MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Amikon cover with selected official Emerson pages

OVATION HIGH-DENSITY THERMOCOUPLE INPUT

1C31116G05

THERMOCOUPLE INPUT PERSONALITY MODULE

OFFICIAL SOURCES

Emerson Ovation I/O Overview PWS_002864 [9], series architecture. Selected pages retain their original content, color and aspect ratio.

Ovation™ I/O Overview

Features

- Modular, plug-in components support long-term process reliability
- Modules are installed and configured quickly and easily with single-point DIN rail fastening
- Built-in connectors eliminate power and communications wiring
- Electronic ID identifies module type, group, serial number and revision
- Fewer module styles reduce spare parts inventory costs
- Redundant power supplies deliver system reliability
- “Hot swapping” streamlines system maintenance
- Standardized status indicators offer color-coded diagnostic messages
- Remote Ovation I/O provides a flexible, cost-effective means to distribute I/O modules to strategic locations throughout the plant



Introduction

Emerson’s Ovation™ control technology is designed to support long-term process reliability and expandability.

With modular plug-in components, Ovation I/O delivers embedded advanced control applications with built-in fault tolerance and system diagnostics.

With their inherent flexibility, Ovation I/O modules convert input signals and create output signals, performing a multitude of functions. Specialized I/O modules are also available.

Simplified Maintenance

Standardized assembly style simplifies maintenance and reduces spare parts inventory costs.

Single-point DIN rail fastening makes installation and configuration quick and easy. Built-in connectors eliminate power and communications wiring.

Ovation I/O modules are software configurable, therefore no jumpers or thumb wheels are necessary. Their advanced electronics also deliver low power consumption.

Ovation I/O Architecture

The Base

Ovation packaging reduces the system footprint by using base units which attach to mounting plates by DIN rail; these hold four independent Ovation I/O modules of any style. This approach simplifies maintenance by making it easy to install, move or replace individual base units.

Base unit features include:

- Field terminal blocks that accept two 14 AWG or a single 12 AWG
- I/O bus communications built into the base
- I/O modules automatically addressed by location
- I/O modules may reside in any location
- I/O module redundant power distribution
- No interconnecting cables for I/O bases
- Built-in spare fuse holders and strip gauge in base

The base unit's high-impact plastic housing protects the backplane, exposing only the connectors as modules are removed.

The I/O Module

The I/O module includes an electronic module and a personality module or cavity insert. The I/O module converts field signals into data and sends it to the controller. Electronic module styles include digital and analog input and output modules, contact inputs, RTD inputs, pulse accumulator / counter, HART input and output modules, FOUNDATION Fieldbus, Profibus, DeviceNet, Ethernet and serial link controller modules.

I/O modules offer a number of protective features including:

- Signal conditioning, part of the surge-withstand feature, dissipates voltage "spikes" to protect the electronics
- Fuses protect the circuit in case of a short in the field device line

Each module is "hot swappable," allowing it to be removed and replaced without interrupting system power or using mechanical tools. The standard Ovation system configuration allows for up to 128 I/O modules in a local configuration. This modular approach simplifies maintenance by requiring less assembly and offering a compact and uniform architecture.

Controller I/O Capabilities

The Ovation controller supports multiple I/O capabilities in various combinations, including:

- Hardware I/O interfaces to Ovation I/O
- Q-Line I/O plus software I/O in the form of simulated I/O
- Virtual I/O generally communicated from OEM models and systems

Ovation I/O has two methods of implementation: locally within the controller and remotely away from the controller. Remote I/O provides a means to distribute I/O throughout a plant.

Controller I/O Capabilities		
Item	**Capability**	
Local Ovation I/O	2 sets of up to 8 independent branches of 8 modules per branch for a total of 128 modules	
Remote Ovation I/O*	Up to 16 nodes of 8 branches of 8 modules per branch for a total of 64 modules per node	
Local Q-Line I/O*	1 node of 48 Q cards	
Local Q-Line I/O*	1 additional node of 48 Q cards	
Remote Q-Line I/O*	Up to 8 nodes of 48 cards	
Smart device capability	FOUNDATION™ Fieldbus – PROFIBUS - DeviceNet	
Virtual I/O capability ** (via Ethernet TCP/IP and standard protocols)	Allen-Bradley PLCs DF-1 GE Mark V/VI GSM Modbus/TCP GE Genius I/O	Toshiba turbine control MHI turbine control External Ovation network
Note: * Refer to the Ovation controller documentation for valid combinations of the above listed hardware interface capabilities since not all can be supported concurrently. ** The valid combinations of software I/O interfaces depend upon the ports available and controller device capability.		

Ovation Local I/O

The Ovation controller can directly support up to 16 independently driven branches of Ovation I/O. For local I/O, all modules reside in up to four standard cabinets, which are placed side by side. All field wiring leads to these cabinets.

Ovation Local I/O Specifications	
Max branches per controller	16 branches
Max I/O modules per branch	8 modules
Max I/O modules per controller	128 modules
Max local I/O bus length	20 m (60 ft)

Ovation Redundant I/O

Redundant Ovation I/O modules are installed in the same fashion as standard Ovation I/O modules, but are associated in pairs located in adjacent branches.

The module pairs exchange health, status and I/O information via their personality module interconnections. This approach allows the user to take advantage of I/O redundancy by wiring the field terminations into a single terminal block on the primary I/O base, with no special control strategy configuration required.

Redundancy is applied and configured during I/O setup, allowing the Ovation system to automatically read and compare during normal operation, the I/O channels of both modules and determining which value to use. When a fault is detected the system automatically switches to the backup module thus increasing reliability and availability of the process inputs or outputs.

Ovation Remote I/O

Ovation remote I/O places I/O modules close to field devices, in contrast to local I/O modules. Remote I/O uses redundant fiber optic cables that stretch from the controller cabinet to up to 4000 meters away — to a cabinet that houses the I/O modules. By placing the I/O modules closer to the transmitters and actuators, field cables can be made shorter.

This significantly reduces the amount of wiring required throughout the plant, delivering substantial cost savings significantly. Interfaces for both local and a remote I/O can reside the same controller. Multiple remote I/O locations can be connected to the same controller.

The remote I/O system is easy to configure and requires no database modification. Again, I/O selection type, whether local or remote, is made during configuration on the controller.

The remote I/O system offers a level of reliability unmatched in the industry through, redundant communications, periodic communication diagnostics and error correction. When remote I/O is implemented in a controller, the remote I/O subsystem provides a flexible, cost-effective means to distribute I/O modules to strategic locations throughout the plant.

Remote I/O Specifications	
Max. remote nodes	16 nodes
Max. I/O modules per node	64 (8 branches with 8 modules for each branch)
Max. I/O modules per controller	512 modules
Remote I/O bus configuration	10 BASE-FL Ethernet physical layer with a proprietary protocol
Remote I/O cycle time	<100 microseconds (no repeaters)
Standard remote communications media	Fiber optic
Maximum cable length for 850 nm fiber-optic media	4 km. Distances of 6 km can be achieved with repeaters (up to two repeaters)

Q-Line I/O (Remote and Local)

The Ovation controller additionally supports both local and remote Q-Line I/O, typically used in Emerson's WDPF control system. This interface capability provides the ability to reuse the majority of the existing configurations.

Simulated I/O

Another type of I/O supported by the Ovation controller is simulated I/O, where the controller can be directed to interface to I/O generated by a software model accessible through the Ovation network.

Virtual I/O

The Ovation controller supports a number of standard 10/100 Ethernet based interface protocols. This capability allows OEM systems which support these same protocols as a standard to intercommunicate with the Ovation system. This ability provides remote operation, monitoring and control where appropriate.

Ovation I/O Summary

Category	Ovation I/O Type
Analog Inputs	Analog input (13-bit), 8-channel
	Analog input, 16-channel
	HART analog input (16-bit), 8-channel
	HART high-density analog input, 16-channel
	HART high-performance analog input (16-bit), 8-channel
	High impedance analog input, 8-channel
	High speed analog input (14-bit), 8-channel
	RTD analog input, 4-channel
	RTD analog input, 8-channel
	RTD analog input, 16-channel
	RTD compact analog input, 8-channel
	Thermocouple analog input, 16-channel
Analog Outputs	Analog output 4-channel
	HART analog output (14 bit), 8-channel
	HART high-density analog output, 8-channel
	HART high-performance analog output (16-bit), 4-channel
Bus Interfaces	DeviceNet
	Foundation Fieldbus
	Profibus
	Ethernet link controller (ELC)
Digital Inputs	Compact contact digital input, 16-channel
	Compact digital input, 16-channel
	Contact digital input, 16-channel
	Digital input, 16-channel
	Digital input, 32-channel
	Redundant digital input, 16-channel
	Sequence of events contact digital input compact 16-channel
	Sequence of events contact digital input, 32-channel
	Sequence of events digital input, 16-channel
	Sequence of events enhanced compact digital input, 16-channel
Digital Outputs	Digital output high side, 16-channel
	Digital output high side, 32-channel
	Digital output, 16-channel
	Relay output panel, 16-channel
	Relay output panel, 32-channel

Category	Ovation I/O Type
Specialty	Excitation controller
	Loop interface, 6-channel
	Machinery Health Monitor
	Pulse accumulator
Turbine	Servo driver
	Speed detector
	Valve positioner

Summary

Ovation I/O significantly improves system performance, speed and reliability. State-of-the-art electronics provides low power consumption and heat dissipation. Remote I/O reduces costs by placing modules closer to field devices, thereby reducing field wiring. Streamlined design standardizes inventory, requiring fewer spare parts. Fast, effective and reliable, simple pull-and-plug card swapping means the Ovation I/O system is always online available and fully functional.

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