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# ABB Ability™ System 800xA

## Alarm Management



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Effective detection, notification, analysis and corrective action of abnormal situations

When an alarm sounds in a process controlled by ABB's System 800xA, operators have a complete all-in-one overview with full visualization and common alarm lists at their disposal.

**Acknowledging or silencing an alarm without investigating it is not an option**

With fewer operators controlling ever larger process areas, effective alarm management is essential for protecting the plant, its workers and the surrounding environment.

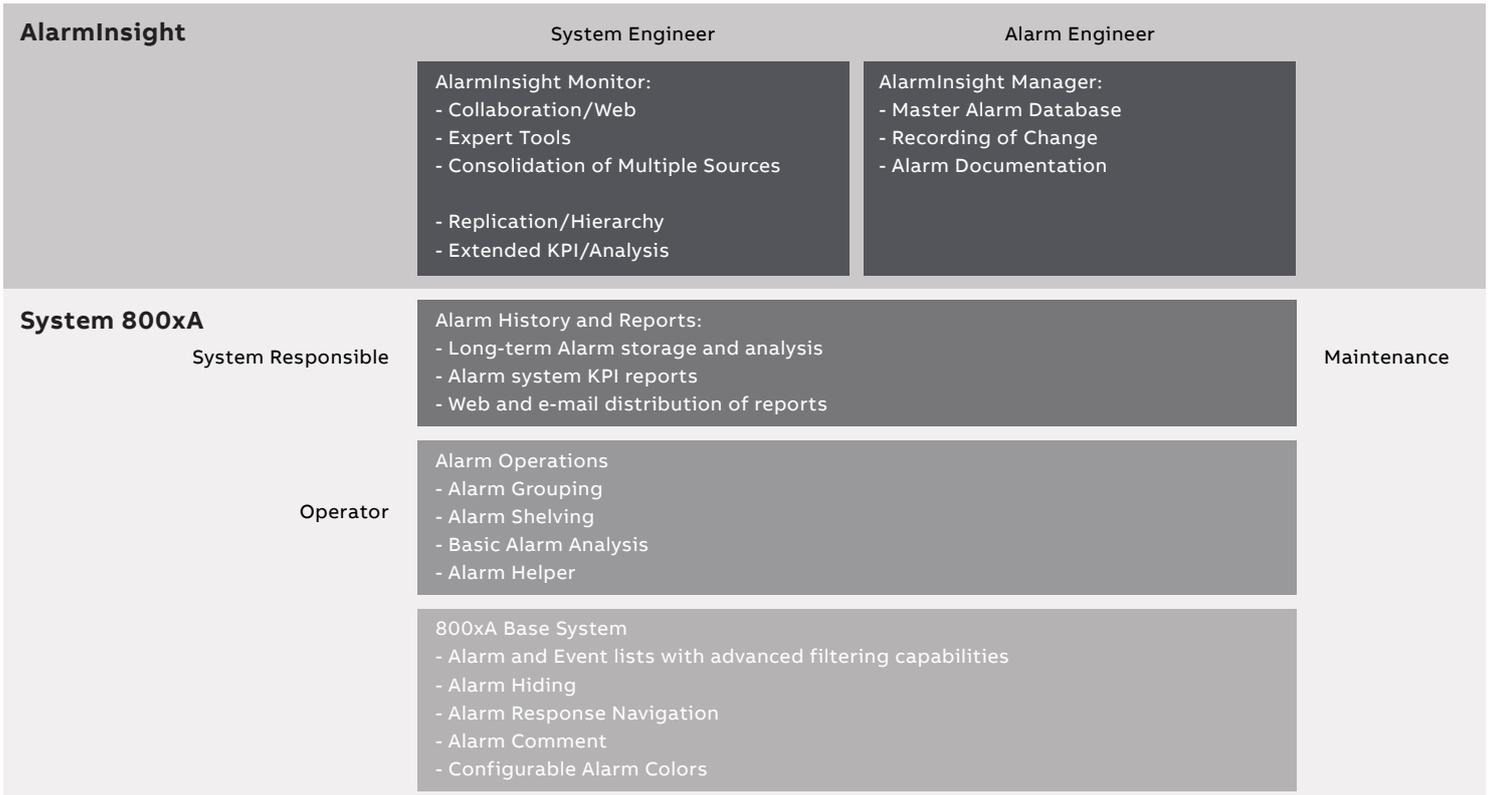
As EEMUA 191 states, 'each alarm should alert, inform and guide, every alarm presented should be useful and relevant to the operator, and every alarm should have a defined response.'

Yet today, too many operators face too many alarms. As a result, they often turn acoustic alarms off, acknowledge alarms without acting, or suppress them for long periods. They may not even know what a particular alarm means.

800xA Alarm Management changes this. It directs operator attention towards those plant conditions that require assessment, and the information for them to act correctly.

**800xA Alarm Management – key highlights**

- Alarm analysis optimizes alarm implementation, optimization and use
- Automatic alarm structuring simplify alarm delegation between process areas and control rooms
- Operator-friendly alarm lists promote quick and simple navigation
- Alarm shelving and hiding reduce operator distraction
- Alarm grouping minimizes alarm list entries
- Alarm response gives operators a head start on solving the problem regardless of their experience
- Consistent right-click navigation makes alarm-related information instantly available
- Alarm Helper gives instant context sensitive access to alarm documentation
- Alarm metrics can be automatically emailed to engineers and maintenance personnel
- Alarm history as an optimal foundation for alarm analysis and alarm system improvement



01 Knowing exactly how much a value deviates from that permitted may affect an operator's response. System 800xA alarm lists show this value 'live'.

**System 800xA has options to extend the basic functionalities with operator-focused features such as Alarm KPI generation, alarm shelving, alarm analysis, escalating up to maintenance and system responsible.**

For advanced alarm management features, focused at System Engineers, the Alarm Insight package offers a complete solution, complementing what is available in System 800xA.

**Proactive, operator-friendly alarm-list presentation**

When an alarm is triggered, an operator's response is based on the information and sequence of events data available via the alarm list. The better this list is, the quicker the operator understands the current abnormal situation and is able to initiate corrective actions.

The way an alarm is presented thus dictates how effectively it is handled. 800xA Alarm Management makes the most of this opportunity. For example, operators can acknowledge all visible alarms, and enter comments for individual alarms that are recorded in the events list.

Navigation to the corresponding event list is simple and direct. Note that a status presentation summary (alarms acknowledged, unacknowledged and inactive) is always on show. Predefined alarm list filters for operators can also be configured.

The visible part of 800xA alarm lists also includes a 'View live values' function where the current values of parameters that led to the alarm are shown. For example, when operators are alerted that the amount of liquid in a tank has fallen below a specified level, they can see exactly what the current level is. Their response can thus be based on whether it is just below or way below.

**Automatic alarm structuring enables simple and safe alarm delegation**

With 800xA, process control is engineered in functional structures that divide plants into different operations under which specified process sections and objects (motors, tanks, etc.) are located. There's no need to define tags into groups for alarm lists as this is automatically done when defining structures in 800xA.

Ack/Prio	State	ActiveTime	ObjectName	ObjectDescription	Condition	Message	CurrentValue
2	ACT	18 08:00:52:078	TL2077_A1	ReactorTemp_State	Temp-HH	Greater than 80.00	95.89
1	ACT	18 08:00:50:578	PL2029_C29	COMP_C29_Pres_State	Pressure-LLL	Less than 5.00	33.96
2	ACT	18 08:00:48:077	PL2029_C29	COMP_C29_Pres_State	Pressure-LL	Less than 10.00	33.96
3	ACT	18 08:00:42:578	PL2029_C29	COMP_C29_Pres_State	Pressure-L	Less than 20.00	33.96
3	ACT	18 08:00:36:078	TL2077_A1	ReactorTemp_State	Temp-H	Greater than 75.00	95.89
1	RTN	18 07:59:27:577	PL2077_A1	ReactorPressure_State	Pressure-LLL	Less than 5.00	38.33
2	ACT	18 07:59:24:577	PL2077_A1	ReactorPressure_State	Pressure-L	Less than 10.00	38.33
3	ACT	18 07:59:18:078	PL2077_A1	ReactorPressure_State	Pressure-L	Less than 20.00	38.33
1	RTN	18 07:58:53:078	TL2029_C29	COMP_C29_Temp_State	Temp-LLL	Less than 5.00	68.41
2	RTN	18 07:58:48:578	TL2029_C29	COMP_C29_Temp_State	Temp-LL	Less than 10.00	68.41
3	RTN	18 07:58:40:077	TL2029_C29	COMP_C29_Temp_State	Temp-L	Less than 20.00	68.41
2	RTN	18 07:57:23:578	TL2029_C29	COMP_C29_Temp_State	Temp-HH	Greater than 80.00	68.41
3	RTN	18 07:57:10:578	TL2029_C29	COMP_C29_Temp_State	Temp-H	Greater than 75.00	68.41
1	RTN	18 07:55:58:578	TL2077_A1	ReactorTemp_State	Temp-LLL	Less than 5.00	95.89
2	RTN	18 07:55:49:078	TL2077_A1	ReactorTemp_State	Temp-LL	Less than 10.00	95.89
3	RTN	18 07:55:32:078	TL2077_A1	ReactorTemp_State	Temp-L	Less than 20.00	95.89
1	ACT	15 09:51:43:578	Compressor-Drive	Compressor-DriveTorque-Low	DischargeLow	Compressor-DriveTorque-Low	
1	ACT	15 09:51:43:578	Reactor_ByPass	Reactor_ByPassByPass_Blk	Red	Reactor_ByPassByPass_Blk	
1	ACT	15 09:51:43:578	Compressor-Hydraulic	Compressor-HydraulicOil-Press-Low	Cavitating	Compressor-HydraulicOil-Press-Low	
1	ACT	15 09:51:43:578	IsolationSystem	IsolationSystemHelium_Gas_CN	Unstable	IsolationSystemHelium_Gas_CN	

— 02 Easy-to-use System 800xA alarm lists encourage operators to take a proactive approach to recording and dealing with unexpected events.

— 03 Built-in alarm management analysis tools help users optimize their system functions for maximum safety and efficiency. Pre-made graphics simplify understanding.

This is not only very fast and cost-effective (since it makes use of engineering work already done), it is also simpler for operators; they only have to monitor alarms for their 'own' objects and not a long list of unsorted alarms belonging to others. Moreover, if a new alarm is added to an object in a functional structure, the relevant alarm list is updated automatically.

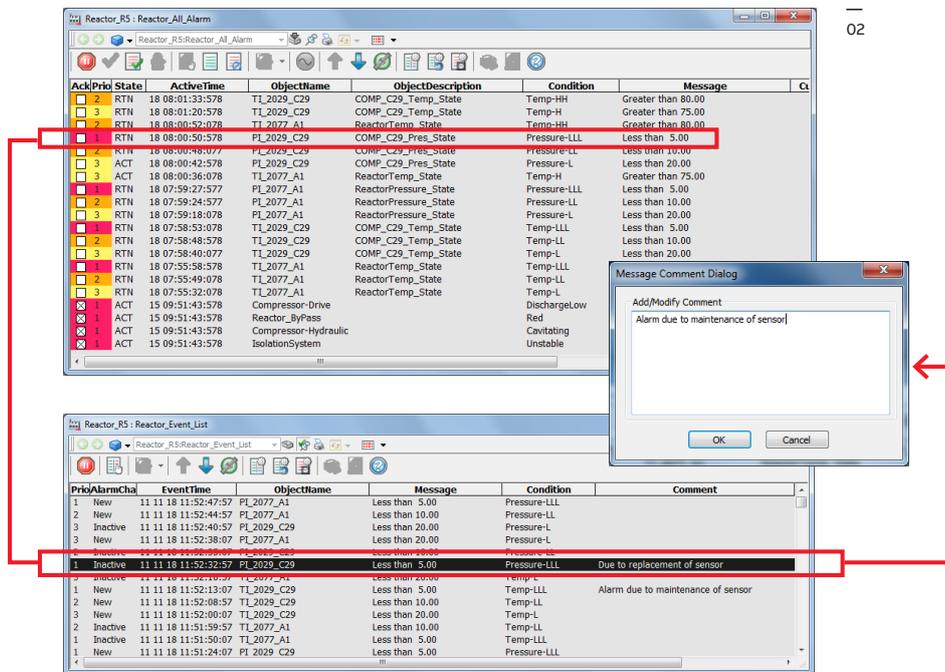
Alarm functions based on functional plant structures also allow smooth and secure point-of-control, which is the transfer of alarm list responsibility for specified process sections between different operators or control rooms.

**Simple-to-configure alarm analysis helps keep alarms in check**

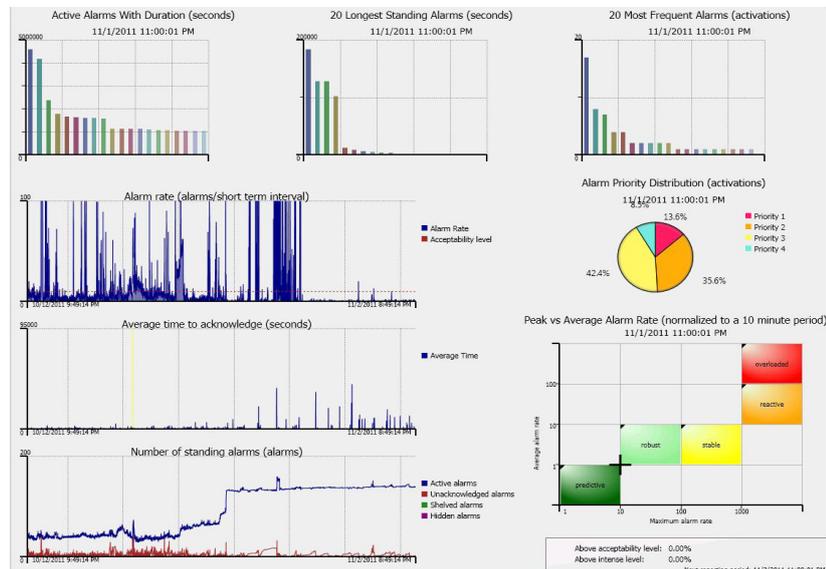
Without a properly configured alarm system, even the most skillful operator may run into

difficulties. The alarm analysis function of 800xA optimizes the alarm system, monitors its performance, and continuously calculates metrics. Furthermore, configuration is very simple; just add an alarm analysis object to an object with an alarm list. Pre-made, easy-to-understand graphic elements simplify understanding, which promotes rapid operator evaluation and speedy response. Key performance indicators include:

- Twenty most-frequent alarms
- Twenty longest-standing alarms
- Alarm rate trend
- Average time to acknowledge alarms over time (trend)
- Alarm priority distribution
- Number of disabled alarms, inhibited alarms, shelved alarms and hidden alarms over time (trend)

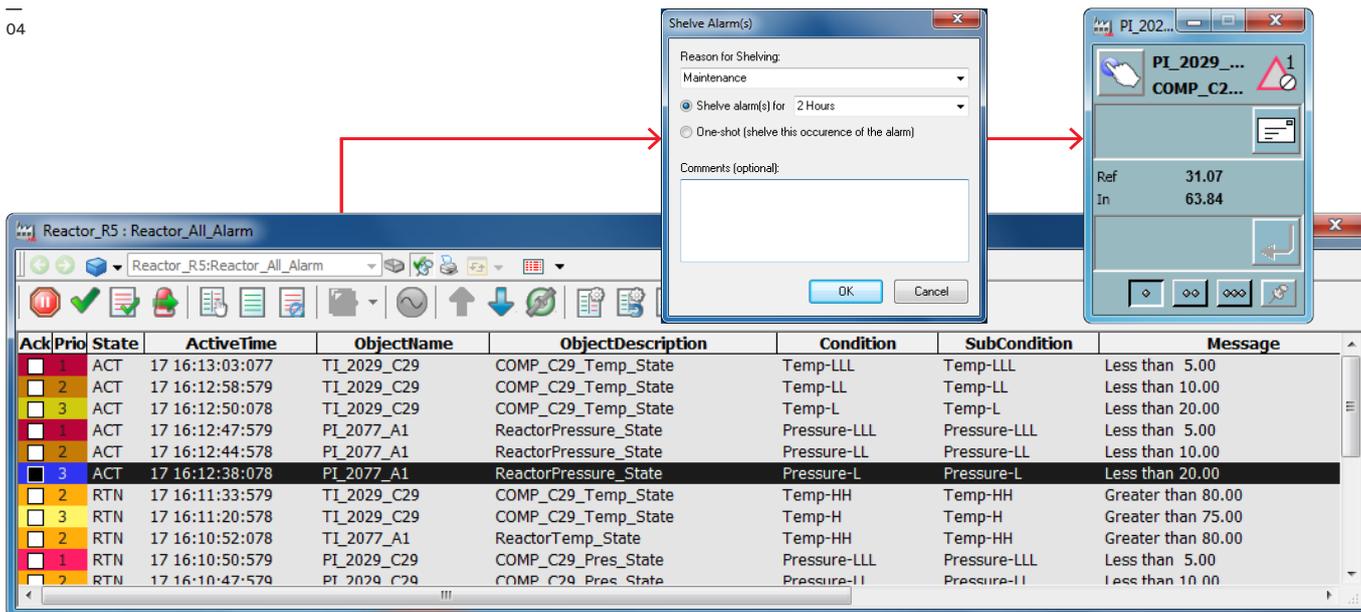


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04 Alarm shelving helps the operators reduce distraction from nuisance alarms.

05 A group alarm represents a number of alarms, usually related to each other. Context menus make defining, configuring alarm grouping in System 800xA easy.

**Alarm shelving and hiding remove unnecessary distractions**

Rationalizing operator workload and helping them handle stressful situations calmly and effectively are two key functions of 800xA's alarm shelving and alarm hiding.

Shelving lets operators decide whether or not to put an alarm 'on the shelf' for a defined period of time or a certain occurrence. This temporarily removes it from the main alarm list to a separate 'shelved list'. In the meantime, operators can concentrate on the alarms that truly require their attention.

Simple navigation makes alarm shelving a valuable and much-appreciated tool that helps operators work with maximum efficiency.

Alarm hiding is set up during the engineering phase. Its main purpose is to suppress resulting alarms that are either expected or not relevant in a particular situation or process state, e.g. low temperatures or pressure during a controlled shutdown.

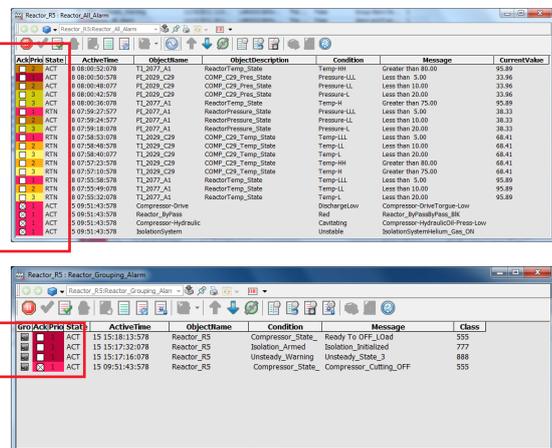
Hidden alarms are still recorded, but as the name indicates, never visible to operators. They only see alarms that require action on their part.

**Alarm grouping replaces long lists**

Like alarm shelving and hiding, alarm grouping is another mechanism to reduce the number of alarms, thereby helping operators handle key tasks with their full, undistracted attention. A group alarm is a single alarm presented instead of several individual alarms.

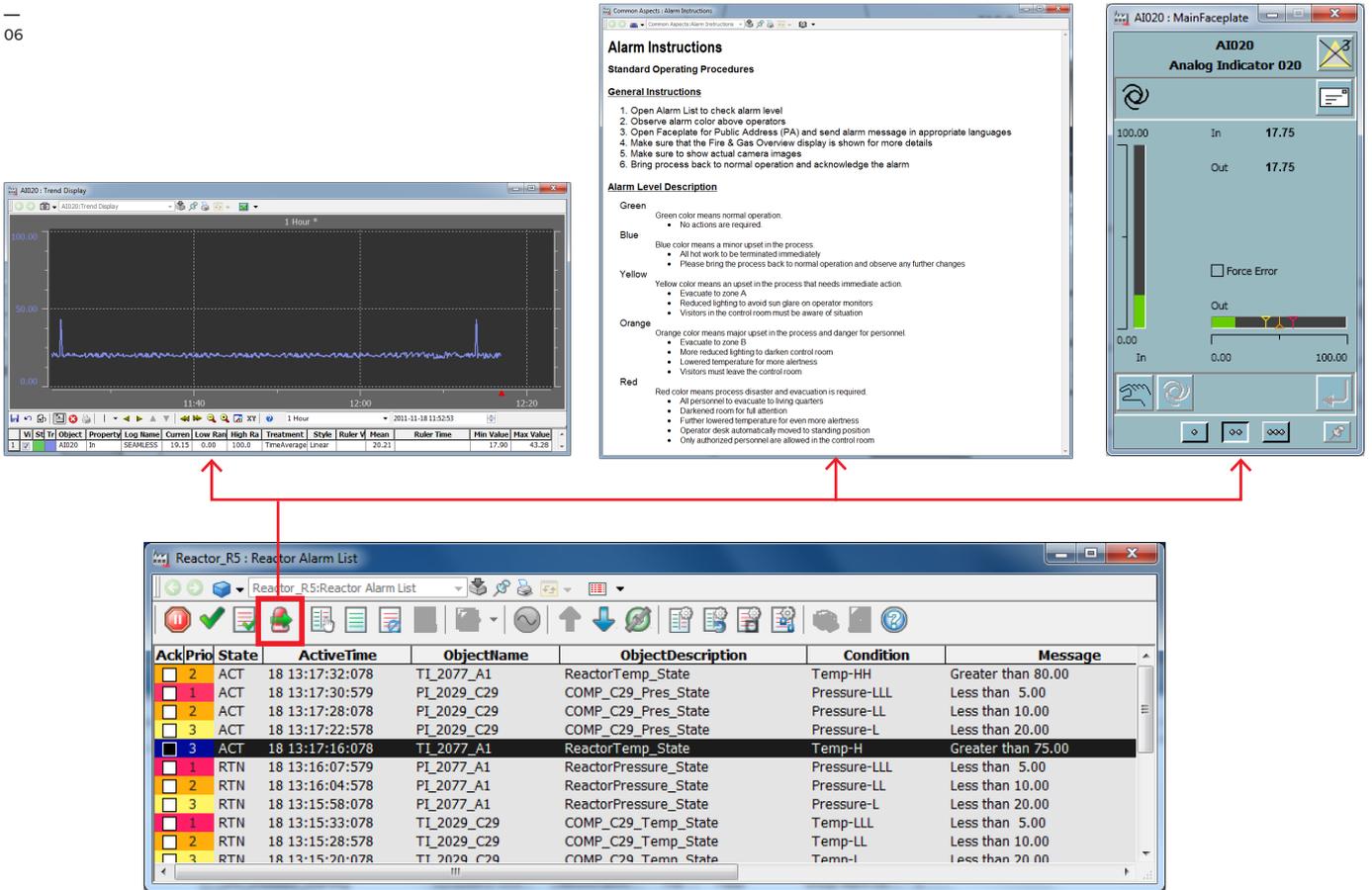
The individual alarms are generally related to a common process unit or a similar operator response. By minimizing the number of alarm list entries that have to be read and assessed, alarm grouping helps operators work more effectively.

In addition, alarm grouping also helps operators identify the "trigger" alarms, thereby improving their understanding of the situation. By both reducing the number of alarms and making them more informative, alarm grouping helps operators concentrate on taking the correct countermeasures to prevent or reduce damage occurring.



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06 Consistent alarm-response navigation

In alarm systems that lack this function, the success of damage limitation has often depended on an individual operator’s ability to ‘piece together’ the information from several simultaneous alarms plus their experience of what this means for the process. This is both time-consuming and risky. With 800xA Alarm Management, the ability to deal with abnormal situations is much improved.

**Consistent alarm-response navigation gives fast access to essential information**

Should a situation become urgent, the operator needs support to shorten the time from the alarm occurring to finding the root cause and taking corrective action. 800xA Alarm Management provides this support in the form of consistent right-click navigation from the alarm list to instantly available, alarm-related information.

When an alarm is raised operators are then just one click away from the object’s faceplate, graphic display, operating manual or live video. This saves valuable time when seeking specific information to understand the abnormal process condition.

The system configuration console offers users the option of simple configuration of default behavior or advanced configuration from Plant Explorer. An example of the latter involves up to four aspects (items of information) being opened at once as determined by the current workplace settings, e.g. overlap/base panel, position, screen.

**An embedded alarm documentation database ensures fast and correct actions**

Access to relevant documentation plays an important role in the correct handling of alarms. 800xA Alarm Helper provides the necessary tools for maintaining alarm documentation. For example, operators can make a lookup in the documentation database to access the latest information and guidance for a particular alarm.

It is easy for the operators to access the relevant alarm documentation. It is available in the alarm helper in the context menu on objects and alarms. This ensures the best possible starting point for understanding the alarm and gives guidance to employ best practices in the handling of the alarms.

**E-mail distributed alarm metric reports improve organizational awareness**

For those who want to improve alarm analysis even further, 800xA Alarm History and Reports features a long-term storage alarm historian. This function includes several preconfigured reports dedicated to supporting alarm awareness, as well as ready-to-use daily maintenance tasks.

Moreover, user-defined reports are easy to create if the standard versions do not fulfill project or user requirements. All reports can be scheduled and sent via e-mail for simple distribution and speedy access.

07 Alarm information provided to operator through the Alarm Helper display guides correct behavior in alarm situations.

08 Reports in 800xA Help & Reports are based on Microsoft Reporting Services, which among other things features web access, email notifications and Excel exports.

**21TT4050 : Alarm Helper**

**TT\_20\_0322**  
**TT\_20\_0322\_Description**

Alarm Response | Alarm Parameters | Alarm Change History

**Likely Cause of Alarm:**

- Level controller 32LIC4356 on manual mode or with wrong flow setting.
- Controller 32FIC5433 on manual mode or not on cascade control and flow setting not in compliance with actual product flow.

**Consequence if alarm is missed**  
PSD 3.11

**Corrective Actions:**

- Check and maintain level control loop 32LIC4356
- Check and maintain flow control loop 32FIC5433
- Check temperature 32T15445 of stabilizer column bottom and rectify if necessary

07

System: Demo Plant Year: 2012 Week: 49 View Report

**Alarm management analysis**  
Week 49 Weekly report

1 week period: 2012-12-03 00:00:00 to 2012-12-09 23:59:59  
4 week period: 2012-11-12 00:00:00 to 2012-12-09 23:59:59

**Top 20 Alarm Frequency - 1 week**

No	Tagname	Description	Text1	Text2	Count	%
1	143PSTH_0001	HC TO FLARE	Value	Alarm	69	5.91
2	226PSTH_2035	2 STG HP COMP SUCT	Value	Alarm	29	2.49
3	320PSTH_2037	2 STG HP COMP DISC	Value	Alarm	20	1.71
4	445LSTH_0003	FUELGAS SCRUBBER	Value	Alarm	18	1.54
5	520PSTL_1037	LP 2 STG DISCHARGE	Value	Alarm	17	1.46
6	620LSTL_1152	OL 2 STG SEP	Value	Alarm	16	1.37
7	720LSTL_1112	OL 1 STG SEP A	Value	Alarm	16	1.37
8	823PSTH_1037	LP 2 STG DISCHARGE	Value	Alarm	15	1.29
9	923PSTL_1017	LP 1 STG DISCHARGE	Value	Alarm	15	1.29
10	1023TSTH_1032	LP 2 STG DISCHARGE	Value	Alarm	15	1.29
11	1144PSTL_1200	PV BOOSTER SHIP-A OIL	Value	Alarm	15	1.29
12	1220LSTL_4103	OL 1 STG SEP B	Value	Alarm	14	1.20
13	1323TSTH_1033	LP 2 STG DISCHARGE	Value	Alarm	14	1.20
14	1421PSTH_0100	OUTLET EXP OIL PUMP	Value	Alarm	12	1.03
15	1520LTL_1113	OL 1 STG SEP A	Value	Alarm	11	0.94
16	1629PSTH_2017	1 STG HP COMP DISC	Value	Alarm	11	0.94
17	1729PSTL_2052	HP COMP B LUBE OIL	Value	Alarm	11	0.94
18	1858ERD1B_0203F	UPS B FAULT	Value	Alarm	11	0.94
19	1929PSTL_2015	1 STG HP COMP SUCT	Value	Alarm	10	0.86
20	2029PSTL_2015	1 STG HP COMP SUCT	Value	Alarm	10	0.86
<b>Total:</b>					<b>349</b>	<b>29.91</b>

**Alarm System Performance**

Legend: 4 weeks (blue diamond), 1 week (red diamond)

1 - Overloaded  
2 - Reactive  
3 - Stable  
4 - Robust  
5 - Predictive

**Alarm rate - 4 weeks**

Legend: x07Target Alarm Rate (green line), Alarm Rate (blue line), Trendline (black line)

Graph showing Alarm Rate (Y-axis, 0-350) vs Time (X-axis, 2012-11-12 to 2012-12-03). The alarm rate shows a significant spike around 2012-12-03, reaching approximately 300.

08



### **AlarmInsight provides full scale alarm management**

AlarmInsight builds on 800xA Alarm Operations and 800x Alarm History and Reports to provide full-scale alarm management. By offering extensive analysis functions as well as a broad set of visualization tools, it brings key alarm information to any user anywhere. Operations experts wanting specific alarm information and managers needing to see overviews find that AlarmInsight meets both their demands.

Successful alarm management requires the attention of the entire organization. AlarmInsight achieves this by gathering data from the same consistent source and ensuring that it reaches all relevant users through all kinds of user interface. AlarmInsight plugs into the same infrastructure as 800xA Alarm History and Reports. Implementing this option not only provide decision support for the operators, it also begins building the portfolio of tools needed to close the alarm management loop.

For enterprise solutions AlarmInsight consolidates data from multiple controls systems, different vendors and different assets. This gives organizations one common tool for implementing alarm management benchmark reports and analysis tools for marking and awareness.

### **Greater availability and improved safety**

Integrating ABB's advanced yet user-friendly alarm management into 800xA dramatically improves an operator's ability to navigate, analyze and act in a timely and correct manner.

Knowing at once what an alarm means and how best to deal with it increases plant availability and thereby productivity. As well as helping secure the investment made in the facility, this also protects the individuals working there and the surrounding environment.

Optimizing an operator's ability to monitor processes also means that they can be entrusted with larger sections of the plant without compromising safety. This lowers costs and gives owners the opportunity to reduce the control room footprint or consolidate several units into one for greater efficiency.

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