Alarm Management

Alarm Standards

Process alarms are used to draw the operator's attention to an abnormal condition that, if disregarded, could lead to poor product quality, unplanned downtime, damaged assets, personnel injury or a catastrophic accident. Alarm management is one of many layers of protection to prevent the escalation of a hazard into an accident.

Standards

In 2009, the standard ANSI/ISA-18.2, "Management of Alarm Systems for the Process Industries" (ISA-18.2) was released. It provides guidance that helps users design, implement and maintain an alarm system in order to optimize performance for an operator response to alarm. ISA-18.2 was used as the starting point for the creation of an international standard, IEC 62682, which was released in 2014. The ISA-18.2 standard is considered a recommended and generally accepted good engineering practice (RAGAGEP) by insurance and regulatory agencies.

Most process industry plants are driven to create additional productivity/efficiency and extend the life of their assets. One of the easiest and most effective ways to do this is to address a poorly performing alarm system and its effect on operator performance.

What is an Alarm?

According to the standards, an alarm is defined as an audible and/or visible means of indicating to the <u>operator</u> an equipment malfunction, process deviation, or abnormal condition that <u>requires a response</u>. When employed appropriately, alarms help the operator to keep the plant running safely and within normal operating conditions. If alarms instead serve as a distraction or nuisance, then the performance of the operator suffers.

	Action Required	Information
Abnormal	Alarm	Alert
Expected	Prompt	Message

A message like "mixer running normally" should not be classified as an alarm because it is information and requires no action from the operator. Message other than alarms distract the operator.

Basic vs Advanced Reporting

XLReporter provides alarm reports at two levels: Standard and Advanced.

Standard reports are available with every version of **XLReporter** that supports database connectors. These types of reports provide a partial list of the alarm metrics and information suggested by ISA-18.2 and IEC62682 standard. This is an ideal start to alarm management.

Advanced reports are available with the ISA-18.2 Alarm Management Module which is an addition to **XLReporter**. The addition measures all the metrics suggested by the ISA-18.2 and IEC62682 standard and provides the necessary information that will help you identify systematic design issues and specific areas for improvement. This is the subject of this documentation.

Alarm Hierarchy

XLReporter considers the alarm hierarchy discussed below. Not every alarm system supports this hierarchy and so, by configuration, it can be modified.

In the hierarchy, alarms are generated from modules (tags) which have attributes (e.g., HIHI). The modules belong to Areas (locations in the facility) which are managed from Operator Positions. Collectively this is all part of a Facility. The hierarchy is depicted in the following diagram.



Alarm Cycle

Alarms are usually in one of the following states:

• Active-Unacknowledged

This signifies the occurrence of a new alarm (start of cycle). The alarm is active and has not been acknowledged by the operator.

Active-Acknowledged

This signifies that the alarm is active and has been acknowledged by the operator.

• Inactive-Unacknowledged

This signifies that the alarm is not active and has not been acknowledged by the operator.

• Inactive-Acknowledged

This signifies the end of the alarm cycle. The alarm is inactive and has been acknowledged by the operator.

Other irregular states such as Disabled and Suppressed are also possible.

To determine the ISA metrics, each of these states have to be identifiable in the alarm system. Alarm systems from different vendors have different methods of determining these states. **XLReporter** provides settings for the alarm states as part of the **Connector** definition (see later).

Registration

Before you begin, enable the software to run either in evaluation or full mode. From the **XLReporter Project Explorer**, on the right-side **Tools** tab click **Register**.

🚺 Registration		-	×
Options			
First Name Last Name			
Company			Ī
Start Trial	Extend Trial	Re	

Evaluation License

Enter the information required and select **Start Trial** to start the evaluation. When the evaluation period expires, you can re-open this display and select **Extend Trial**.

The evaluation license runs continuously for two hours and <u>limits the information that is returned</u> <u>from the Alarm Management connector</u>. When the product is registered with an Advanced Module license, this limit is removed.

Full License

For information on registering a license, see the Product Registration document.

Predefined Templates

Overview

When an alarm management connector is created, a set of predefined templates are automatically added to the current project. These templates are fully functional but will <u>limit their output if a full</u> <u>license is not present</u>.

Define the Connector

From the **XLReporter Project Explorer** on the right-side **Tools** tab, in the **Connect** section click **Connectors** to display the connectors defined in the project. This same display appears when creating a new project.

lodify 🔀 Delet	e 🛛 🎲 Catalog	
	Provider	Description
jement	Alarm Management (ISA 18.2)	SY020\SQLSERVER16
nector	Simulator Historical values	
ata Connector	Simulator Real-time values	
or		
1	gement inector ata Connector or	Provider gement Alarm Management (ISA 18.2) inector Simulator Historical values ata Connector Simulator Real-time values or

- Click Add.
- Expand Advanced Modules and select Alarm Management (ISA-18.2)
- Click OK.

Connector Name	Alam_Management
Description	TB05-SQLSVR\SQLSERVER16
Provider	Emerson Automation Solutions DeltaV Event Journal
Alam/Event Database	•
Туре	Microsoft SQL Server
Data Source	TB05-SQLSVR\SQLSERVER16
Table/View	JOURNAL
Data Source Table/View	TB05-SQLSVR/SQLSERVER16 JOURNAL
Connector	~
	Settings

In this display, provide information about your alarm system database.

• Set the **Provider**.

Under Alarm/Event Database

- Connect to the database where the alarms are being logged.
- For **Table/View**, select the table or view containing the alarm data. Typically, this is defaulted once the **Data Source** is specified.

Click Settings.

- Under the **Facility** tab enter **Name** and **Location**.
- Click OK
- Click **OK** again.
- Close **Connectors**.

When the connector is saved, several templates are added to the project that can be used "out of the box".

Report On-Demand

The predefined templates can be used on-demand to produce reports using custom settings. From the **Project Explorer**, on the right-side **Tools** tab, in the **Report** section select **On-Demand Reports**.

eport 🛧							
Schedule T	Template	Web Portal	On-Demand	Data Entry	Workbook	PDF	Web
Designer C	Categories		Reports	Forms	Reports	Reports	Reports

The **On-Demand Reports** application shows with the templates added to the project in the left pane.

Options	« 🖬 Sa	ve 🆼 Print 🔹 Email 📋	Freeze Panes 🔜 Zoom	In 🛄 Zoom Out 🔛 Keypad		
<u>à</u>	A1	•				
Report Templates AlarmAnalysis		A B	С	E	F	G
AlarmFlood	2	Alarm Analysis	- The trial vers	ion is for evaluation	only and limits	the output
	4	Facility	SyTech		Module	All
	5	Location	Franklin		Attribute	All
	6	Position	All		Cycle	All
	8	Key Performance In	dicators			
	9	Total	50			
	10	Timestamp	 Duration 	▼ Area	 Module 	 Attribute
	11	6/8/2017 00:00:07	3:21:21	12-24-DISTILLATION	12-24-PI-416	HI_ALM
	12	6/8/2017 00:01:15	3:10:11	12-24-DISTILLATION	12-24-PI-319	HI_ALM
Refrech Instance	13	6/8/2017 00:01:26	3:09:03	12-24-DISTILLATION	12-24-PI-318	HI_ALM
Menesi a fisiance	14	6/8/2017 00:01:46	0:00:00	AREA_A	12-92-CR-109	ADVISE_ALM
Elitere Data Dasage	15	6/8/2017 00:01:48	1:14:18	12-22-FILTER	12-22-TIC-301	PVBAD_ALM
Filter Date Range V	16	6/8/2017 00:01:48	0:00:00	AREA_A	12-92-CR-109	ADVISE_ALM
Start 08 Jun 2017	17	6/8/2017 00:02:25	0:04:33	12-25-DEHYDRATION	12-25-LI-203	LO_ALM
End 09 Jun 2017	18	6/8/2017 00:03:40	2:32:24	22_STARCH	22_LI-03	HI_ALM
	19	6/8/2017 00:03:58	1:35:39	12-52-CIP-SYSTEM	12-52-AI-102	LO_ALM
	20	6/8/2017 00:05:39	0:03:35	12-51-KLAGER	12-51-FIC-209	DV_HI_ALM
Parameter	21	6/8/2017 00:07:26	0:25:41	12-25-DEHYDRATION	12-25-TI-204	HI_ALM
Setting Value	22	6/8/2017 00:08:03	0:07:08	22_STARCH	22_LIC-03	HI_ALM
Module All	23	6/8/2017 00:14:22	0:29:06	12-24-DISTILLATION	12-24-PI-402	HI_ALM
Attribute All	24	6/8/2017 00:16:34	5:45:20	21_MILLING	21_WIQA-01	LO_ALM
Cycle All	25	6/8/2017 00:22:16	0:00:00	AREA_A	12-92-CR-109	ADVISE_ALM
	26	6/8/2017 00:26:05	0:10:17	12-24-DISTILLATION	12-24-TDIC-404	HI_ALM
	27	6/8/2017 00:26:19	1:52:55	22_STARCH	22_LIC-03	HI_ALM
	28	6/8/2017 00:27:49	0:39:15	12-24-DISTILLATION	12-24-PDI-419	HI_ALM
	29	6/8/2017 00:30:00	0:00:00	12-24-DISTILLATION	12-24-AI-301	LO ALM

AlarmReport

The **AlarmReport** is a comprehensive multi-sheet report that displays alarm analysis described in ISA-18.2 standard. A dashboard is the first provides an "at-a-glance" view of the alarm system and the other sheets provide detailed information that support the KPIs.

A report is produced on-demand by specifying settings for the *Start/End* dates, *Position*, *Module* and *Attribute*. In the case of *Position*, *Module* and *Attribute*, they need to be setup in the Alarm Connector in advance (see **Connector**).

Enter input settings and click Refresh.

🙀 On-Demand Reports - Alarm repo	rt for IS	A18.2, IEC62682 analysis								
Options «	🖬 Sa	ve 🎯 Print 🔹 Email 📋 Freeze Pane	s 🛄 Zoom In 🛄 Zoom (Dut 📃	Keypad					
th O	A1	•								
Report Templates AlarmétiveCount		A B	С	D	E	F	G	н	1	J
AlarmAnalysis AlarmCount	2	Alarm Performance Da	shboard							
AlarmCyclePeriod	4	Facility	Facility, Inc.		Module	All Modules		Report Start Date	7-Jun-17	
- AlarmNewCount	5	Position	All Areas		Attribute	All Attributes		Report End Date	6-Jul-17	
AlarmNewCountFiltered	6				Alarm Cycle	All Cycles		Alarm Period (hrs)	696	
- AlarmTest	8	Key Performance Indicators								
- Report 1	9	Total Number of New Alarms			43798		Total	Number of Stale Alarms Sources	58	
😂 Refresh 📓 Instance	10	Total Number of Alarm Floods			245		Stand	ing Alarms at Period End	131	
* 🖽 Date	11	Total Number of Alarm Suppression	n Actions		16		Not in	cluding alarms > 696 hours old		
Filter Date Range 💌	13	Average Alarm Rate	4540.00		Average Alarm Rate	62.02		Average Alarm Rate		
Start 07 Jun 2017	14	per day	1510.28		per hour	62.93		per 10 min	10.49	
End 06 Jul 2017	15	Acceptable	limits	1	Acceptable	limits	1	Acceptable	limits	
004 + +	16	Manageable	150		Manageable	12		Manageable	2	
	17	Critical	750		Critical	30		Critical	5	
Setting Value	19	>30 Alarms			>10 Alarms			Peak Alarms		
Position All Areas	20	per hour	68.68%		per 10 min	30.20%		per 10 min	130	
Module All Modules	21	Acceptable	limits	1	Acceptable	limits	1	Acceptable	limits	
Attribute All Attributes	22	Manageable	1%		Manageable	1%		Manageable	10	
oyde All Cycles	23	Critical	10%		Critical	5%		Critical	20	
	25	Flood			Top 10 Contribution	1		Chattering/Electing		
	26	per period	0.82%		period	31.09%		per period	246	
	27	Acceptable	limits	1	Acceptable	limits	1	Acceptable	limits	
	28	Manageable	1%		Manageable	5%		Manageable	1	
	29	Critical	5%		Critical	20%		Critical	2	
	31	Stale			Average Alarm			Average Alarm		
	32	per period	271		per hour during flood	103.57		per hour excluding flood	0.18	
	33	Acceptable	limits	1	Acceptable	limits	1	Acceptable	limits	
	34	Manageable	1		Manageable	12		Manageable	12	
	14 4	H Dashboard / Distribution / Sum	mary /AlarmSource /Alarm	nFloods	AlarmStanding AlarmAcknowledge	AlarmActivation Alarm	Suppres	sed / AlarmDisabled / AlarmTimeline /	•	- F

Note that in trial mode only the Dashboard and AlarmSummary reports are displayed.

Dashboard

The report shows the compliance metrics as a dashboard together with the recommended limits (which can be modified in the template). Each metric is rated according to the limits and color coded for easy detection of non-compliance.

Alarm Summary

The report shows the primary KPIs and metrics performance indicators. It also shows the distribution of the new alarms by configuable group levels for each day in the report period. For the most active day, the distribution is shown by hour.

Alarm Source

The report shows the sources of new alarm activity in descending order of alarm occurance (bad actors). The top 20 most active alarms are shown in a pareto chart to determine the percentage effect of the active alarms to the whole.

Alarm Floods

The report shows the occurrence of each alarm flood as sdefined in the template. By default, a flood starts with more than 10 alarms in 10 minutes and ends with less than 5 in 10 minutes. The report also shows the peak of the flood and the total new alarms that occurred during the flood.

Alarm Standing

The report shows the alarms that are active at the end of the report period.

Alarm Acknowledge

The report shows a summary of the alarm acknowledgement time. The metrics are based on the time taken for an active alarm to be acknowledged.

Alarm Activation

The report shows a summary of the alarm activation time. The metrics are based on the time taken for an active alarm to become inactive.

Alarm Suppressed

The report shows a list of alarms that are suppressed during the alarm period. Note that this is not supported by every alarm system. An indicator shows if they are in that state at the end of the period.

Alarm Disabled

The report shows a list of alarms that are disabled during the alarm period. Note that this is not supported by every alarm system. An indicator shows if the alarms are in the disabled state at the end of the period. In this scenario the final disabled alarm message is not considered in the overall count.

AlarmAnalysis

The alarm analysis report is a powerful environment to understand alarm behavior. It is primarily used to determine and track alarm details in order for effective diagnosis and repair.

Con-Demand Reports - Report f	or alarn	n imp	rovement analysis		and the second					<u>а х</u>
© Options		Save	Ga Print • 🖃 Email 🛄 Fr	eeze Panes 🛄 Zoom In 🛄 Z	oom Out 🛄 keypad					
Report Templates			•	6		6		C		
- AlarmActiveCount		P	в	L	D	E	1	6	н	
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AlarmCyclePeriod		4	Facility	Facility, Inc.		Module	All Modules	Report Start Date	7-Jun-17	
AlarmHood AlarmNewCount		5	Position	All Areas		Attribute	All Attributes	Report End Date	6-Jul-17	
AlarmNewCountFiltered		6				Cycle	All Cycles	Alarm Period (hrs)	696	
AlarmReport		8	Key Performance Inc	dicators						
- D Report 1	-	9	Total	570						
Refresh 🛃 Instance	1	0	Timestamp	▼ Area	▼ Module	 Attribute 	▼ State	▼ Level	Duration	۲.
🛄 Date	3	90	6/7/2017 07:33:57	24 DISTILLATION	24 TIC-32	LO ALM	ACT/UNACK	11-WARNING	0:00:01	_
Filter Date Range 🔻	3	95	6/7/2017 07:36:52	12-63-SVAT	12-63-P-02-A	FAIL ALM	ACT/UNACK	07-ADVISORY	0:00:01	
Start 07. Jun 2017	4	12	6/7/2017 07:41:49	32 DRYING	32 E12M3	FAIL ALM	ACT/UNACK	11-WARNING	0:00:01	
Start of our corr	5	72	6/7/2017 09:43:28	12-27-ETANOLLAGE	LARM DEPÅ	DAGV F SKYDD	ACT/UNACK	15-CRITICAL	0:00:01	
End 06 Jul 2017	5	73	6/7/2017 09:43:28	12-27-ETANOLLAGE	LARM_DEPÅ	LÄCKAGE_LARM	ACT/UNACK	15-CRITICAL	0:00:01	
@ @ ◀ ▶ → ▶	5	93	6/7/2017 09:47:46	12-66-PROCESSVAT	12-66-TIC-101	DV LO ALM	ACT/UNACK	07-ADVISORY	0:00:01	
Parameter	7	70	6/7/2017 10:44:25	12-62-KILN	12-62-TIC-204	DV_HI_ALM	ACT/UNACK	07-ADVISORY	0:00:01	
etting Value	12	32	6/7/2017 15:25:30	11_GRAINSILO	11_LIA-28	LO_ALM	ACT/UNACK	11-WARNING	0:00:01	
osition All Areas	12	44	6/7/2017 15:35:01	11_GRAINSILO	11_LIA-28	HI_ALM	ACT/UNACK	11-WARNING	0:00:01	
odule All Modules	12	45	6/7/2017 15:35:01	11_GRAINSILO	11_LIA-28	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01	
tribute All Attributes	12	87	6/7/2017 16:58:12	21_MILLING	21_LS-08	DISC_ALM	ACT/UNACK	11-WARNING	0:00:01	
,	14	159	6/7/2017 20:56:09	12-95-DAGVATTENS	12-95-LAH-108	DISC_ALM	ACT/UNACK	07-ADVISORY	0:00:01	
	14	63	6/7/2017 21:03:12	12-95-DAGVATTENS	12-95-XS-102	FAIL_ALM	ACT/UNACK	07-ADVISORY	0:00:01	
	14	66	6/7/2017 21:11:52	24_DISTILLATION	24_TIC-32	LO_ALM	ACT/UNACK	11-WARNING	0:00:01	
	14	76	6/7/2017 21:32:39	52_CIP	52_LIA-01	HI_ALM	ACT/UNACK	11-WARNING	0:00:01	
	16	35	6/7/2017 23:13:36	12-21-MALT	12-21-LAH-305	DISC_ALM	ACT/UNACK	07-ADVISORY	0:00:01	
	17	27	6/7/2017 23:57:59	52_CIP	52_LIA-03	HI_ALM	ACT/UNACK	11-WARNING	0:00:01	
	17	48	6/8/2017 00:28:05	11_GRAINSILO	11_LIA-04	LO_ALM	ACT/UNACK	11-WARNING	0:00:01	
	17	49	6/8/2017 00:28:05	11_GRAINSILO	11_LIA-04	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01	
	19	87	6/8/2017 05:34:47	51_CHEMICALS	51_LIA-06	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01	
	20	94	6/8/2017 06:50:38	12-66-PROCESSVAT	12-66-TIC-101	DV_LO_ALM	ACT/UNACK	07-ADVISORY	0:00:01	
	21	06	6/8/2017 07:04:12	12-63-SVAT	12-63-P-02-B	FAIL ALM	ACT/UNACK	07-ADVISORY	0:00:01	

Note that in trial mode only the first 50 rows of data are displayed.

The report shows every new alarm occurrence and the duration of how long it was active. By using the *Duration* column filter alarms with short alarm activity (chattering) and long alarm activity (stale) can easily be detected. By combining this filter with *Level* column, critical alarms on a short alarm cycle can be determined.

Key Performance In	dicators					
Total	13					
Timestamp	▼ Area	▼_ Module	 Attribute 	▼_ State	▼ Level ▼	Duration
6/7/2017 15:35:01	11_GRAINSILO	11_LIA-28	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/8/2017 00:28:05	11_GRAINSILO	11_LIA-04	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/8/2017 13:17:43	11_GRAINSILO	11_LIA-28	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/11/2017 09:59:45	11_GRAINSILO	11_LIA-04	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/20/2017 05:44:28	11_GRAINSILO	11_LIA-26	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/20/2017 09:09:05	11_GRAINSILO	11_LIA-04	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/21/2017 12:50:09	11_GRAINSILO	11_LIA-25	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/21/2017 13:30:12	11_GRAINSILO	11_LIA-28	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/25/2017 08:01:49	11_GRAINSILO	11_LIA-02	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01
6/30/2017 11:59:55	11_GRAINSILO	11_LIA-04	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
7/2/2017 08:07:02	11_GRAINSILO	11_LIA-04	LO_LO_ALM	ACT/UNACK	15-CRITICAL	0:00:01
7/2/2017 12:00:20	11_GRAINSILO	11_LIA-01	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01
7/4/2017 13:55:39	11_GRAINSILO	11_LIA-28	HI_HI_ALM	ACT/UNACK	15-CRITICAL	0:00:01

In the above, there were 13 occurences of critical alarms in the *11-GRAINSILO* area initiated from the modules 11_LIA_01,_02,_04,_25,_26 and 11_LIA_28.

AlarmFlood

The alarm flood report allows further analysis of the flood activity presented on the Alarm Floods subreport in the Alarm Report.

1	0 1	2	6 B	C		D	F		F	G		н	
- 🔄 Report Templates	-	1	4		-	-		-	1.00	-			
AlamAnalysis		2	Flood Analysis										_
- Aamelood		4	Facility	Facility, Inc.	8		Module		All Modules	Report Start Dat	e	6-Jun-17	
		5	Location	Boston, MA			Attribute		All Attributes	Report End Date	e	9-Jun-17	
		6	Position	All Areas			Cycle		All Cycles	Alarm Period (hr	s)	72	_
		8	Key Performance I	ndicators									
Refresh 🛃 Instance		9	Tota	l Floods 29									
Eler Data Passa a		10	Start Date	▼ End Date		Duration (mins) 👻	Total Alarms			 Start Date (Peak) 		Total (Peak)	
Det Of La 2017		11	6/6/2017 22:10:00	6/6/2017 22:40:00		30		31		6/6/2017 22:10:00			18
Start 00 Jun 2017 []]+	+	43	6/7/2017 0:20:00	6/7/2017 00:50:00		30		44		6/7/2017 0:30:00			23
	+	88	6/7/2017 1:00:00	6/7/2017 03:50:00		170		306		6/7/2017 2:50:00			39
4441	+	395	6/7/2017 4:30:00	6/7/2017 05:00:00		30		47		6/7/2017 4:30:00			25
Destroyed	+	443	6/7/2017 5:20:00	6/7/2017 10:20:00		300		590		6/7/2017 5:40:00			64
ting Value	+	103	4 6/7/2017 10:40:00	6/7/2017 11:50:00		70		150		6/7/2017 11:10:00			36
dion All Areas	+	118	5 6/7/2017 13:00:00	6/7/2017 14:10:00		70		81		6/7/2017 13:20:00			16
dule All Modules In te All Strike ter	+	126	7 6/7/2017 14:40:00	6/7/2017 15:10:00		30		38		6/7/2017 14:40:00			21
le Al Cycles	+	130	6 6/7/2017 17:50:00	6/7/2017 18:20:00		30		37		6/7/2017 17:50:00			21
	+	134	4 6/7/2017 18:30:00	6/7/2017 19:40:00		70		192		6/7/2017 18-50-00			50
	+	153	7 6/7/2017 19:50:00	6/7/2017 20:10:00		20		24		6/7/2017 19:50:00			15
	+	156	2 6/7/2017 21:20:00	6/7/2017 21-50-00		30		23		6/7/2017 21-20-00			17
	+	158	6 6/7/2017 22:50-00	6/7/2017 23-00-00		10		11		6/7/2017 22:50:00			11
	+	150	8 6/8/3017 0.00.00	6/9/2017 20:00:00		10		17		6/9/2017 22:30:00			13
	+	161	1 6/8/2017 0.40.00	6/8/2017 00:10:00		80		140		6/8/2017 0.40-00			20
	+	175	1 6/8/2017 0.40.00 7 6/8/2017 2.10.00	6/8/2017 02:00:00		60		143		6/8/2017 0.40.00			29
		104	0/8/2017 2:10:00	6/8/2017 03:10:00		00		04		6/8/2017 2:30:00			19
		220	2 6/8/2017 3:30:00	6/8/2017 08:50:00		200		300		6/8/2017 6:00:00			29
		220	0/6/2017 7:10:00	0/8/2017 08:50:00		100		134		6/6/2017 7:20:00			22
	E	234	4 6/8/2017 9:10:00	6/8/2017 09:50:00		40		50		6/8/2017 9:10:00			15
		239	5 6/8/2017 10:30:00	6/8/2017 12:00:00		90		93		6/8/2017 10:40:00			23
	+	248	9 6/8/2017 12:30:00	6/8/2017 12:50:00		20		22		6/8/2017 12:30:00			16

Each row indicating a flood is collapsed by default and is expandable to show individual alarm attributes that were activated during the flood.

+	1537	6/7/2017 19:50:00	6/7/2017 20:10:00		20	24
+	1562	6/7/2017 21:20:00	6/7/2017 21:50:00		30	23
T٠	1563	6/7/2017 21:21:14	23_FERMENTATION	23_LSA-08	DISC_ALM	11-WARNING
· ·	1564	6/7/2017 21:22:04	12-24-DESTILLATI	12-24-PD-337	HI_ALM	07-ADVISORY
· ·	1565	6/7/2017 21:22:08	12-24-DESTILLATI	12-24-TDI-207	HI_HI_ALM	07-ADVISORY
· ·	1566	6/7/2017 21:22:19	12-24-DESTILLATI	12-24-PD-337	HI_ALM	07-ADVISORY
	1567	6/7/2017 21:22:34	12-24-DESTILLATI	12-24-PD-337	HI_ALM	07-ADVISORY
	1568	6/7/2017 21:22:34	12-24-DESTILLATI	12-24-PD-339	HI_ALM	07-ADVISORY
· ·	1569	6/7/2017 21:22:49	12-24-DESTILLATI	12-24-PD-337	HI_ALM	07-ADVISORY
· ·	1570	6/7/2017 21:22:49	12-24-DESTILLATI	12-24-PD-339	HI_ALM	07-ADVISORY
· ·	1571	6/7/2017 21:23:04	12-24-DESTILLATI	12-24-PD-337	HI_ALM	07-ADVISORY

Note that in trial mode only the first 20 flood occurrences are displayed, and only the first 20 rows of flood details are displayed.

Report Automatically

Set the Schedule

The predefined templates can be scheduled to produce reports automatically. Special consideration is given to the *AlarmReport* since its schedule can be produced from configuration. From the **Project Explorer**, on the right-side **Tools** tab in the **Connect** section select **Connectors** and open the connector.

- Click Settings
- Click the **Schedule** tab

Sr	ecify a schedule for the	AlarmRep	art		
~	later al	Desition		Frencet	
-	Daily	All		Export	[7]
*	new schedule				
r	new schedule				

- In the top row under **Interval** select *Daily*.
- Set **Postion** to *All*.
- Click **OK**.
- Close **OK** again to save the connector.
- Close Connectors.

When the settings are saved, a schedule is automatically configured.

Schedule Des	signer			
File Tools	Scheduler			
🛉 🖶 Add 🥒 Mo	dify 🔀 Delete 🏻 🖥 Outline 🛛 🧭 Test		Outline	-
Condition		Action		
😑 🔽 Daily Alarn	n Report			
Daily	Every day; 00:15:00	Set	Start Date~End Date	Position Period {dat
Daily	Every day; 00:15:00	UpdateGroupBool	AlarmReport.xlsx 1	
add schedule				

This can be viewed and modified in the Schedule Designer.

Report Names

The naming convention followed by the report is specified in the **Report Names** option of the template. This can be viewed by opening the *AlarmReport* template in the **Template Studio** and selecting **Report Names** under the **Report** tab.

Report Names			
Vorkbook Worksheets Dashboard_S Dashboard AlarmExport AlarmSource AlarmFloods AlarmStandin AlarmArknow	Folder AlarmReport {YYYY-1D}\{Period} Name AlarmReport_{Start Date}-{Position}-{Period} Image: Construction of the start]	

By default

- A Folder after the year containing a sub folder named after the Period
- A Name as a combination of the Start Date of the report, Position and Period

For example, a weekly report for the *All* position covering *10th Jan*, *2021* to *16th Jan*, *2021* would be stored in the folder **2021\Weekly** with the name **AlarmReport-2021-01-10-All-Weekly**.

Backfilling Reports

A powerful feature of the Scheduler is that it can be executed at a specified date/time in contrast to when it is running in the background and using the current date/time.

From the **Project Explorer**, on the right-side **Tools** tab in the **Report** section, open the **Schedule Designer**. <u>Highlight</u> the schedule lines to execute and choose **Tools**, **Report Backfill**.



The selected schedule lines are listed. The caption shows the time period of the backfill when the **Start** button is clicked. Use **Backfill Clock Settings** to modify the date range (make sure that it reflects the schedule e.g., if the schedule is at 00:15:00 then the backfill clock should be the same).

Connector

Overview

Now that you have seen some of what the Alarm Management connector can do, let's take a deeper look into what is available.

Alarm Management Connector

Alarm Management (ISA-18.2)					
Connector Name	Alam_Management				
Description	TB05-SQLSVR\SQLSERVER16				
Provider	Emerson Automation Solutions DeltaV Event Journal				
Alam/Event Database					
Туре	Microsoft SQL Server				
Data Source	TB05-SQLSVR\SQLSERVER16				
Table/View	JOURNAL				
Create Metrics Tables					
	Settings				
	OK Cancel				

Provider

The **Provider** setting contains a list of vendor specific alarm databases. The **Provider** selection supplies default settings for the connector which can be changed if needed.

Alarm/Event Database

These settings define how to connect to the database as well as what Table/View contains the alarm/event records.

Typically, the Table/View is defaulted correctly once the Data Source is specified.

Metrics Table

When the data connector is saved, one of the templates automatically added to the project is called *AlarmReport* which contains key alarm metrics of the alarm system and the underlying alarms that influence the KPI. These KPIs can be exported periodically, such as every day, to an external database. With the KPIs stored in the **Metrics Table**, long term trends can be produced.

When **Create Metrics Tables** is checked, the **Connector** list is enabled and provides a list of every other connector in the project that is connected to a database.

If this option is enabled, when the connector is saved, the **Update Database** window appears showing that new tables have been added to the database to receive the KPI/alarm information.

 Done
 DROP TABLE TableKPI

 Done
 DROP TABLE TableTop10

 'Create KPI table

 Done
 CREATE TABLE TableKPI (Facility VARC

 Done
 CREATE INDEX TableKPIIndex ON Table

 'Create Top 10 Table
 'Create TABLE TableTop10 (Facility VARC)

Settings

The Settings button is used to access specific settings for the connector.

Facility Tab

The **Facility** tab shows general information about the location of the alarm system. These settings can be used in the header of a report.



Sub Report Filters Tab

The **Sub Report Filters** tab contains the sub tabs **Alarm Duration**, **Operator Positions**, **Modules** and **Attributes**. The filters specified here are only definitions and have no effect on the output of a report until they are used.

Filters



When a filter is defined for **Operator Position**, **Modules** or **Attributes** it can use one of the following operators:

• IN

When **IN** is selected, one or more conditions can be added to the list below. When the filter is used, only values that match exactly with one of the conditions is listed will be considered.

• NOT IN

When **NOT IN** is selected, one or more conditions can be added to the list below. When the filter is used, any value that matches exactly with one of the conditions listed will <u>not</u> be considered.

• LIKE

When **LIKE** is selected, one or more conditions can be added to the list below. Each condition can contain a % wildcard for matching purposes. For example, if the conditions are %*DISTILL*%

%REFINE%

Any value that contains DISTILL or REFINE will be considered.

• NOT LIKE

When **NOT LIKE** is selected, one or more conditions can be added to the list below. Each condition can contain a % wildcard for matching purposes. For example, if the conditions are:

%DISTILL%

%REFINE%

Any value that contains DISTILL or REFINE will not be considered.

Alarm Duration

The **Alarm Duration** tab displays various periods that can be used as filters. **XLReporter** defines the alarm duration as the time between **Active-Unacknowledged** and **Inactive-*** (any inactive state).

Settings							[×
Facility Sub	Report Filters	Primary Databa	ase					
Alarm Duratio	on Operator P	ositions Modu	les	Attributes				
Alarm Durati	ons (use to ider	ntify chattering a	and st	tale alarms)				
Add	🖉 Modify 🍃	< Delete						
Al Cycles CHATTER STALE			K	0 secs ANE) <=1 secs			
<u> </u>						ОК	Cancel	

In the example above, if a report is filtered by *CHATTER*, then only the alarms that are active for *l* second or less will be considered in the report. Avoid using symbols (<, >, ~) in the Cycle Configuration names.

Operator Positions Tab

The **Operator Positions** tab is used to define the operator positions that can be used as filters. **XLReporter** defines operator positions as a collection of areas under the responsibility of an operator. If the alarm system does not support the concept of alarm areas, then this filter is not used.

								×
Columns	Primary Filter/Order	Databas	ie Fil	ters				
Cycle Pe	riods Operator Pos	tions Mo	dules	Attributes				
0	D. Miner							
	or Positions							
All And	a 🖉 Moaity ∧ D	elete		IN 10.05 D				
DISTIL	as LATION			12-25-D 12-31-R	EFINING	ION		
REFIN	ING			12-32-T	RANSPOR	TER		
STOR	AGE							
							ОК	Cancel

In the example above, if a report is filtered by *REFINING* operator position, then only the **Areas** *IN* that definition will be considered for the report.

Modules Tab and Attributes Tab

These tabs are used to define the Module/Attribute sets that can be used as filters.

Facility Sub Report Filters Schedule Prima	ry Database
Alarm Duration Operator Positions Modules	Attributes
Module Sets (use to analyze modules)	
Add Modify X Delete	NOTHKE
	12.%
DISTILLATION	12-76
Regulators CRAINSILO	
	OK Cancal

In the example above, if a report is filtered by the module set *DISTILLATION*, then the **Modules** *NOT LIKE 12-%* (this represents module names not starting with 12-) will be considered for the report.

Schedule Tab

By default, all the templates provided with the alarm module can be used on-demand. In addition, the *AlarmReport* can be configured to produce reports periodically.

		le l		
Facility Sub Report Filte	rs Schedule Primary Database			
Specify a schedule for th	ne AlarmReport			
opeany a senedate for a		_		
Interval	Position	Export		
Daily	ISTILLATION			
Monthly	DISTILLATION			
Daily	FERMENTATION			
Monthly	FERMENTATION			
* new schedule				
		OK Cancel		

In the example above every day a report is generated for the *DISTILLATION* and *FERMENTATION* positions and the daily KPIs are exported to the **Metrics Table**. Every month a monthly report is generated for the *DISTILLATION* and *FERMENTATION* positions as well.

Note that the **Export** option should only be used if the **Metrics Table** has been defined.

The settings here will produce one or more schedule lines. These can be viewed in the **Schedule Designer**.

🖷 Add 🖉 Modify 🔀 Delete 🗃 Outline 💭 Test	Outline	• -
Condition	Action	
Daily Alarm Report		
Daily Every day; 00:15:00	Set	Start Date~End Da
Daily Every day; 00:15:00	UpdateGroupBool	AlarmReport.xlsx 1
Monthly Every month; 1; 00:15:00	Set	Start Date~End Da
Monthly Every month; 1; 00:15:00	UpdateGroupBool	AlarmReport.xlsx 1
Daily Every day; 00:15:00	Set	Start Date~End Da
Daily Every day; 00:15:00	UpdateGroupBool	AlarmReport.xlsx 1
Monthly Every month; 1; 00:15:00	Set	Start Date~End Da
Monthly Every month; 1; 00:15:00	UpdateGroupBool	AlarmReport.xlsx 1
add ashadula		

Primary Database Tab

The default settings in this tab are derived from the **Provider** selected are implementation specific. Any changes in this tab <u>will affect every report</u> generated. Usually, only the settings on the **Level Condition Tab** need changing based on the settings in the alarm system.

Columns Tab

The **Columns** tab defines the columns in the database table that will be used by the connector. It is rare that any setting on this tab will require a change.

Settings	
Facility Sub Report Filters Primary Database	
Columns Level Condition Filter/Order Se	ttings
Map of Physical Columns in the database	
Timestamo	Date Time
Timestamp (convert to DateTime)	
Module (Tag Name)	Module
Module Description	Module_Description
Area (Location)	Area
Node (Workstation)	Node
Level (e.g., WARNING)	Event_Level
Event Type (e.g., ALARM)	Event_Type
Attribute e.g., (HI_ALM)	Attribute
State (e.g., ACT/UNACK)	State
Category (e.g., PROCESS)	Category
Description 1	Desc1
Description 2	Desc2
	OK Cancel

Level Condition Tab

The **Level Condition** tab defines how alarm levels of the alarm system. These setting are associated with the **Level** column in the database.

Settings						
Facility Sub Re	port Filters Primary D	Database				
Columns Level Condition Filter/Order Settings						
	Label	Level Condition				
	CRITICAL	CONTAINS CRITICAL				
	WARNING	CONTAINS WARNING				
	ADVISORY	CONTAINS ADVISORY				
	INFO	CONTAINS INFO				
*						
		OK Cancel				

• Label

The label shown in the report.

Level Condition

The condition used on the Level column.

Filter/Order Tab

The **Filter/Order** tab shows the filters and order applied to the database data. Only the data resulting from this filter will be considered for the alarm metric calculations.

Settings 🛛
Facility Sub Report Filters Primary Database
Columns Level Condition Filter/Order Settings
Global filters and ordering
Primary Filters
Filter 1 Event_Type Like ('%ALARM%')
Filter 2
Filter 3
Orte
Area ASC. Module ASC. Attribute ASC. Date Time ASC

Additional filters can be specified in **Filter 2** and **Filter 3**. Note that these filters will be system wide and will affect <u>every</u> report in the project. Other filtering techniques are discussed later which can be applied to specific reports.

Settings Tab

The **Settings** tab shows specific settings for the database selected.

Settings	
Facility Sub Report Filters Primary Database	
Columns Level Condition Filter/Order Settings	
Database Settings	
Client Wait Time (sec) 60	
Table/Column Delimiter	
Start [End]	
Delimit all tables and columns	
Date/Time Delimiter	
Start ' End '	
Date/Time Storage	
UTC Date and Time	
Date format is YYYY-MM-DD	
	OK Cancel

Trending Alarm KPIs

Overview

As stated earlier, the KPIs and metrics from the AlarmReport template can be exported to an external database and additional reports can then be used to trend improvements.

Select a Database to Store the KPIs

To set up the KPI database, from the **Project Explorer**, open **Connectors**. Click **Add.** Expand **Databases** and select the appropriate type.

	Database OLE DB/ODBC Microsoft SQL Server Microsoft Access Oracle MySQL Oracle Database PostgreSQL SQLite Detabase (imagesize)
Connector Name Description	Alarm Export
Primary Database Type	Microsoft Access
Data Source	C:\XLRprojects\XLR_Demo\Data\XLRdatabase.mdb
	Settings
	OK Cancel

For **Primary Database** click the browse button [...] for **Type** and specify the database to connect to. Once complete, click **OK** to save this connector.

Modify the Alarm Management Connector

Modify the **Alarm Management** connector, check **Create Metrics Tables** and select the **Connector** configured above.

Connector Name	Alarm_Management		
Description	C:\XLRprojects\XLR_Demo\Data\DB_data9.mdb		
Provider	Emerson Automation Solutions DeltaV Event Journal		
Alarm/Event Database			
Туре	Microsoft Access		
Data Source	C:\XLRprojects\XLR_Demo\Data\DB_data9.mdb		
Table/View	AlarmsAndEvents		
Create Metrics Tables	Alarm Export		
Connector	Atalin Export		
	Settings		

• Click **OK**.

Create a Historical Connector to Collect Metrics in Reports

To set up the reporting connector, from the **Project Explorer**, open **Data Connectors**. Click **Add**. Expand **Database (time series)** and select **Historical Values (wide)**.

	, , ,
🚊 🖓 🧰 Dat	abase (time series)
	Historical values (wide)
	Historical values (wide multi-table)
	Historical values (narrow)
	Historical values (narrow multi-column)
· ···· 🛅	Alams

- Assign a Name, e.g., Alarm KPI.
- For **Primary Database** click the browse button [...] for **Type** and specify the same database used in the export connector above.
- Set the **Table** to *TableKPI*.
- Set the **Date Column** to *DateAndTime*.

Once complete, click **OK** to save this connector.

Modify the Alarm

Open Settings and select the Sub Report Filters tab.

Columns	Prima	ary Filter/Order	Databa	se Filt	ers				
Cycle Pe	riods	Operator Posi	tions Mo	dules	Attributes				
Onere	lor Do	sitiana							
		Madifu 🗙 Du	lata						
All Au	u 💉		elete	_	IN 10.05 D		TION		
DISTI	LATIC	N			12-25-D 12-31-R	EFINING	TION		
REFIN					12-32-T	RANSPO	RTER		
STOR	AGE								
								ок	Cancel

- Select the **Operator Position** tab.
- Define one or more **Positions** to areas in the facility.

Select the **Schedule** tab.

					X
Fa	cility Sub Rep	oort Filters Schedule	Primary Database		
Sp	ecify a schedu	ule for the AlarmReport	t		
	Interval	Position			Export
	Daily	DISTILLATIO	N		✓
►	Weekly	DISTILLATIO	N		
	Monthly	DISTILLATIO	NC		
	Daily	FERMENTA	TION		✓
	Weekly	FERMENTA	TION		
	Monthly	FERMENTA	TION		
*	new schedule	9			
				ОК	Cancel

- Add a schedule line for at least one of the defined **Positions**. Set the **Interval** to *Daily* and check the **Export** column.
- Click **OK**.

Click **OK** to save the connector. A prompt will appear to reset/create the tables in the **Connector** database to receive the data from the report.

Update	Database
Status	Action
	' delete tables
Done	DROP TABLE TableKPI
Done	DROP TABLE TableTop10
	' Create KPI table
Done	CREATE TABLE TableKPI (Facility VARCHAR(128), DateAndTime DATETIME, PositionName VARCHA
	'Create Top 10 Table
Done	CREATE TABLE TableTop10 (Facility VARCHAR(128), DateAndTime DATETIME, Area VARCHAR(128
	Close

Generate the Alarm Reports and Log the KPIs

From the **Project Explorer**, open the **Schedule Designer**. <u>Highlight</u> the schedule lines for one of the **Position** you added. Choose **Tools, Report Backfill**.



The selected schedule lines are listed. The caption shows the time period of the backfill when the **Start** button is clicked. Use **Backfill Clock Settings** to modify the date range (make sure that it reflects the schedule e.g., if the schedule is at 00:15:00 then the backfill clock should be the same).

Produce a KPI Trend

Open the **Project Explorer** and from the right-side **Tools** tab in the **Template Design** section select **Library**.

From the list of templates, expand Trend Charts, Line and select Line Charts.



- Click Next
- On the next step
 - Set the Name

- Set the **Connector** to the KPI connector e.g., *Alarm KPI*.
- Click Next
- Click Finish



From the on-demand window

- Select the template you just created
- Enter a date range
- Select tags (KPIs)
- Click **Refresh**.

Custom Template

Overview

The predefined reports in the last section are created from templates. In this section, we will discuss how to create such a template and use it to produce reports, automatically and on-demand.

Template Studio

The Template Studio is used to create and modify templates which can be used either standalone or an add-in to Excel.

In the Project Explorer, from the right-side Tools tab in the Template Design select Studio.



From the studio, select File, New and enter a name for the template.

New Report Template	×
Name	
AlarmActiveCount	.xlsx 🔻
Apply Template Access Code	
Description	
Template Type	
Report	
Use Template Library	
Data Entry	
Base Template Content On	
<import template=""></import>	•
ОК	Cancel

- Check Import Existing Workbook
- Click **OK**

In the list of pre-defined templates, select *alarm-sources.xlsx*

Layout

Add layout to the template such as static text and a chart.

	間での 。	Template Stud	io - AlarmActiveCount.xl	5X	🔲 Auto Save 🥐 S	earch tool	-		×
File	Connect Design	Report							
Conr	ect Manage Link Variat	Analytics Event Frames	Database Manager Tools						•
fx	A1 ~								
i j	В	С	D	E	F	G	F	1	^
2	Active Alarm Sou	irces							
4	Report Start Date			Alarm Period (hrs)	168				
5	Report End Date	7-Jan-00]				
7	Key Performance Indicat	ors		¥		Settings			
8	Total Number of New Alarms			0		Operator Position	ALL		
10	Top 20 Alarm Source Contribu	ition		#DIV/0!					
12	Top 20 Alarm Contributio	on							
13	1]							Γ 1	
14	1 -							- 1	
16	1 -							- 1	
17	1 -							- 1	
18	1 -							- 1	
20	0 -							- 0	
21	0 -							- 0	
22	° 1							- 0	
23									
25									
26									
27									
29	Module/Node	Description	Attribute 💌	Alarm Quantity 💌	Average Per Hour	- Accum Total.	Accum %		- 4
30 31					0.00	0	#DIV/0!		
H 4	▶ ▶ Report						<		>
Local								90)% -

Note that in the above example, the bar chart references rows 30 to 49. Also note that F30, G30 and H30 are formula that are evaluated from the other columns and as such, the output (see **Columns** tab below) to the template has to account for this.

Data

Add data connections to the template that will provide the alarm data. From the **Template Studio**, under the **Connect** tab, select **Data**, **Connect**.



Click Add to add a new connection.

Set the **Sheet** to *Report* to indicate that the connection will apply to the *Report* sheet

\sim

Set the **Source Connector** to *Alarm_Management* and for **Name** click the browse pushbutton.

Source		
Connector	Alarm_Management	•
Name		•

The dialog that is shown is used to define sub reports and where in the report their output will be placed. The display consists of two tabs, **Definition** and **Output**.

Sub Report Definition

Sub reports represent different alarm analysis. An Instance of a sub report is used in a report.

For a detailed discussion on the **Definition** and **Output** of a sub report, refer to the **Sub Report Definitions** chapter below.

To create a sub report instance, select a sub report name to populate the **Definition** and **Output** tabs with defaults. When an instance is created, it is listed under the sub report name.

In this example, a sub report to *ALARM COUNT* will be defined to provide data to the imported template.

• Select ALARM COUNT

Settings Tab

C:\XLRprojects\V141_Alarm\Input\A	NarmActiveCount
Definition Output	
Sub Reports	
ALARM DATA	Settings Columns
	Name Alarm Active Count New alarm count calculated over area (position), module or attribute.
ALARM FLOOD ALARM ACTIVATION ALARM ACTIVATION	Type New alarm count by Attribute
ALARM ACKNOWLEDGE ALARM SUPPRESED ALARM SIBABLED ALARM STANDING ALARM STANDING ALARM ANALYSIS ALARM CUSTOM	Order Count DESC

- Set the Name (of the instance) to Alarm Active Count
- Set the **Order** to *Count DESC*

Note that the **Type** determines how the count will be evaluated. The choices are by **Attribute**, **Module** or **Area**.

Note that if multiple sub report instances are assigned to a single report for each **Type**, a comprehensive view of the alarm activity can be achieved.

Columns Tab

The columns tab shows the **Available** columns for the selected sub report and the columns **Selected** for the sub report output. The selected columns are usually ordered by the design of the template layout. If any empty columns are required in the output then the *<empty>* column can be used.

🖳 C:\XLRprojects\JSA182 Alarms\Jnput\AlarmActiveCount				
C:XLRprojects\ISA182 Alarms\Inpu Definition Uutput Sub Reports ALARM DATA C Data ALARM COUNT ALARM ACNOULT ALARM RATE ALARM RATE ALARM RATE ALARM RATE ALARM ALODD ALARM ACKNOWLEDGE ALARM SUPPRESSED ALARM SUPPRESSED ALARM SUPPRESSED D Disabled D Disabled C DI C Disabled C DI C Disabled C DI C DI	t AlarmActiveCount Settings Columns Available Ares Module Description Attribute Level Count AccumCount ArgPerfour AlarmPercent ArealD ModuleID <empty></empty>	Selected Description Attibute Count semptys semptys semptys Area		
ALARM DISABLED				

In this example, the *<empty>* selection is used to account for the formula that is in the template.

Sub report instances are automatically saved and appear as a branches on the appropriate **Sub Report**. To **Delete** a sub report instance, highlight the instance and click the **Delete** key.

Sub Report Output

The **Output** tab is used to specify the filters and cell location for the sub report output.

- Remove all the entries listed (these are defaults) by highlighting and pressing **Delete** on the keyboard.
- Highlight an empty row.

•	C:\XLRprojects\ISA182 Alarms\Input\AlarmActiveCount									
De	Definition Output									
	Sub Report Instance Cycle Position Module Attribute Target Cell Placement Row Count									
	ALARM COUNT	Alarm Active Count	All Cycles	All Positions	All Modules	All Attributes	Report!\$B\$30	Direct	9999	
*										
]	

Select a sub report, in this case select ALARM COUNT. If there are many instances for the selected sub report, they will appear in the **Instance** dropdown list. Select the **Instance** Alarm Active Count

Filters

By default no filters are imposed. To impose an <u>inclusive</u> filter on the output, select it from the dropdown lists. Note that these lists are populated using those settings in the connector (see **Connector**).

Cycle	Filter on an alarm cycle duration
Position	Filter on operator positions which represent a group of alarms areas
Module	Filter on a set of modules
Attribute	Filter on a set of attributes

In our case leave the defaults.

Location on the Report

• Target Cell

Cell location where the output is placed in the form Sheet!\$A\$1. The cell location can also be expressed as a **Named Range** in the form *Sheet!Name*. A named range location will change as cells are inserted above or to the left.

In our case set this to *Report!\$B\$30* where *Report* is the name of the sheet in the report.

Placement

The method used to place the output at the **Target Cell**.

Direct Place directly at the target, overwritting any content. **Insert**

Insert at the target cell, pushing exising content down.

Row Count

Limit on the number of rows in the output.

Close the Alarm Designer and return to Connections display.

Data	Connect							×	
i 🛖 /	📫 Add 🥒 Modify 🔀 Delete 🛛 Connections: 3 of 500 🛛 🗮 Export 📑 Import 💌								
	Group	Source Connector	Name	Target Cell	Туре	Direction	Offset		
	0	Alarm_Management	Alarm Sub Reports	Report!\$A\$1	Direct				
	0	Variables	{Start Date}	Report!\$C\$4	Direct				
	0	Variables	{End Date}	Report!\$C\$5	Direct				
							OK Canc	el	

Click **OK** to add the configuration to the grid. Note that the *Target* on this display is not used since this information was entered for each sub report.

The start and end date of the report are held in the variables *Start Date* and *End Date* which will also be configured.

- Click **Add** to add a new connection.
- Set **Sheet** to *Report*
- Set **Connector** to *Variables*
- For **Name** browse and select *Start Date*
- Set the **Target Cell** to *\$C\$4*
- Click **OK**

Repeat the above, setting C to the end date variable

If data from other connectors, such as a historian, is added to the report then use the variables **Start Date** and **End Date** (see **Filter Variables**) to maintain the time frame across all the connections.

Clic OK to close Data Connects and return to the main display of the studio.

Manage

The formulas in cells F 30, G 30, and H 30 can be propagated down to the the extent of the alarms in the report using a **Manage** connection. This idea also applies to the formula in E resulting in the handling of dynamic data rows.

Data Manag	Data Management							
Add	nodify 🔀 Delete	葨 Export 🍎 Import 💌 🔺						
Grou	p Category	Туре	Source	Target	Sheet			
	0 Worksheet	Formula Range	\$B\$30		Report			
	0 Worksheet	Fill Range	\$B\$30		Report			
					OK Cancel			

From the ribbon, under the Connect tab select Data, Manage.

For the Total (E8)

- Click Add to add a new connection
- Set **Sheet** to *Report*
- Set **Category** to *Worksheet*
- Set **Type** to *Formula Range*
- Set **Cell** to *\$B\$30*
- Set **Formulas** to *\$E\$8*
- Click **OK**

For the Formulas (F30 to H30)

- Click Add to add a new connection
- Set Sheet to Report
- Set Category to Worksheet
- Set **Type** to *Fill Range*
- Set **Cell** to *\$B\$30*
- Set **Formulas** to *\$F\$30: \$H\$30*
- Click **OK**

Click OK again to save the management connections.

On-Demand Report

Note that for an unlicensed system, this content of this chapter will not work.

Under the **Report** tab, click **Preview**.



Set a date range and click Refresh to produce the report.



Filters Review

Overview

Filters are used to add flexibility to a report template. In the example above, a limited amount of flexibility is provided in allowing the user to select the date range.

Usage

In the previous chapter, when the *ALARM COUNT* **Sub Report** was configured on the **Output** tab, all the filters were defaulted to *All*.



It is possible to "override" the filters at runtime by specifying a value to the underlying **Variable** representing the filter.

There are 6 variables used by all sub-reports:

Start Date	The start date of the report.
End Date	The end date of the report.
Cycle	The cycle period. Default to All
Position	The operator position. Default to All
Module	A set of modules. Default to All
Attribute	A set of attributes. Default to All

If any variable is given a value before the report is initiated, then the value will override the value specified in the sub report settings. This is illustrated in the following:



In the above example, the template has been configured with the **Position** filter set to *Line A*.

- 1) When the report is updated automatically from the scheduler, the variable **Position** was not altered and so the *Line A* report is produced.
- 2) When the template is used on-demand, the **Position** filter is set to *Line B* so the *Line B* report is produced

There are two methods for setting the values of variables, either on-demand using an input panel or from the scheduler using the **SET** command.

On-Demand Report

To see the Filters is action, re-open the AlarmActiveCount template. Click Preview.



Select a Date Range, Position and click Refresh to produce the report.



Notice the filtered areas.

Sub Report Definitions

Overview

Sub Reports are pre-defined reports that produce output that complies with ISA18.2/IEC62682 specification. They also provide the details behind the metrics which prove to be essential in improving and rationalizing an alarm system.

Sub reports **Instances** are configured for a report. A sub report **Instance** is essentially the sub report with specific settings, columns and where its output is located in the report.

From **Data Connect** in the **Template Studio**, add a connection, select the **Alarm Management** connector and open the **Alarm Designer**.

To define an **Instance**, select the sub report in the left pane, fill out the the **Settings** and **Columns** tabs. When complete, the instance will be listed in the left pane using the **Sub Report** name. To modify an instance, highlight it in the left pane.

Common Features

Sub reports share common features which are discussed in this section.

Settings

The following settings are common to some of the sub reports and are described here to avoid repetition.

Settings	Columns
Name	
	New alarm count calculated over area (position), module or attribute.
Туре	New alarm count by Attribute
Order	

• Name

The name of the sub report instance.

Order

The order of the output from the instance. Click the pushbutton [...] to open the **Order** dialog.

Order	X
Area	▼ ASC ▼
Module	▼ ASC ▼
	• •
	_
	OK Cancel

Select a column and the ordering method. If more than one column is selected, then the ordering is performed top down e.g., in the above the Area is ordered first and then Module in each Area.

Columns

The Columns tab consists of two lists, the left list shows the Available columns, and the right list are the Selected columns. Each selected column will result as a column in the report starting from cell location Target Cell specified on the Output tab.



The following settings are common to some of the sub reports and are described here to avoid repetition.

Module •

The module/tag name

Description •

The module/tag description

- Attribute • The module/tag attribute e.g., HIHI
- Area •

The area that the module/tag is sourced

Level •

The alarm level e.g., WARNING

AreaID, ModuleID •

A unique ID assigned to the area or module in the output. This ID is usually used when several instances of a sub report are in the same output and a common numeric ID between the instances is required for analysis.

<empty> •

Empty column.

ALARM DATA

The **Alarm Data** sub report provides user selected data. Each item selected provides two values which are displayed by row or by column.

Settings

Columns	
Alarm Data	
Alarm data dis	splayed in either a Row or a Column.
Output	
	Report Period
	Facility
	🔽 Area Filter
	Module Filter
	Attribute Filter
	Cycle Filter
Arrange	By Row 🔻
	Alarm Data Alarm data dis Output

Report Period

The start date and end date of the report

• Facility

The facility name and location defined in the data connector

• Area, Module, Attribute, Cycle Filter The filter selected for the report expressed as a name and definition.

Arrange

•

• By Column

	7-Jun-2017	DISTILLATION		
	8-Jun-17	12-24-Distillation, 12-25-Distillation		
By Row				
	7-Jun-2017	8-Jun-2017		
		12-24-Distillation		

For custom layout, output to a background sheet and use formula to place the values as required.

ALARM COUNT

The Alarm Count sub report provides new alarm counts over area, module and attribute.

Settings

Settings	Columns			
Name	ByAttribute			
New alarm count over postion(area), module or attribute.				
Туре	New alarm count by Attribute			
Order	Count DESC			

- Type
 - New alarm count by Attribute

The counts are calculated by module/tag attributes

• New alarm count by Module The counts are calculated by module

• New alarm count by Area

The counts are calculated by area

Columns

• Count

A count of the number of new active alarms for the area, module or attribute.

AccumCount

Accumulated count of the number of new active alarms.

• AvgPerHour

Count of the number of new active alarms divided by the total number of hours of the report period.

AlarmPercent

Percentage of the number of new active alarms.

• AccumAlarmPercent

Accumulated percentage of the number of new active alarms.

Output

Module/Node	Description	Attributes	Alarm Quantity	Average Per Hour	Accum Total.	Accum %	Area
12-92-CR-109	HVAC/ Area 22	ADVISE_ALM	215	8.96	215	12.5%	AREA_A
12-31-PDI-906	Filter guard 12-31G09	HI_ALM	191	7.96	406	23.6%	12-31-REFINING
23_LSA-08	Foaming controller 23T03	DISC_ALM	97	4.04	503	29.2%	23_FERMENTATION
12-22-TIC-301	Mash temperature 22E04	PVBAD_ALM	76	3.17	579	33.6%	12-22-FILTER
12-21-XS-108	Activate 12-21Q12B	FAIL_ALM	63	2.63	642	37.3%	12-21-MALT
12-21-XS-106	Activate 12-21Q12A	FAIL_ALM	62	2.58	704	40.9%	12-21-MALT
12-95-XS-102	Aumadon dike	FAIL_ALM	27	1.13	731	42.5%	12-95-DAGVATTENS
SEQ-12-95-P01	Control Module	LARM_1295P01A_B	14	0.58	745	43.3%	12-95-DAGVATTENS
23_FIC-03	mash Feed till 23T01	DV_LO_ALM	14	0.58	759	44.1%	23_FERMENTATION
12-24-TDI-207	Tempdiff. 24D10 tray 1-4	HI_HI_ALM	13	0.54	772	44.9%	12-24-DISTILLATION
12-22-P-02	Discharge pump 12-22T02	FAIL_ALM	12	0.50	784	45.6%	12-22-FILTER
22_AIC-03	Mash linens pH reg.	LO_ALM	12	0.50	796	46.3%	22_STARCH
12-22-LAH-302	Liquid Level 12-22T03	DISC_ALM	11	0.46	807	46.9%	12-22-FILTER
12-22-XS-307	Mash on/off 22E03	FAIL_ALM	11	0.46	818	47.5%	12-22-FILTER
12-24-AI-301	Conditioning ethanol 24P71	LO_ALM	11	0.46	829	48.2%	12-24-DISTILLATION
12-24-PI-416	Before 12-24E65A ethanol	HI_ALM	11	0.46	840	48.8%	12-24-DISTILLATION
32_TI-30	Kyldiff pellet cooler	HI_HI_ALM	11	0.46	851	49.4%	32_DRYING
12-23-PIC-804	Pressure regulator 23P14	HI_ALM	10	0.42	861	50.0%	12-23-FERMENT
21_J11BM1	Silo transporter	FAIL_ALM	10	0.42	871	50.6%	21_MILLING

ALARM TIMELINE

The **Alarm Timeline** sub report provides a count of daily alarm activity and also for each hour of the most active day.

Settings

ettings	Columns
Name	Timeline
Count	of activity for each day. For the most active day, count is ad for each hour
Activity	
	Ivew Addin
Gro	up by Level Conditions

• Activity

Indicates the type of activity for the timelines. Choices are:

- o New Alarm
- o Suppressed Alarm
- o Disabled Alarm
- High Alarm
- Low Alarm

Custom activity can also be specified.

• Group by Level Conditions

If unchecked, the timeline calculation will be for all levels combined.

To produce timelines for specific levels, uncheck this setting and specify the level conditions in the **Connector Settings**, one row for each condition.

Output

For each day:

otal by Day		CRITICAL	WARNING	ADVISORY	INFO	
	6/9/2017	38	427	659	0	
	6/10/2017	40	247	451	0	
	6/11/2017	78	470	453	0	
	6/12/2017	284	1062	528	0	
	6/13/2017	68	433	1991	0	
	6/14/2017	106	528	4621	0	
	6/15/2017	128	554	2574	2	

For the most active day, calculated by hour:

otal by Hour	CRITICAL	WARNING	ADVISORY	INFO
6/14/2017	7	13	112	0
6/14/2017 1:00	1	3	115	0
6/14/2017 2:00	5	26	70	0
6/14/2017 3:00	7	47	160	0
6/14/2017 4:00	7	24	152	0
6/14/2017 5:00	8	10	236	0
6/14/2017 6:00	2	32	179	0
6/14/2017 7:00	4	38	204	0
6/14/2017 8:00	6	25	229	0
6/14/2017 9:00	9	19	295	0
6/14/2017 10:00	4	13	256	0
6/14/2017 11:00	9	26	274	0
6/14/2017 12:00	6	10	309	0
6/14/2017 13:00	3	25	266	0
6/14/2017 14:00	4	51	323	0
6/14/2017 15:00	5	37	358	0
6/14/2017 16:00	4	16	266	0
6/14/2017 17:00	1	6	467	0
6/14/2017 18:00	1	6	166	0
6/14/2017 19:00	3	18	14	0
6/14/2017 20:00	0	33	58	0
6/14/2017 21:00	0	12	26	0
6/14/2017 22:00	3	19	43	0
6/14/2017 23:00	7	19	43	0

ALARM RATE

The **Alarm Rate** sub report calculates the new alarm counts over two custom alarm periods: **10 minutes** and **1 hour**. It expresses the output in four threshold groups, each with a configurable label and count interval.

Settings

Settings	Columns									
Name	AlarmRate									
	New alarm rate calculated thresholds.	New alarm rate calculated over custom time intervals and specific thresholds.								
Time P	eriod - 10 minutes									
	Acceptable(<=1)	<=	1	*						
	Manageable(2-4)		2	▲ ▼	to	4				
	Demanding(5-9)		5	▲ ▼	to	9				
	Unacceptable(>=10)				>=	10	▲ ▼			
	Percent of 10 mins >		10	▲ ▼						
Time P	eriod - 1 hour									
	Acceptable(<=6)	<=	6							
	Manageable(7-12)		7	A	to	12				
	Demanding(13-29)		13	▲ ▼	to	29				
	Unacceptable(>=30)				>=	30				
	Percent of hours >		30	▲ ▼						

Thresholds

For each time period, four thresholds are specified. Each threshold consists of a textual label, a low limit and a high limit.

For each period, a count of the alarms is calculated and compared to the low/high limits to determine which threshold to increment.

• Percent

Indicates the percentage of time exceeding the specified count.

Output

per 10 min				per hour				
Name		low	high	count		low	high	count
Acceptable(<1)			1	443	Acceptable(<6)		6	22
Demanding(5-9)		2	4	936	Demanding(13-29)	7	12	22
Manageable(2-4)		5	9	1376	Manageable(7-12)	13	29	164
Unacceptable(>=10)		10		1421	Unacceptable(>=30)	30		488

In the example, there were 443 10 minute periods during which *1* or less alarms occurred. On the other hand, there were 1421 10 minute periods where more than *10* alarms occurred (which by definition is the beginning of an alarm flood).

ALARM FLOOD

The **Alarm Flood** sub report provides a list of all the occurrences of alarm floods. An alarm flood is configured with a start condition and end condition. Usually, the start condition is more than 10 new alarms in 10 minutes and the end condition is less than 5 new alarms in 10 minutes.

Settings	Columns
Name	
	List of alarm floods and their duration calculated over specific thresholds.
Туре	Overview of each flood occurence
Order	
	Flood Interval (mins) 10
Flo	od Start when New Alarm count >= 10
F	Flood End when New Alarm count < 5

- Type
 - Overview of each alarm flood

Overview of each flood occurrence showing start/end times and the total alarms that occurred.

• Details of the alarms in each flood

The details of the alarms in the flood. Note that the **FloodID** can be used to associate the details to the overview.

- Metrics of the alarms in each flood
 Count of each alarm in the flood. Note that the FloodID can be used to associate the details to the overview.
- Flood Interval (mins)

The time interval used by the flood start/end settings.

• Flood Start when New Alarm count >=

Start of flood definition calculated over the flood interval.

• Flood End when New Alarm count < End of flood definition calculated over the flood interval.

Columns

- StartDate
 - Start date of a flood.
- EndDate End date of a flood.
- Duration

Duration of the flood (in days).

• Start Peak

Time of the highest number of alarms during the flood interval.

• Peak

Number of alarms during the peak flood interval.

- Total
 - Total number of new alarms.
- FloodID

A unique ID for each flood.

Output

Overview of each alarm flood:

Start	End	Duration (mins)	Peak Start	Peak Count	Alarm Total
6/7/2017 2:10	6/7/2017 2:40	30	6/7/2017 2:10	18	31
6/7/2017 4:20	6/7/2017 4:50	30	6/7/2017 4:30	23	44
6/7/2017 5:00	6/7/2017 7:50	170	6/7/2017 6:50	39	306
6/7/2017 8:30	6/7/2017 9:00	30	6/7/2017 8:30	25	47
6/7/2017 9:20	6/7/2017 14:20	300	6/7/2017 9:40	64	590
6/7/2017 14:40	6/7/2017 15:50	70	6/7/2017 15:10	36	150
6/7/2017 17:00	6/7/2017 18:10	70	6/7/2017 17:20	16	81
6/7/2017 18:40	6/7/2017 19:10	30	6/7/2017 18:40	21	38
6/7/2017 21:50	6/7/2017 22:20	30	6/7/2017 21:50	21	37
6/7/2017 22:30	6/7/2017 23:40	70	6/7/2017 22:50	50	192

Details of the alarms in each flood:

Start	Module	Description	Attribute	Level	Area	FloodID
6/7/2017 2:11	12-95-LAH-106	LiquidLevel 12-95P03	DISC_ALM	07-ADVISORY	12-95-DAGVATTENS	1
6/7/2017 2:14	23_FIC-03	mash Feed till 23T01	DV_LO_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:14	22_HS-01	sulfuric acid mixer 22A04	FAIL_ALM	11-WARNING	22_STARCH	1
6/7/2017 2:15	63_LIC-05	Level regulator collection p	it HI_ALM	11-WARNING	63_WASTEWATER	1
6/7/2017 2:15	12-24-PD-337	Delta press. 12-24E32B	HI_ALM	07-ADVISORY	12-24-DISTILLATION	1
6/7/2017 2:15	23_FIC-05	mash Feed till 23T02	DV_LO_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:16	23_LSA-08	Foaming controller 23T03	DISC_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:17	23_FIC-03	mash Feed till 23T01	DV_HI_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:17	51_FIC-10	23T01 Flows reg.	DV_LO_ALM	11-WARNING	51_CHEMICALS	1
6/7/2017 2:17	22_AIC-03	Mash linens pH reg.	DV_HI_ALM	07-ADVISORY	22_STARCH	1
6/7/2017 2:17	22_AIC-03	Mash linens pH reg.	HI_ALM	11-WARNING	22_STARCH	1
6/7/2017 2:17	22_TIC-07	mash till fermentation tem	p DV_HI_ALM	11-WARNING	22_STARCH	1
6/7/2017 2:18	22_TIC-07	mash till fermentation tem	p HI_ALM	11-WARNING	22_STARCH	1
6/7/2017 2:18	22_TIC-07	mash till fermentation tem	p HI_HI_ALM	15-CRITICAL	22_STARCH	1
6/7/2017 2:18	22_AIC-03	Mash linens pH reg.	HI_HI_ALM	15-CRITICAL	22_STARCH	1
6/7/2017 2:18	23_FIC-03	mash Feed till 23T01	DV_LO_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:18	23_FIC-03	mash Feed till 23T01	DV_HI_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:19	23_FIC-03	mash Feed till 23T01	DV_LO_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:20	22_AIC-03	Mash linens pH reg.	HI_ALM	11-WARNING	22_STARCH	1
6/7/2017 2:21	23_FIC-03	mash Feed till 23T01	DV_LO_ALM	11-WARNING	23_FERMENTATION	1
6/7/2017 2:21	22_AIC-03	Mash linens pH reg.	HI_HI_ALM	15-CRITICAL	22_STARCH	1

Metrics of the alarms in each flood:

Module	Attribute	Total	Area	FloodID
11_LIA-28	HI_ALM	1	11_GRAINSILO	1
11_LIA-28	HI_HI_ALM	1	11_GRAINSILO	1
12-22-AIC-401	DV_HI_ALM	1	12-22-FILTER	1
12-22-AIC-401	DV_LO_ALM	1	12-22-FILTER	1
12-23-XS-110	FAIL_ALM	1	12-23-FERMENT	1
SEQ-12-23-FERM	23T05_PROV	1	12-23-FERMENT	1
SEQ-12-23-FERM	FERMENTOR_KLAR	1	12-23-FERMENT	1
12-24-PD-337	HI_ALM	1	12-24-DISTILLATION	1
12-24-TIC-214	DV_LO_ALM	1	12-24-DISTILLATION	1
12-51-P-38	FAIL_ALM	1	12-51-KLAGER	1
12-95-LAH-106	DISC_ALM	1	12-95-DAGVATTENS	1
22_AIC-03	DV_HI_ALM	1	22_STARCH	1
22_AIC-03	HI_ALM	2	22_STARCH	1
22_AIC-03	HI_HI_ALM	2	22_STARCH	1
22_HS-01	FAIL_ALM	1	22_STARCH	1
22_TIC-07	DV_HI_ALM	1	22_STARCH	1
22_TIC-07	HI_ALM	1	22_STARCH	1
22_TIC-07	HI_HI_ALM	1	22_STARCH	1
23_FIC-03	DV_HI_ALM	2	23_FERMENTATION	1
23_FIC-03	DV_LO_ALM	4	23_FERMENTATION	1
23_FIC-05	DV_LO_ALM	1	23_FERMENTATION	1
23 154-08	DISC ALM	2	23 FERMENTATION	1

ALARM ACTIVATION

The **Alarm Activation** sub report provides the alarm activation times over area, module and attribute. Alarm activation time is defined as the time from when an alarm is active to when it is inactive. This sub report is used to determine chattering and stale alarms.

Settings	Columns		
	Ν	lame	
			List of new alarms and activation times calculated over area, module or attribute. Use for chattering and stale
		Туре	Alarm Activation by Attribute
	C)rder	

Settings

- Type
 - Alarm Activation by Attribute

The alarm activation times are calculated by attributes.

• Alarm Activation by Module

The alarm activation times are calculated by module.

• Alarm Activation by Area

The alarm activation times are calculated by area.

Columns

• Count

Number of cycles

• Average

Average amount of time (in days)

- **Total** Total amount of time (in days)
- Peak

Longest time (in days)

Output

Module/Node	Description	Time A	ctive Average Time	Total Time	Peak	Area
12-63-P-02-A	Fermenter waste pump	1	0.12:59:27	0:12:59:27	0:12:59:27	12-63-SVAT
32_SS-05	32J03B rotation valve	1	0.07:21:23	0:07:21:23	0:07:21:23	32_DRYING
23_LIA-01	23T07 yeast liquid level sensor	3	0.07:09:12	0:21:27:35	0:11:02:17	23_FERMENTATION
24_TIC-32	24D30 inFeed temperatur Pt-100	2	0.06:45:59	0:13:31:59	0:13:26:34	24_DISTILLATION
31_DIC-50	Flows Density	2	0.06:26:52	0:12:53:44	0:09:58:52	31_STILLAGE
32_AIC-03	O2 Mätning 32E01B	2	0.06:17:22	0:12:34:45	0:06:18:55	32_DRYING
31_FIC-04	Flow till 31S01B	1	0.05:44:33	0:05:44:33	0:05:44:33	31_STILLAGE
31_FIC-26	Saturation water till 31P61A	1	0.05:39:09	0:05:39:09	0:05:39:09	31_STILLAGE
12-24-PD-337	Delta press. 12-24E32B	2	0.05:38:41	0:11:17:23	0:08:17:08	12-24-DISTILLATION
32_TIA-70	Temperature 32S01A	2	0.05:38:24	0:11:16:48	0:05:41:59	31_STILLAGE
31_EI-03	decanter 2	1	0.05:32:39	0:05:32:39	0:05:32:39	31_STILLAGE
12-66-TIC-101	Saturated Steam t. 12-66T01	1	0.05:31:05	0:05:31:05	0:05:31:05	12-66-PROCESSVAT
31_P01M1_CTR	speed 31P01M1	1	0.05:24:46	0:05:24:46	0:05:24:46	31_STILLAGE
12-31-LI-754	Level 12-31T50	2	0.05:22:35	0:10:45:10	0:05:22:35	12-31-REFINING
12-32-GA-403	Door 12-32E23A	1	0.05:08:31	0:05:08:31	0:05:08:31	12-32-TRANSPORTER
32_J54M1	Silo elevator	1	0.04:43:13	0:04:43:13	0:04:43:13	32_DRYING
32_J56M1	Silo elevator	1	0.04:40:11	0:04:40:11	0:04:40:11	32_DRYING
32_\$52M1	PELLETTerm	1	0.04:40:03	0:04:40:03	0:04:40:03	32_DRYING
32_S52M2	PELLETTerm	1	0.04:39:59	0:04:39:59	0:04:39:59	32_DRYING

ALARM ACKNOWLEDGE

The **Alarm Acknowledge** sub report provides the alarm acknowledgement times over area, module and attribute. Alarm acknowledgement time is defined as the time period of the transition from an unacknowledged to acknowledged state.

Setting	Columns	
Nar		
	Alarm acknowledgement time calculated over area (position), module o attribute.	r
Ту	Alarm Acknowledgement by Attribute	
Ord	•	

Settings

• Type

• Alarm Acknowledgement by Attribute

The alarm acknowledgement times are calculated by attributes.

- Alarm Acknowledgement by Module
 The alarm acknowledgement times are calculated by module.
- Alarm Acknowledgement by Area The alarm acknowledgement times are calculated by area.

Columns

- Count
 - Number of cycles
- Average Average amount of time (in days)
- Total

Total amount of time (in days)

Peak

Longest time (in days)

Output

•

Module/Node	Description	Time Active	Average Time	Total Time	Peak	Area
65_PI-14	Pressure Before ejector	2	0.035474537	0:01:42:10	0:01:07:30	65_STEAM
12-32-GA-401-B	Band time guard 12-32J26	1	0.021273148	0:00:30:38	0:00:30:38	12-32-TRANSPORTER
23_LIC-07	Level reg. 23T03 level sens	1	0.016770833	0:00:24:09	0:00:24:09	23_FERMENTATION
LARM_DEPÅ	Alarm depot	2	0.014722222	0:00:42:24	0:00:21:12	12-27-ETANOLLAGE
21_EIC-01	Feed controller 21G11A	2	0.014502315	0:00:41:46	0:00:37:44	21_MILLING
63_LIC-05	Level regulator collection	: 7	0.013883929	0:02:19:57	0:01:40:15	63_WASTEWATER
65_TI-14	Condensation return temp	2	0.011400463	0:00:32:50	0:00:27:20	65_STEAM
12-92-CR-109	HVAC/ Area 22	2	0.011383102	0:00:32:47	0:00:25:21	AREA_A
12-23-PIC-804	Pressure regulator 23P14	8	0.011157407	0:02:08:32	0:00:58:55	12-23-FERMENT
22_FIC-06	Finished Flow till 22T01	1	0.010694444	0:00:15:24	0:00:15:24	22_STARCH
12-63-LAH-108	Pump i kemhus	1	0.009039352	0:00:13:01	0:00:13:01	12-63-SVAT
31_LIA-03	31T03 level sensor	2	0.008883102	0:00:25:35	0:00:23:40	31_STILLAGE
23_LSA-06	Foaming controller 23T02	1	0.008275463	0:00:11:55	0:00:11:55	23_FERMENTATION
51_FIC-16	Caustic Flow till 24D50	8	0.008266782	0:01:35:14	0:01:21:15	51_CHEMICALS
21_LS-08	21T02 Level	1	0.005648148	0:00:08:08	0:00:08:08	21_MILLING
12-51-FIC-209	Flowsregl. NaOH t. 24T08	4	0.00556713	0:00:32:04	0:00:25:26	12-51-KLAGER
12-32-GA-401-A	Band time guard 12-32J26	5	0.005168981	0:00:37:13	0:00:13:43	12-32-TRANSPORTER
11_LIA-28	12-11T28 level sensor	14	0.005123181	0:01:43:17	0:00:21:47	11_GRAINSILO
12-11-GA-111	Imbalance 12-11S24A	1	0.005104167	0:00:07:21	0:00:07:21	12-11-SP
65_PI-06	Pressure till 65T01	2	0.005005787	0:00:14:25	0:00:10:45	65_STEAM
12-24-TDI-207	Tempdiff. 24D10 tray 1-4	15	0.004862654	0:01:45:02	0:00:23:28	12-24-DISTILLATION
12-32-GA-401-G	Band time guard 12-32J26	6	0.00480517	0:00:41:31	0:00:23:33	12-32-TRANSPORTER
32_G51A	Pellet press interlocks	5	0.004622685	0:00:33:17	0:00:16:17	32_DRYING

ALARM SUPPRESSED

The Alarm Suppressed sub report provides the alarms suppressed during the report period.

Settings

Settings	Columns
Name	
	Alarms suppressed calculated over attributes.
Order	

Columns

• Count

Number of times the alarm was suppressed during the report period

Average

Average amount of time the alarm was suppressed during the report period (in days)

• Total

Total amount of time the alarm was suppressed during the report period (in days)

AtClose

Marker to show that the alarm remained suppressed at the end of the report period

Output

Module/Node	Description	Attribute	Count	Average Time	Total Time	Alarm Area
22_TIC-07	mash till fermentation	t-HI_ALM	8	0.01:16:45	0.10:14:02	22_STARCH
22_TIC-07	mash till fermentation	t-HI_HI_ALM	8	0.01:16:45	0.10:14:02	22_STARCH

ALARM DISABLED

The Alarm Disabled sub report provides the alarms disabled during the report period.

Settings

Settings	Columns
Name	
	Alarms disabled calculated over attributes.
Order	

Columns

• Count

Number of times the alarm was disabled during the report period

Average

Average amount of time the alarm was disabled during the report period (in days)

• Total

Total amount of time the alarm was disabled during the report period (in days)

AtClose

Marker to show the alarm remained suppressed at the end of the report period

Output

Module/Node	Description	Attribute	Count	Average Time	Total Time	Alarm Area
< 11_LIA-25	12-11T25 level sensor	HI_ALM	1	0:07:26:41	0:07:26:41	11_GRAINSILO
< 11_LIA-25	12-11T25 level sensor	HI_HI_ALM	1	0:07:26:41	0:07:26:41	11_GRAINSILO
62_X-02	Alarm 62PV21/22 open	DISC_ALM	4	0:04:59:58	0:19:59:55	62_COOLINGWATER
12-24-AI-301	Conditioning ethanol 24P71	HI_ALM	1	0:02:42:47	0:02:42:47	12-24-DISTILLATION
12-24-TI-412	Temp alcohol to RK1	LO_ALM	1	0:02:35:54	0:02:35:54	12-24-DISTILLATION
12-24-TDIC-329	Tempdiff. 24D70	HI_ALM	1	0:01:20:54	0:01:20:54	12-24-DISTILLATION
12-24-TDIC-404	Tempdiff. 24D60	HI_ALM	1	0:01:20:54	0:01:20:54	12-24-DISTILLATION
12-24-TDIC-404	Tempdiff. 24D60	LO_ALM	1	0:01:20:54	0:01:20:54	12-24-DISTILLATION
12-24-TDI-207	Tempdiff. 24D10 tray 1-4	HI_ALM	1	0:01:20:53	0:01:20:53	12-24-DISTILLATION
12-24-TDI-307	Tempdiff. bottom 1-4 24D30	HI_ALM	1	0:00:45:54	0:00:45:54	12-24-DISTILLATION
12-24-TDI-310	Tempdiff. 24D30/D70	LO_ALM	1	0:00:45:54	0:00:45:54	12-24-DISTILLATION
12-24-PIC-218	Pressure regulator t. 24P03	HI_ALM	1	0:00:45:53	0:00:45:53	12-24-DISTILLATION
12-24-TDIC-329	Tempdiff. 24D70	LO_ALM	1	0:00:35:55	0:00:35:55	12-24-DISTILLATION
12-24-TIC-214	Temp bladder	DV_HI_ALM	1	0:00:35:53	0:00:35:53	12-24-DISTILLATION
12-24-TIC-214	Temp bladder	DV_LO_ALM	1	0:00:35:53	0:00:35:53	12-24-DISTILLATION
< 11_LIA-26	12-11T26 level sensor	HI_ALM	1	0:00:24:16	0:00:24:16	11_GRAINSILO
< 11_LIA-26	12-11T26 level sensor	HI_HI_ALM	1	0:00:24:16	0:00:24:16	11_GRAINSILO
< 23_LSA-08	Foaming controller 23T03	DISC_ALM	97	0:00:10:56	0:17:41:23	23_FERMENTATION
32 GS-10A	Emergency dryer	DISC ALM	8	0:00:03:22	0:00:27:01	32 DRYING

ALARM STANDING

The **Alarm Standing** sub report provides the alarms standing at the end of the report period. Standing alarms are new alarms that remain active at the end of the report period.

Settings

Settings	Columns
Name	
	Alarms standing at the end of the report period.
Order	

Columns

• FirstDate

First time the alarm became active but did not return back to normal

LastDate

Last time the alarm state changed (except inactive) before the end of the report period

• State

Last state of the alarm at the end of the report period

Output

Module	Description	First Date	Last Date	State
11_LIA-28	12-11T28 level sensor	6/7/17 15:35	6/7/17 15:43	ACT/ACK
11_LIA-28	12-11T28 level sensor	6/7/17 15:35	6/7/17 15:43	ACT/ACK
11_LIA-28	12-11T28 level sensor	6/7/17 15:25	6/7/17 15:25	ACT/ACK
12-21-LAH-305	Liquid Level 12-21Q35	6/7/17 23:13	6/7/17 23:14	ACT/ACK
12-22_VVX_CIP	CIP Alarm VVX	6/7/17 21:29	6/7/17 21:29	ACT/ACK
12-22-TDI-301	Temp. difference in/out	6/7/17 11:36	6/7/17 11:38	ACT/ACK
12-22-TIC-101	Temp. regulator 22T01	6/7/17 19:46	6/7/17 19:50	ACT/ACK
12-22-TIC-301	Mash temperature 22EC	6/7/17 23:52	6/7/17 23:52	ACT/UNACK
12-24-AI-301	Conditioning ethanol 24	6/7/17 23:36	6/7/17 23:49	ACT/ACK
12-24-FIC-102	Mash flow regulator 24F	6/7/17 13:53	6/7/17 13:53	ACT/ACK
12-24-LIC-305	Level regulator 24D30/7	6/7/17 23:58	6/7/17 23:58	ACT/UNACK
12-24-PD-337	Delta press. 12-24E32B	6/7/17 14:31	6/7/17 14:31	ACT/ACK
12-24-PI-334	Pressure after 12-24P21	6/7/17 14:03	6/7/17 14:03	ACT/ACK
12-24-PI-416	Before 12-24E65A ethar	6/7/17 22:38	6/7/17 22:39	ACT/ACK
LARM_DEPÅ	Alarm depot	6/7/17 9:43	6/7/17 10:04	ACT/ACK
LARM_DEPÅ	Alarm depot	6/7/17 9:43	6/7/17 10:04	ACT/ACK
12-31-LI-754	Level 12-31T50	6/7/17 22:31	6/7/17 22:32	ACT/ACK
12-31-LI-754	Level 12-31T50	6/7/17 22:31	6/7/17 22:32	ACT/ACK
12-32-E-23-A-M3	Cell feeder pellet cooler	6/7/17 4:32	6/7/17 4:32	ACT/ACK
12-62-TIC-204	Temp.reg Water	6/7/17 10:44	6/7/17 10:44	ACT/ACK
12-63-FIC-201	Flows reg. till scrolling ta	6/7/17 23:58	6/7/17 23:58	ACT/UNACK
12-63-P-02-A	Fermenter waste pump	6/7/17 20:58	6/7/17 20:58	ACT/ACK

ALARM CUSTOM

The **Alarm Custom** sub report provides a custom output based on a specified set of columns and filters.

Settings

Settings	Columns
Name	
	List of alarms using custom settings.
Order	
Filter	

• Filter

Filter is a valid *SQL WHERE* clause. Note that custom variables can be used as part of the clause. For example, using the filter *Level* = {*LevelSetting*} introduces a custom variable which can be set from either on-demand or from the Scheduler.

Columns

• Selection of columns

ALARM ANALYSIS

The **Alarm Analysis** sub report is similar to the Alarm Custom sub report except that the Activity is selected from a pre-defined list. See the **AlarmAnalysis** template as an example.

Settings

Settings	Columns
Name	
	Alarm states with custom filters.
Activity	New alarm states
Filter	

- Activity
 - o New alarm states
 - o Active alarm states
 - o Active/Acknowledged alarm states

Columns

Selection of columns

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