and I/O modules are all DIN rail mountable, providing the flexibility to match Controller layouts with process requirements for various locations, environments, and space availability. The normal configuration is to mount DIN rail items on plates which can then be installed in existing or new cabinet enclosures. Top and bottom entry for I/O cables is available to meet required specifications.

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A variety of Controller and I/O cabinet configurations are available. The basic Controller cabinet houses a chassis for single or redundant controllers and two I/O branches on the front of the plate. Mounted on the rear of the plate is a redundant power supply, power distribution module and two additional I/O branches for a total of 32 I/O modules since each I/O branch can hold up to eight I/O modules.
Expansion cabinets house up to an additional 32 I/O modules in four branches and a transition panel for connection to the Controllers. It can also provide additional space for mounting redundant power supplies (when required), and a power distribution module.

Ovation's standard cabinet structure is front and rear access but can be provided with front access only. Other custom or OEM (Original Equipment Manufacturer) cabinet enclosures are available to accommodate specific requirements for plate sizes, cabinet sizes, construction materials, environmental ratings, cabinet interior and exterior accessories, termination options, and marshaling cabinets.

OCR3000 Specifications

Ovation Controller Model OCR1100 - Specifications	
Item	**Capability**
SoC (System on a chip)	Zynq UltraScale+ MPSoC (Multiprocessor System on a chip)
Processor system	Application Processing System • Quad-core ARM® Cortex™ A53 • Operating frequency – 1200 MHz • Number of cores – 4
Originated points	Up to 64,000 points
Process control tasks	Up to 5 each with a different loop execution rate
Control task loop execution time	Ovation 3.8: All 5 tasks are user definable, with each task individually defined to execute at a rate between 10 milliseconds and 300 seconds in increments of 10 milliseconds.
DDR Memory	1GByte LPDDR4 SDRAM with ECC (error correcting code)
QSPI Flash (Boot)	32MByte (single chip) – expandable to 128MByte
USB Flash	Up to 1Gbyte – wear leveling, ECC
Console port	FTDI FT232 USB-UART – reliable enumeration

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Ovation Controller Model OCR1100 - Specifications	
Ethernet ports	• 4 UTP or 2 SFP/2 UTP – ports on backplane • PHY chip - one PHY per port • PHY-RGMII interface to SoC through PL side interface • Supports both auto MDI/MDIX (UTP) and Serializer/Deserializer (SerDes) Small Form-factor Pluggable (SFP) • 10/100/1000 MBPS
Ambient air temperature	0-60°C or 32-140°F
Power	24VDC
Humidity	0 - 95% RH through an ambient air temperature range of 0-60°C (with a maximum wet bulb temperature not over 35°C)
Mac address storage	• EEPROM. • Removable module on Controller backplane – one per Controller • Uses a unique range of MAC addresses
I/O interface	• 16 local Ovation I/O branches supported • 16 branches scanned in parallel • All Ovation I/O supported
LEDs	Controller statuses reported by LEDs
Backplane power switch	Single power switch per controller in the redundant pair
Certifications	IEC 61131-2, CE Mark
Electromagnetic compatibility	EMC Directive EMC/104/EC

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