

Features

- Multiple types of fully configurable, easy-to-understand alarm displays
- Convenient access to past alarms, returns, and state changes
- Simplified ability to acknowledge, print, and send alarms to the historian
- New Alarm Analysis tool



Emerson's Ovation™ alarm management strategy combines a best-in-class philosophy with the implementation of hardware and software to clearly convey potential problems to operators.

The Alarm Management System focuses the operator on important plant activities that deviate from normal operation. The base alarm system detects and displays abnormal plant conditions on the Ovation operator workstation. These conditions include points out of range, digital state changes, drop time outs, and much more. Alarms are displayed in the workstation alarm window and can be sent to the audio annunciator, the eDB historian, and the alarm printer.

— **Alarm Philosophy**—Determines what will alarm and how alarms will be annunciated, viewed, acknowledged, and recorded. It is a process for insuring that alarms are cleared.

— **Alarm Destination**—Filters alarms by individual unit/plant area. The alarm filter can be specified for a particular type of equipment or for the entire system.

— **Alarm Priorities**—Distinguishes the importance of alarms. Process point alarm priorities are defined on a priority scale of one (highest) to eight (lowest). Separate priorities can be assigned to analog high and low alarm limits. Color codes within Alarm System displays are based on alarm priority.

— **Alarm Suppression**—Systematically prevents points from alarming based on equipment or plant conditions.

— **Audio Alarm**—Produces an audible output when an alarm occurs. The audio feature sounds an alarm for a configured period of time, or until the sound is acknowledged. Different tones can be defined for each priority.

— **Alarm Acknowledgment**—Acknowledges an alarm or group of alarms, indicating operator awareness of an alarm condition or confirming an action to follow.

— **Unacknowledged Alarms**—Displays all unacknowledged alarms in reverse order of the Alarm List, which means that new alarms are added to the bottom of the list.

— **Reset Lists**—Lists all acknowledged returns so they can easily be reset and removed from the Alarm List.

— **History List**—Displays a history of the most recent alarms, returns, and state changes.

— **Iconic Alarming**—Provides a visual equivalent to hardware annunciators or light boxes or group alarms based on priority and plant area.

Alarm Philosophy

Our customers' alarm philosophy is the first area that we address in the development of a customized alarm management strategy. Emerson compared current practices with defined best practices to develop our standard alarm management system. Areas we considered in the development or redefinition of alarm strategies included:

- Standardize alarm viewing, annunciation, and acknowledgment
- Analyze how and why alarm returns are annunciated
- Alleviate operator alarm congestion or overload
- Relieve backlog of active alarms through suppression and evaluation of "good" alarms
- Consider automatic alarm suppression and deadband
- Regularly review and correct suppressed alarms and other alarm conditions

Plant management, operations, and controls personnel will decide our customers' final alarm philosophy after they have a thorough understanding of the capabilities of Ovation.

Alarm Filtering

Alarm Destination

Emerson defines specific alarm regions to ensure that workstations only receive alarms on the areas of the station they control. This reduces the potential for error, and ensures that alarm locations are in the most efficient areas.

Ovation defines the alarm destination with the first character in the set of characteristics of a process point. This character generally represents a plant location. When defining priorities, Ovation also permits the operator to determine what destinations will pass the filtering for the Alarm List, Reset List, Historical Storage, and Printer. Operators can also adjust the filtering criteria for alarms sent to the eDB Historian. We can also develop a method to quickly review alarms in different areas of the plant through the implementation of iconic alarms.

Alarm Priorities

Ovation defines eight priorities within the system. Priority 1 is the highest and most critical, while 8 is the lowest and least important. With point-and-click checkboxes, the operator has the ability to select which priorities will pass the filtering for the Alarm List, History List, Unacknowledged List, Reset List, and Historical Storage.

Ovation allows operators to filter points in the alarm window based on where the alarm is coming from and the level of importance placed on it. Every point in the system passes through priority and destination filters. These filters offer two modes: Normal mode and Priority mode.

Alarm Suppression

Alarm suppression prevents points from alarming based on equipment or plant conditions. It is beneficial when the alarm system includes alarms for normal or steady state conditions, for equipment that is not running, or for any alarms that the operator consistently ignores. We will analyze the need for these alarms, and suppress any that are found to be unnecessary until such a time that they are deemed meaningful.

Audio Alarm

Ovation offers a continuous audio system to alert operators with an auditory alarm that produces a sound whenever an alarm occurs. The continuous audio system is filtered using the Alarm List settings, and alarm messages that are sent to the continuous audio must pass the alarm list filter for the current mode (Normal or Priority).

The continuous audio system provides the operator with the ability to define distinct audio files that correspond to each alarm priority and return event.

When an alarm is received, the defined audio file is sounded continuously. This will continue until the audio is silenced or the configurable auto turn off time has expired. Each time an alarm is received, the audio file for the highest priority alarm will be sounded.

Alarm Acknowledgment

When an alarm occurs, some type of user action is usually required. For this reason, Ovation requires that an operator acknowledge each alarm to indicate that he or she is aware of the alarm condition. Alarms are acknowledged on a point-by-point basis and are broadcast system-wide; when one operator acknowledges an alarm, it is acknowledged at every station.

Alarm List

The Alarm List displays only current alarms, and there is a maximum of one entry per broadcast point. If the alarm status changes (for example, an analog point alarm goes from HIGH4 to HI WRS), the system automatically updates the entry, value, and status by adding new alarm entries to the top of the list. Unacknowledged and resettable returns are shown in the window only if specified during configuration. The Alarm List only contains points that match the filtering criteria defined for the Alarm List for the current alarm mode (normal or priority).

History List

The Alarm History List displays a history of the most recent 15,000 alarms, returns, and state changes. All incrementals and returns are displayed as individual entries. The Alarm History List contains only points that match the filtering criteria defined for the History List for the current alarm mode (normal or priority). Also, state changes may be configured to appear or not appear on the History List. An individual broadcast point can have multiple entries.

Unacknowledged Alarm List

When an alarm occurs, (a new alarm, toggle alarm, or incremental alarm), it is broadcast on the data highway as an unacknowledged alarm. The Unacknowledged Alarm List displays all unacknowledged alarms in reverse order of the alarm list, which means that new alarms are added to the bottom of the list. The alarm will remain unacknowledged until the operator acknowledges it.

The value and status of unacknowledged alarms are constantly updated. The list contains only one entry per broadcast point. Unlike the alarm and history lists, however, the unacknowledged

list does not contain a block of blank lines. Returns can also be shown on the unacknowledged alarm list if specified during configuration. The Unacknowledged Alarm List only contains points that match the filtering criteria for the unacknowledged list for the current alarm mode (normal or priority).

Reset List

An alarm must be reset before it will be removed from the Alarm List. The Reset List is shown when the user requests that alarm returns to be acknowledged. The system can be configured to display returns on the list, so that Reset List displays all of the resettable returns. The value and status are constantly updated on the screen. The Reset List displays all the resettable returns in reverse order of the alarm list. New resettable returns are placed at the bottom of the list. The Reset List does not contain a block of blank lines at the top, as is done on the Alarm List and History List. Resettable returns are removed once they have been reset or once they go back into alarm. The Reset List only contains resets that match the filtering criteria for the Reset List for the current alarm mode (Normal or Priority). Resettable returns can be reset by clicking on individual or groups of points.

Iconic Alarming

Much like hardware annunciators or light boxes, Iconic Alarming groups alarms by priority and associated plant area. It provides alarm groups that are represented by bitmap images displayed in the Iconic Alarm List window. The icon list contains up to 200 bitmaps, each with a user-defined border that changes color depending on the alarm status of individual points within groups and the acknowledgment status of the entire group. Each bitmap icon is linked to process graphics that relate to the points within the group, providing quick display of alarm information.

Alarm Configuration

The Base Alarm System allows the operator to monitor and detect abnormal plant conditions. Some of the basic parameters that can be configured are discussed in the following pages.

Analog Alarms

Up to four high and four low alarm limits may be entered for each analog point. These limits may be either actual values or an analog point, whose value will be used as the limit. In order for any point to be checked, the alarm must be configured in the analog point record. If an analog point is to be used in place of an actual alarm value, then the name must be entered.

There can also be two incremental alarm limits (one high and one low). These incrementals will only take effect when the value of the point passes the last defined alarm limit (either high or low) for the point. The incremental alarms allow a point to re-alarm once it has passed the last defined alarm limit. The re-alarms will occur at multiples of the incremental limit plus the last defined high limit, or minus the last defined low limit.

Deadband Management — Deadband management adjusts the resets for both analog and discrete alarms, and includes the proper configuration of incremental alarms. There can be two different deadbands (high and low) applied to any analog point. These deadbands will keep a point whose value is close to the alarm limit from toggling in and out of alarm. There can be one high deadband applied to each of the possible four defined high alarm limits and the high incremental limit. There can also be one low deadband applied to each of the four possible low alarm limits and the low incremental limit. If the deadband is negative, then the deadband is interpreted as a percentage of the limit.

User Defined Alarms —There are two User Defined Alarms (UDA): high and low. These may be set anywhere over the range of the point as long as the low UDA is lower than the high UDA. If the point value is above the high UDA, then the point is in high UDA alarm. If the point value is below the low UDA, then the point is in low UDA alarm. The UDAs are independent of the other four high and four low limits. Depending on the value of the UDA in relationship to the other limits, a point may be in both UDA alarm and one of the other analog alarms. The high or low deadbands are used to keep the point from toggling in and out of UDA.

Digital Alarms/Status Checking

Each digital point in the system can have either a 0 or a 1 as its alarm limit. The default status checking is none.

Module and Node Alarms

Module and Node Record types are treated like packed alarms, except that they do not have Invalidity Bits, nor can they be forced. They do not have any cutouts or delays associated with them. They are alarmed based only on the Current Value, the Alarm Mask and the Bit Sense fields of the point record.

Additional Configuration for Both Analog and Digital

Initial time delay

Each point in the system can have an initial delay associated with it. The delay defining is in seconds in the point record. This feature will delay the reporting of the alarm to the system. Therefore, a point with a delay time of 60 seconds will not be reported to the system as being in alarm for one minute after it first went into alarm.

At that time, the current alarm state is sent in an alarm message to the alarm display system. That means that if a point goes into alarm and returns to normal before the time delay has expired, then no alarm is sent. Always, the alarm state at the end of the time delay will be reported, as opposed to the alarm state when the time delay started. This delay can be turned off by setting the delay time to 0. The default alarm delay is 0.

Alarm Cut-Out

Each point in the system is capable of being cutout. (If a point is cutout, it will not go into alarm.) If the cutout is enabled, then the cutout is defined by a point entered in the Alarm Cut-Out field of the point record. This point may be either a digital or a packed point. If the cutout is disabled or enabled, and its value is reset, the point is alarmed as normal. If the cutout is enabled and its value is set, then the point is inhibited from alarm.

Cutout Delay

This delay can be associated with the cutout, and is defined in the Alarm Cut-Out Delay field of the point record. If the cutout delay time is set to 0, then the delay is not used. The delay is activated when the value of the cutout point goes from 1 to 0. This time delay allows time for the point to return to normal during transitions in the plant. The default Cutout Delay is 0.

Alarm Inhibit Function

All points in the system may have Alarm Checking Removed. If a point is Alarm Checking Removed, then the four high, four low, and UDA alarms are not limit checked and therefore not alarmed.

Alarm Processing Order

All alarms are checked in the order of priority. If the value is below the lowest defined high alarm, no other high alarms or ranges are checked. If the value is above the lowest defined low alarm, no other low alarms or ranges are checked. If both of these are true, if the point was not in alarm last time, the system continues checking the UDA alarms.

Operator Functionality

The final phase of the development of an alarm management strategy deals with operator functionality. We have developed training and evaluation processes that ensure the operator is fully informed and adept with the application of the alarm management system. This includes the understanding of all the alarms, and the knowledge of how to perform their various functions within the plant.

Emerson's Alarm Analysis Tool

The recently released Alarm Analysis tool is part of Emerson's ongoing commitment to help customers develop an effective alarm management strategy that contributes to reduced downtime and increased operator productivity.

An increasing number of alarms can make it difficult for operators to distinguish between critical events that require intervention, and nuisance alarms. Emerson's Alarm Analysis package examines alarm data, collected by the Ovation historian, providing the user with information necessary to minimize unnecessary alarms. This, in turn, enables plant operators to more effectively address real, high-priority issues and focus on actionable items.

The user-friendly tool can be used online or offline and can run on any laptop or desktop computer running the Windows XP SP2 operating system. The package allows users to filter and analyze alarm information by a number of variables including point names, point description, plant areas, time ranges, and alarm type. Alarms can also be summarized according to alarm display, priority, rate, and frequency.