

PRODUCT INFORMATION NOTE

Implementing Advanced Alarm Management Solutions to Improve People Effectiveness



Honeywell Advanced Alarm Management Solutions

- Help protect plant uptime and safety, reducing losses caused by ineffective alarming
- Increase operator effectiveness by reducing the number of alarms that require operator intervention
- Reduce time and effort to develop, deploy and maintain an alarm system
- Integrate abnormal situation management intelligence to prevent, detect and mitigate plant incidents

Effective Alarm Management Strategy Reduces Abnormal Situations

During an abnormal situation, the automation system cannot correct a process disturbance, and operator intervention is required. The inability to diagnose and control abnormal situations has an estimated economic impact of at least \$10 billion annually in the U.S. petrochemical industry alone, based on research by the Honeywell-led Abnormal Situation Management Consortium

It's been proven that an effective alarm management program is critical to minimizing the number and impact of abnormal situations. Effective alarm management protects uptime and safety of production operations by enhancing the ability of people to detect process faults and implement corrective actions at an early stage. The ARC Advisory Group estimates that while an Advanced Process Control investment could typically increase production by three percent, the same investment made in ASM would increase production by five percent.*

Only Honeywell Advanced Alarm Management Solutions are Designed for Abnormal Situation Management

Honeywell Advanced Alarm Management tools and Consulting Services incorporate abnormal situation management® intelligence. The Abnormal Situation Management (ASM)® Joint Research and Development Consortium is a Honeywell-led research and development consortium of 11 companies and universities. The ASM Consortium's mission is to prevent, detect and mitigate abnormal situations. Honeywell is the only process automation supplier that integrates ASM intelligence into its solutions. ASM Consortium members include Honeywell, Celanese, ChevronTexaco, ConocoPhillips, ExxonMobil, Nova Chemicals and Shell.

An Effective Alarm Management Solution Improves People Effectiveness

Honeywell's alarm and event analysis software and services reduce potential losses from process upsets caused or worsened by excessive alarms; assist in assessing the workload of people due to alarms; and reduce effort to manage the alarm system consistent with best practices. Honeywell's alarm and event management services provide advanced solutions that allow the alarm system to be engineered and maintained to meet your site's alarm management policies and industry-recommended practices.

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Establishing a Consistent Alarm Philosophy

Adopting a consistent alarm management philosophy is a key part of abnormal situation management, as operators are frequently inundated with alarms, complicating their daily plant operation duties. An effective alarm system quickly provides appropriate information to operators, helping them to identify the cause of an abnormal situation and restore the plant to normal operation.

Evolution of Alarm Systems

Control systems have evolved over the past 30 years from single-loop pneumatic controls to today's multivariable model-based control and optimization. Although alarm systems have grown over the last 30 years, they have not significantly advanced.

Common Alarm Challenges

Peter Andowⁱ and Donald Campbell Brownⁱⁱ have documented the problem known as, "*alarm creep*," in which the easiest solution to an alarm overload problem is often adding another alarm. Over time, this action decreases the performance of the alarm system.

Andow writes that alarm systems have grown from "*a few hundred alarms to many hundreds or thousands of alarms on most plants during the last 20 years*," and asserts that some plants operate with an average of over one alarm a minute, and examples like "*40 alarms in the first minute*" of an upset are not unusual.

Commonly documented alarm system problems include:

- Redundant alarms
- Chattering alarms
- Standing alarms
- The inability of alarm settings to track the state of the plant

Pushing plants to maximum capacity make it especially important for alarm systems to perform optimally and communicate accurately with the operators.

Experion Integrates Alarms and Events with Honeywell Installed Base

An alarm and event management subsystem integrated with the Experion platform fully embraces the flexible OPC Alarm and Event standard. Only Honeywell offers operational integration of alarms and events from its installed base into its next generation system.

Advanced applications, third-party alarms and events, messages, sequence of events, as well as common journaling for events from all sources, are all seamlessly presented to the operator in a single display. Flexible fields from third-party sources may be logically mapped into desired columns within the alarm and event summaries. This allows simple access to key data without overcomplicating presentation to the operator, and is fully supported in the SQL Server-based advanced journaling subsystem.

Honeywell Advanced Alarm Management Solution

Feature	Benefit
Constraint-driven alarm configuration management	Helps you assure alarms are always consistent with fundamental plant constraints
Auxiliary notification	Provides reminders to operators and other plant personnel without cluttering the alarm system
An event analysis tool	Assists in quickly identifying cause and effect relationships
Analysis of alarm and event activity metrics	Identifies alarm system problems and performance, operator workload

Honeywell ASM Consulting Services

ASM Consulting Services help apply these features and benefits effectively to your site. Our ASM Consulting Services experts help you:

- Benchmark alarm performance
- Train your operations staff
- Develop your site's alarm philosophy
- Execute an alarm improvement program
- Deploy the results
- Track your site's performance

Customers report significant decreases in the number of alarms configured, the average alarm rate and the peak alarm rate after serious upsets as a result of employing these ASM Consortium developed and validated techniques. No other supplier has had the opportunity to develop its work process with the full collaboration of the ASM Consortium.

Honeywell’s Approach to Delivering Improved Alarm Management

Honeywell Advanced Alarm Management incorporates the Six Sigma **DMAIC** methodology: *Define, Measure, Analyze, Improve, Control*. This DMAIC methodology consists of five steps:

Step 1: Define the Alarm Philosophy

- Developed in the course of the Alarm Philosophy Workshop, which simultaneously trains personnel in the problems, approaches and processes for improving the alarm system.

Step 2: Measure the Current Alarm System

- Metrics are calculated in the workshop and evaluated against current alarm management best practices.

Step 3: Analyze Metrics

- Compare metrics with the goals established by the defined alarm philosophy and identify areas for improvement.
- Rationalize the alarms consistently with the alarm philosophy, wherever appropriate in your plant.
- Add advanced alarm processing as needed.

Step 4: Improve the Alarm System

- Clean up problem alarms identified in Step 3.
- Add advanced alarm processing as needed.

Step 5: Control the on-going performance of the alarm system

- Employ regular monitoring of the alarm system and continual assessment of alarm system practices.
- Make corrections to ensure retention of the benefits established by the improvement process.

This same process, removing the analysis and improvement of the current alarm system step, is applied in new facilities as a part of initial plant design. At the conclusion of this initial DMAIC process, a plant can be assured of the on-going effectiveness of the alarm system.

Honeywell’s Advanced Alarm Management Features

Improved capability to configure and monitor alarms provided by the robust alarm system.
Easier monitoring of the alarm system performance using the simple, powerful analysis of Alarm and Event Analysis for alarm and event occurrences, alarm configuration, and alarm configuration management.
Increased productivity by reducing work associated with gathering alarm system data, documenting and rationalizing alarms
Assured continual awareness of alarm system configuration via displays of current and historical information
Retention of the investment in the alarm improvement program by periodic monitoring and enforcement of the engineered alarm configuration.
Assurance that alarms are always appropriate to the current plant operations via operating-mode based alarm enforcement
Help operators to respond correctly to alarms via access to recommended actions from rationalization process in operator displays, visibility of alarm system exceptions and results of enforcements
Speed returning plant to normal and minimizing work required via facilitating analysis of root cause of process upsets

Honeywell ASM Consulting Services

ASM Consulting Services help apply these features and benefits effectively to your site. Our ASM Consulting Services experts help you:

- Benchmark alarm performance
- Train operations staff
- Develop site alarm philosophy
- Execute an alarm improvement program
- Deploy results
- Track site’ performance

Getting Started with Advanced Alarm Management

Get started on Advanced Alarm Management by taking advantage of our Alarm Performance Benchmarking analysis (free for Honeywell control systems), which will help you evaluate your alarm system against established industry guidelines. (<http://www.loopsout.com/alarmscout>).

The Alarm Philosophy Development Workshop will provide your team with essential expertise needed to understand the problems, challenges and opportunities of implementing effective alarm systems. Working through the exercises in that workshop, your team will develop:

- Customized site alarm philosophy
- Draft of the project plan for improving the alarm system

Additionally, Honeywell will include benefit management techniques to assist in preserving any investment in the improvement process. Honeywell can continue working with your team in *executing the project* at whatever level is appropriate for your site; from periodic reviews to full-time leadership. Your team's expertise is essential to making final decisions about the correct alarm configuration.

Our software can accelerate the capture of alarm system data rapidly deploy the results to your distributed control system.

A series of enforcements of new configurations enable you to seamlessly:

- Compare current and engineered configurations
- Record the differences
- Enforce the newly engineered configuration.

Honeywell can help you:

- Make collected information available to your operators, helping them respond to alarms
- Configure alerts as auxiliary notifications to offload anything that doesn't really qualify as an alarm from the alarm system.
- Configure equipment constraints into ACM and tie the alarm limits to them, assuring that alarms remain consistent with those constraints.
- Incorporate advanced alarm solutions such as plant operating mode-based alarms and alarm suppression techniques, in situations where needed

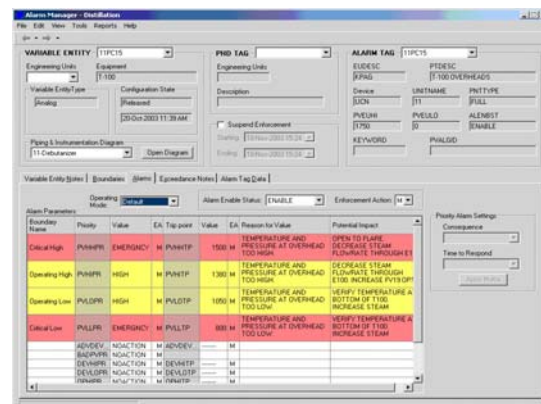
- Support associated efforts, such as improving your operating displays so that they are consistent with ASM best practices.
- Install software tools to support your alarm system.

Additional Software Information

The Advanced Alarm Management Suite combines the following applications to provide solutions for engineers, operators, and plant management:

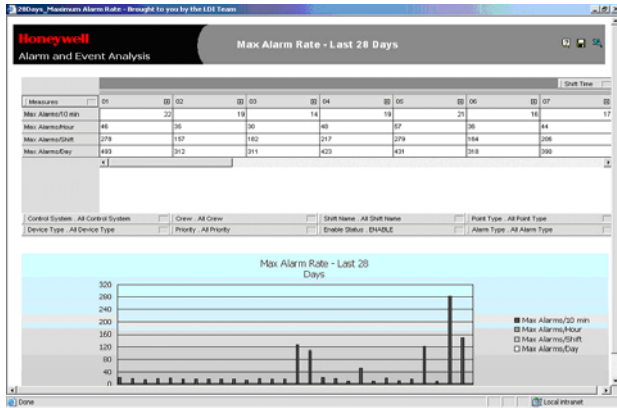
- Alarm Configuration Manager
- Alarm and Event Analysis
- User Alert

Alarm Configuration Manager supports engineering the alarm configuration and collecting associated documentation for the site. This function provides a key link to equipment constraints through its boundary management capability. Boundary management helps you capture key constraints and then make them available to alarm management, user notification and other applications.



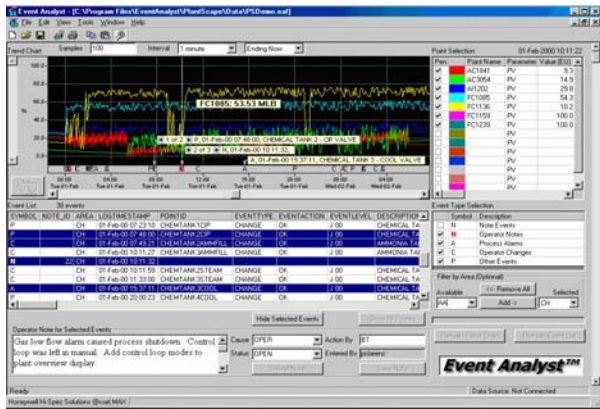
Alarm Configuration Management function

Alarm and Event Analysis provides metrics of alarm and event rates, alarm configuration and alarm configuration management. See the image entitled *Alarm and Event Metric Analysis*.

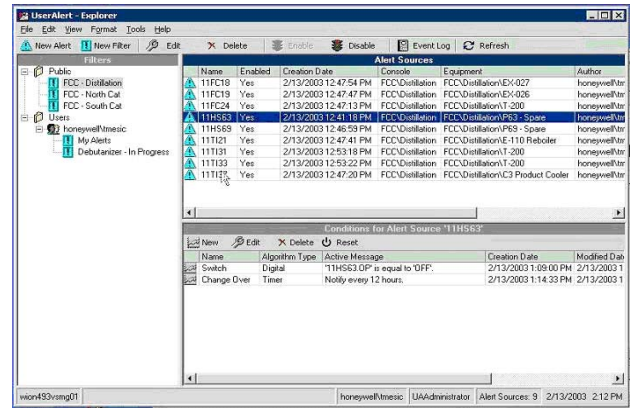


Alarm and event metrics analysis

The synchronized display of events and process history is a powerful tool for root cause analysis of abnormal situations, as well as the synchronized display of events and process history. This is available via Event Analyst

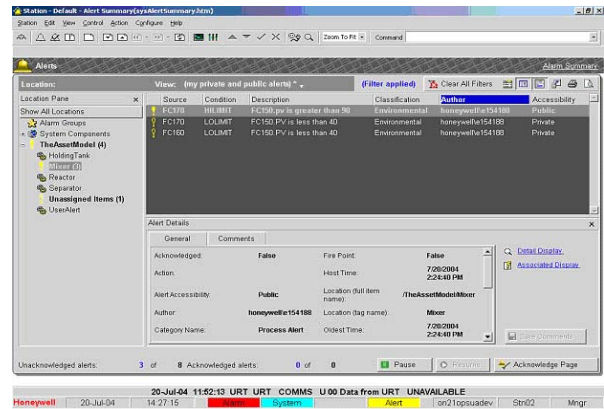


Event analysis function

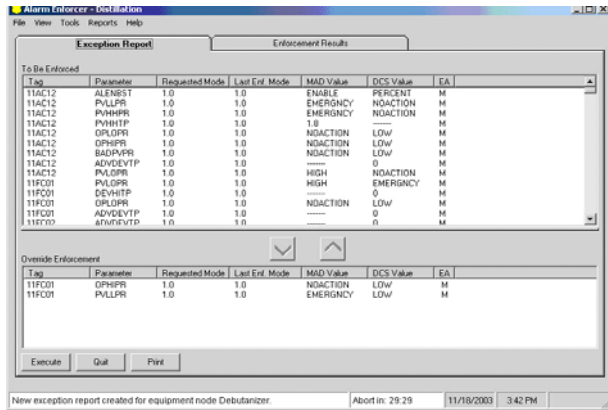


User Alert configuration

User Alert sends e-mails and pages to notify operators of an abnormal situation. Beginning with Experion Release 200, operators can use the Experion PKS Alarm and Event display to receive and review alarm, event and User Alert sourced alert information. This viewer will be a separate instance of the display, and may also be used by non-operators. Operators can monitor and enforce the alarm configuration for different plant operating modes. Alerts can be engineered to replace alarms for conditions that don't deserve alarms as shown in the Configuration View.



User Alert monitor display (Experion R200)



Alarm configuration enforcement function

These capabilities provide a more effective environment for operators, and reduce the time and effort needed to create the enhanced operating environment.

Service-Based Approach to Alarm Improvement

The software components described thus far comprise a comprehensive alarm improvement solution. For sites that have dedicated resources to address alarm improvement, these tools enable continuous monitoring, improvement and documentation of their alarm system.

However, some sites do not have adequate resources to administer and apply alarm improvement programs on an on-going basis. In these cases, Honeywell offers an alternative Alarm Scout annual service that proactively identifies alarm system pain points and provides regular e-mail reports, typically daily or weekly, to key stakeholders.

Alarm Scout provides a simple method of targeting the alarm points that are constantly vying for the operator’s attention – either by nuisance alarming or by forcing the operator to frequently change a setpoint, mode or output.

Providing Alarm Scout reports to the appropriate staff enables quickly highlighting, understanding and resolution of immediate alarm system issues. In all cases, this service-based approach has resulted in rapid improvements in alarm system performance and can be used to determine if a more comprehensive approach to alarm system improvement is appropriate for your site.

System Requirements for Advanced Alarm Management software

Operating Systems	Experion PKS R201 and R210 Windows 2000 and XP Operating Systems.
Database Management System	Sequel Server Oracle may be used for the Master Alarm Database
System Interfaces	Data collection from Experion PKS, TPS History Module, or Event Journal Collector Alarm System Configuration via OPC DA User Alert via OPC DA Other DCS

Summary of Advanced Alarm Management Benefits

- Helps protect plant uptime and safety by reducing losses caused by ineffective alarming
- Increases operator effectiveness through reduction of alarms requiring operator intervention
- Reduces time and effort to develop, deploy and maintain an alarm system consistent with ASM Consortium-defined best practices
- Broadens understanding among staff of the importance and best approach for delivering and maintaining a Best Practices Alarm System.
- Complete documentation of all alarm system changes
- Operator visibility to all alarm system changes

Experion Basic Alarm System Features

The capabilities of the Experion PKS basic alarm system are listed in the table below. See Experion Station PKS Specification and Technical Data, EP03-210-100 for more details.

Views personalized to operators
Adjustable style and frequency of annunciation
Connection for external notification
Alarm paging
Alarm messages
Event archiving
View selector
Status zone
Alarm zone showing the highest priority unacknowledged alarm in the operator's scope of responsibility regardless of any filter being applied
Area/panel selector
Detail pane with links to related information, field for operator comments
Printable summary
Millisecond resolution
Sort
Filter
Operator selectable fields
Unanswered alarms pushed to another area
Elevate (escalate) alarms as function of time
Display alarms in operator graphics, as points, tables
ASM-consistent alarm features

Events in general handled the same as alarms
Use of OPC Alarms and Events
OPC Advanced Alarm & Event Client
Alarm summary shows current value of point in alarm (not just value when tripped)
Journal only capability
Indicate number of occurrences of an alarm instead of a new line for each occurrence
Acknowledge entire page or selected alarm only
Aggregate alarming (Experion enterprise-model consistent)

i Andow, Peter, "Alarm Performance Improvement During Abnormal Situations," HAZARDS XV: The Process, Its Safety, and the Environment: Getting it Right, Institute of Chemical Engineers, Manchester, UK, April 2000.

ii Campbell Brown, Donald, "Alarm Management: A Problem Worth Taking Seriously," Control, August, 1999.

Campbell Brown, Donald, and O'Donnell, Manus., "Too Much of a Good Thing? – Alarm Management Experience in BP Oil, Part 1: Generic Problems with DCS Alarm Systems," IEE Colloquium on "Stemming the Alarm Flood," London, UK, June, 1997.

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For More Information

To learn more about the benefits of Honeywell's Advanced Alarm Management, visit our website or contact your Honeywell account manager.

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