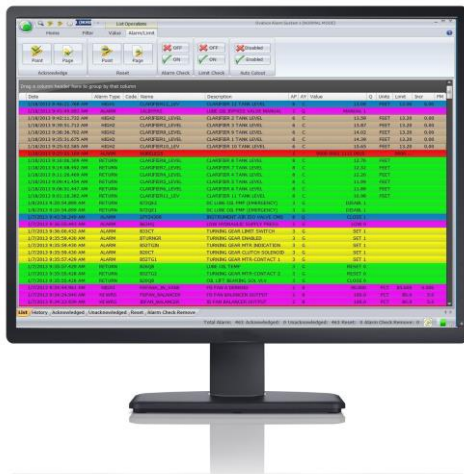




# Ovation™ Process Historian

## Features

- Designed to meet the needs of precision, performance, scalability and historical data management for the Ovation control system
- Collects historical data of Ovation process values, messages and status changes
- Creates a chronological record of operator actions and process alarms
- Demonstrates scalable operation for 1,000 up to 400,000-point values
- Provides flexible deployment options for a variety of system configuration needs
- Offers online, long-term archive solutions
- Connectivity features and client applications for external data access, analysis, trending and reporting
- Support for backup and restore of the Ovation process runtime environment via Ovation System Backup and Recovery
- Provides a proxy scanner capability to transmit scanned data samples over a TCP connection to an external receiver
- Read capability with high resolution trending and oscillography using the controller and digital exciter controller (DEC) module data
- Historian redundancy for data integrity



## Introduction

Emerson's Ovation™ Process Historian (OPH) collects process values and messages that are generated by the Ovation control system. The historian stores these values and messages in an optimized historical data storage unit that runs on a Microsoft® Windows® platform. The user can view and filter this information or output it to printers, files, e-mail or Web pages. The historian can archive the gathered information to a



removable media or to a nearby or remote fixed disk storage unit. The user can use the historian to better understand the typical and abnormal behavior of the plant's processes, to identify common trends, to explore abnormalities and to diagnose process flaws and failures.

The frequency and precision of historian monitoring are beneficial when accuracy is of utmost importance.

## Historian Architecture

The Ovation Process Historian provides a robust, redundant data collection architecture to serve multiple systems by collecting and storing a wide array of process information and message types. Several client applications are available to the user for analysis of collected data.

### Data Collection Supports Flexible Deployment

To meet various system application needs, the historian collection function (known as a "scanner") can be deployed either on the historian server or remotely on one or more operator stations located throughout the Ovation system.

By distributing the collection of process values and messages, the collected data is processed locally and forwarded to the historian server for long-term storage. Therefore, an outage by the server will not interrupt data collection, as this data is buffered until communication with the server resumes.

### Centralized Deployment Option Serves Multiple Systems

The Ovation Process Historian's distributed data scanner architecture supports data collection from multiple Ovation systems. This allows a centrally deployed historian server to collect and store data, service requests for process values and messages from multiple plant units and provide this information to historical client applications.

### Server Redundancy

Redundant servers protect against data loss by communicating to each other for:

- forwarding messages from the primary server to the partner server in real time, and
- backfilling data that might be missing when one of the servers went offline. Redundant server operation takes place automatically and does not require operator initiation or intervention.

During normal operation, the scanner communicates to the primary server, which in turn forwards that information to the partner server. The partner server acknowledges receipt of information to the primary server, which in turn passes the acknowledgement to the scanner.

During failover operation, when the primary server is offline, the scanner automatically communicates with the partner server, and the partner server acknowledges receipt of information back to the scanner.

When the primary server has come back online, the scanner automatically switches its communications back to the primary server, which forwards that information to the partner server. The partner server not only acknowledges receipt of that information, it also forwards the missing data that the primary server was unable to collect while it was offline. After recovery, both servers will automatically share all available historical data (up to six months' worth).

## Rich Client Applications for Data Users

The historian and the Ovation process data retrieval applications (e.g. trending, reporting functions) operate in a client/server fashion for requesting, serving and presenting historical data. The user interacts with these applications to specify the time period and type of data desired, along with any filter criteria for analysis or review. The historian server then responds to these retrieval requests by recalling this information from its historical data archives.

The Ovation client application programs typically run on an operator or engineer workstation. These applications provide the functions to display, print or save pre-formatted reports of the data retrieved from the historian server. The historian's optional desktop application package provides special versions of the Ovation historical reviewing and trending programs for use on desktop PCs.

## Historical Sampling and Collecting

The Ovation historian software scans and collects the following types of historical process information:

- Real-time point values and statuses
- Point attributes
- Laboratory data
- Alarm messages
- Operator action messages
- Sequence of event (SOE) messages
- Triggered events
- Real-time (RT) event messages
- Controller events and data
- COMTRADE – substation automation

By maintaining a comprehensive set of historical records, users can better understand their processes' typical and abnormal behavior to identify common trends, explore anomalies, and diagnose process flaws and failures. The detail contained within the Ovation historical data can lead the user to identify conditions that could be missed by generic historian systems.

## Process Value History

Point history continuously reads process points and collects exception values and their corresponding status and time-stamp indication. In other words, a data sample collection is based on point status or value changes that occur outside a user-selectable deadband. This minimizes disk storage consumption while providing an accurate record of process activity. Most scan frequencies are based on user defined increments of one second; however, a small subset of points can be configured to be scanned every 0.1 seconds to provide more samples for increased accuracy in high-speed processes.

In addition to sampling analog and digital point types, the historian can also store time-stamped readings of packed digitals, node records and drop status points.

The status conditions that are monitored and saved include:

- High (or low) limited exceeded
- Hardware error
- Alarm acknowledgement
- Cutout from alarm checking
- Value quality
- Operator entered value
- Scan removed
- Alarm / limit checking disabled
- Timed out point

Although typical historian configurations will collect process point data for 5,000 or 10,000 points, the Ovation historian is designed to support up to 400,000 data points in some configurations. Point attributes such as units or descriptions are also stored for later use.

Point history also processes user requests to retrieve previously stored process point information, trending and reporting functions.

## Laboratory Data

Laboratory data is a special data collection method for storing point data that is not acquired in real-time (such as laboratory test results). These points may be collected via manual entry or by file import generated by external devices.

## Message History

In addition to point values and attributes, the historian also collects process messages from the Ovation system including alarm messages, operator event messages, sequence-of-events messages, and RT event messages.

## Alarm History

The historian receives alarms sent by a designated alarm logging drop, to an alarm message scanner which packages and sends them to the historian server for storage into an alarm history subsystem.

Once stored, alarm history allows users a list of alarms for display, print or saving to a file. It also provides the capability to filter the alarm list based on factors such as point name, time period and/or unit or drop of origin.

## Operator Event History

Operator event history records operator actions initiated by users at an Ovation operator workstation. Actions, such as auto/manual transfers, raise/lower commands, on/off commands, set point changes, alarm limit changes, point scan status changes, or manual entry of values are clearly identified, time tagged and stored chronologically.

Upon request operator event history will retrieve the data and filter this chronological list by time period, originating unit / drop or event type.

## Sequence of Events (SOE) History

The Ovation controller can produce sequence-of-events messages which allow tracking and comparison of process events to a millisecond resolution. SOE history supports the retrieval of this data into a chronologically ordered list for post event analysis of critical plant situations.

It is a requirement that the Ovation controller be equipped with the appropriate sequence of events I/O modules to perform this function.

## Real-time (RT) Event History

RT event history records real-time event messages that occur on one or all Ovation workstations and have been stored by the historian. The RT event message history can then be retrieved into a chronologically ordered list for analysis.

## Historical Data Storage

Once the historical data has been scanned and collected, it is stored for future retrievals. The historian manages: primary storage and extended storage area.

### Primary Storage

The most recently collected data is kept online in primary storage. Primary storage maintains a history of data depending on the historian server's internal disk capacity. A solid-state disk array provides primary storage in most historian hardware configurations.

## Extended Storage

In addition to primary storage, the Ovation process historian also supports extended storage options that provide access to a historical archive that may include years of valuable process data.

## Reporting System Features

- Uses SAP® Crystal Reports® to build the templates used by the report manager
- Includes a library of predefined report templates that provide layout, fonts, graphics and other presentation definitions that can be easily applied for quick and simple report creation
- Existing formats may be modified to extend their capabilities; custom report layouts can be created from scratch
- The Ovation report manager is used for the scheduling of reports, programming of event trigger conditions and assigning of process point names to build a "report definition"

The Ovation Process Historian includes a reporting system that allows users to easily acquire relevant historical data and present this information in various formats. Predefined templates may be selected for common reporting tasks or custom reports may be created depending on the customer's needs.

The report system provides the framework for defining and generating various types of system reports including:

- **Scheduled Reports** — Automatically creates a report based on time and date configurations
- **Event Triggered Reports** — Summarizes activity triggered by one or more process conditions
- **Trip Reports** — Provides information prior to and following a trip event
- **Manually Initiated Reports** — Generates reports based on a user's request
- **SOE Reports** — Automatically creates a chronological printout of recent SOE activity

## Report Design

The report designer is used to create or revise an existing format template of a report. This program creates the physical layout of the titles, rows and/or columns of data, graphs, and charts, as well as the fonts and colors to be used. Point values/status, attributes, summary values and formula fields, complete a typical report.

Custom reports may be designed to present process values, process messages (alarms, etc.) or a combination of historian data types to suit specific needs.

## Report Management

Features of the report manager include:

- Configuration of report definitions
- Scheduling of report execution
- Automatic SOE reporting
- Configuration export and import
- Monitoring and reporting of execution status

The report system packages tools to configure, schedule and generate various reports.

Users may also specify the destination of the resultant report. The output may be printed, displayed within a report viewer window or exported to a file. Report output files may also be configured to be sent to users via email by interfacing with an external email server.

Report definitions may then be assigned to time-based or conditionally triggered execution events. Timed events are user-specified and are typically set up to be hourly, daily, weekly and monthly periods. Shift events are also available to be used. Triggered events are initiated by satisfying the logical point value conditions when they occur in the real-time Ovation process database.

The report scheduler initiates report generation when specified via an operator request, conditional trigger or timed event. The embedded Crystal Reports generation engine processes the report format with the data requested from the Ovation process historian and generates the final report output.

## User Applications

The historian provides a complete host of applications that allow the user to access collected and stored data records in order to analyze, investigate, and diagnose plant processes and events.

## Ovation Dynamic Trends

The dynamic trend at the Ovation operator workstation maintains a local buffer of historical data for points recently requested for live trending. When a point is initially assigned, the buffer is pre-filled with data retrieved from the Ovation Process Historian.

## Historical Trends

Historical trends utilize information collected in point histories. Several user-definable points can be contained within one trend. The time period, also determined by the user, can be defined in any interval divisible by one second. Time periods can be defined in one of three ways:

- Start and end times
- End time with a specified interval
- Start time with a specified interval

## Additional Trending Features

Historical trends can utilize mathematically processed data results, such as interpolated data values, average data values, standard deviation values, maximum values and minimum values, etc. A zoom feature is available for focusing in on a particular time period. The page function provides the user with the ability to scroll forward or backward through a trend in either full page or half page increments.

Various features are available to facilitate visual analysis. Users have a choice of presenting the trend in tabular, graphic or radar views. Colors are used to distinguish between different trending points, as well as to show a point's status. A selection cursor is available in the trend window for choosing an area of the trend to view detailed information for that plotted value.

## Historical Review

Historical review is a valuable tool for ad hoc interrogation of Ovation historical data. It offers point-and-click selection of time ranges and data filters and view, print and save-to-file capabilities. It also enables access to individual and combined views of Ovation data, including:

- Point values and statuses
- Alarm messages
- Operator event messages
- Sequence-of-events (SOE) messages
- Real-time (RT) event messages

This application provides users with a powerful tool for investigating and diagnosing detailed process records that correspond to the time period of a plant condition or event. It is available on an Ovation operator workstation or optionally available on a desktop PC.

## Historical Point Review

Historical point review is a method for querying and displaying historical process values and related status information.



The main review window displays a point's value at the time that it was collected. The display is provided in a row and column format, listing the time, date, point name and value for each delta.

The historical point review properties window offers data filters for point values and status-related conditions (e.g. point quality, limit / alarm violations, cutout status and scan removal status). It accepts a user-specified time range in absolute or relative times. It also offers a point browser for building lists of points to query, by searching for valid historian points.

## Historical Data Edit

For circumstances where erroneous data was captured, or data collection was missing, the historical data edit application provides authorized users with a tool to easily replace the flawed data with more accurate values.

Changes to the values (and statuses) are recorded without destroying the original data collections, allowing users the choice to view the modified or the original record. Historical data editing is an optional feature.

## Historical Alarm Review

Another tab within the historical review application allows the user to display, print or save to a file a user-filtered list of alarm messages stored within the Ovation process historian's alarm history. Its properties selection window specifies filters for alarms by many categories, including alarm type, point type and single point. It also runs with a user-specified time range, in absolute or relative times.

## Historical Operator Event Review

The operator event review function filters the chronological list of operator event messages. This allows users to zero in on actions taken during the time period of interest and help to draw conclusions as to whether human interaction preceded a particular plant event.

## Historical SOE Review

SOE review allows the user to view the SOE messages generated throughout the Ovation system and stored by the historian. With millisecond time resolution, users can identify high-speed digital state changes that may have initiated or resulted from an interesting process incident.

## Historical RT Event Review

RT Event reviews display real-time event messages that occur on one or all Ovation workstations and stored by the historian.

## Desktop Application Tools Option

Versions of the historical trend and historical review applications described above are also available for desktop deployment to provide data to users with access to the Ovation historian server without requiring them to be on the control system itself.

In addition, the process historian tools suite includes an add-in for Microsoft Excel which provides users with easy-to-use menus and entry forms to build historical data requests. This tool provides the user with powerful data analysis and reporting capabilities within the familiar spreadsheet environment.

## SQL Query Support

The process historian provides support for SQL data queries for historical data. This interface services queries from external, OLE-DB -compliant desktop applications and extracts the data in tabular form to satisfy SQL requests for historical messages (alarms, SOE, RT, and operator events), and exception-based process point data samples.

## Backup and Recovery Support

Ovation Process Historian supports backup and restore functions of the Ovation process runtime environment, using the Ovation System Backup and Recovery application, ensuring a secure and easy method to restore all system functions in case of failure.

## Summary

The Ovation Process Historian provides mass storage and retrieval of process data, alarms, sequence-of-events (SOE), operator actions, and real-time (RT) events for the Ovation control system. The speed, power and flexibility of the historian allow it to organize vast amounts of real-time process data and present meaningful information to all users of process information, including operators, engineers and maintenance personnel.

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