***em*Power** ®
Quality Monitor
Reference Manual

Part No. 09-0272

REVISION C

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The material in this publication is current as of the release date on the cover page and is subject to change without notice. Any questions concerning the product or any questions or comments concerning this manual should be directed to the NH Research Field Service Department during normal business hours Monday through Friday at (949) 474-3900 or FAX (949) 474-7062 or www.nhresearch.com.

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1. ENABLING A TEST PROGRAM TO COLLECT QM DATA

Enabling a Test Program to collect QM data is a two-step process. Those two steps are:

1. Configuring your Test Program to collect QM data
2. Configuring your Measurements to collect QM data

It is important that you understand that each Measurement in your Test Program must be configured individually before any QM data is collected on it. Each Test Routine may contain one or more Measurements, but you only need to configure the Measurements that you want QM data collected on.

Configuring your Test Program to collect QM data.

You will need to follow these instructions when enabling a Test Program to collect QM data for the first time.

With a Test Program open in EDIT:

Left-click Program in the EDIT menu bar – the Program menu, Figure 1, opens –

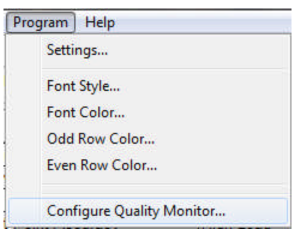

Figure 1 – The Program menu

Select the Configure Quality Monitor… option – the General dialog window, Figure 2, opens –

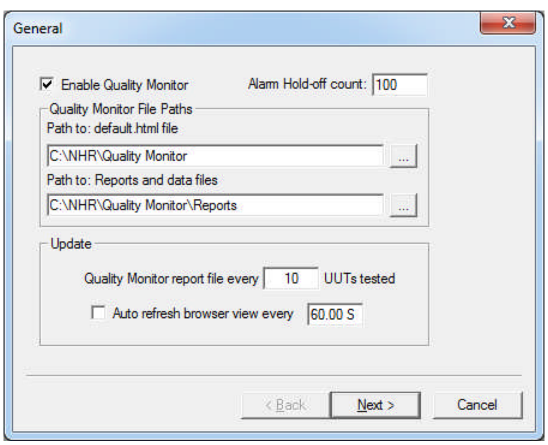

Figure 2 – The QM General dialog window

At this point, if you are just enabling your Test Program to collect QM data:

Click the Next > button – the UUT Settings dialog window, Figure 3, opens –

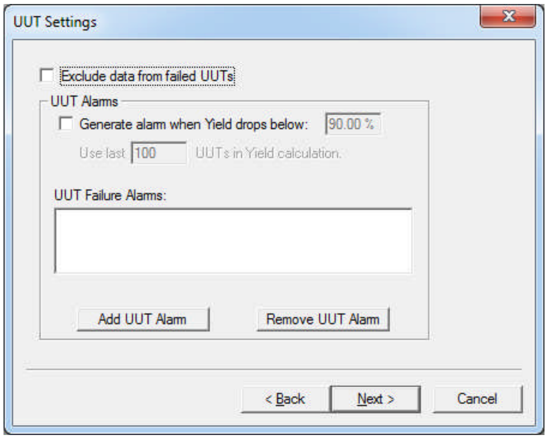

Figure 3 – The UUT Settings dialog window

At this point, if you are just enabling your Test Program to collect QM data:

Click the Next > button – the Alarm Actions dialog window, Figure 4, opens –

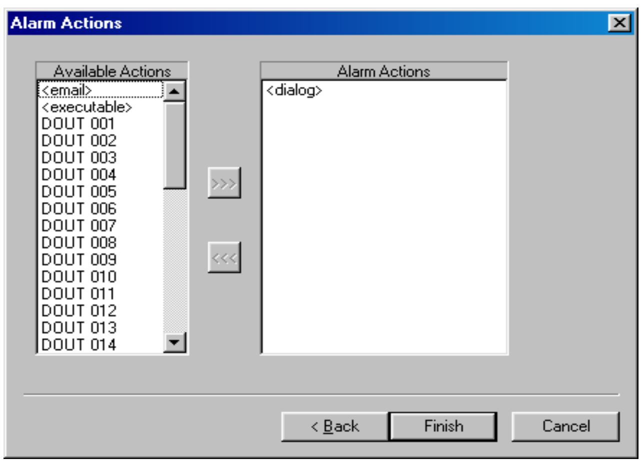

Figure 4 – The QM Alarm Actions dialog window

If you are only enabling your Test Program to collect QM data click the Finish button.

Your Test Program is now configured to collect QM data.

The next step is to configure each of the Measurements in your Test Program that you want QM data collected on, see:

Configuring a Measurement to collect QM data (page 14).

For more information on the QM General dialog window, see:

1. The Enable QM collection checkbox (page 93)
2. The Alarm Hold-off count field (page 94)
3. The QM File Paths frame (page 95)
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For more information on the QM UUT Settings dialog window, see:

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2. The UUT Failure Alarms frame (page 99)

For more information on the Alarm Actions dialog window, see:

1. The <dialog> Alarm Action (page 106)
2. The <e-mail> Alarm Action (page 106)
3. The <executable> Alarm Action (page 108)
4. The DOUT 00X (Digital Output) Alarm Action (page 109)
5. The GPR 00X (General Purpose Relay) Alarm Action (page 110)

1.1 Configuring a Measurement to collect QM data

After you have configured your Test Program to collect QM data (see page 11), you must configure each Measurement in your Test Program that you want to collect QM data on. In order to configure a Measurement you've either got to know where it is already, or search the Test Routines for it.

With an *em**Power*** ® Test Program loaded in EDIT:

Open the Test Routine's Test Parameter dialog window that contains the Measurement you want to collect QM data on – instructions on page 19.

Check the Enable Quality Monitor on this measurement checkbox, Figure 5 – the QM… button becomes active.

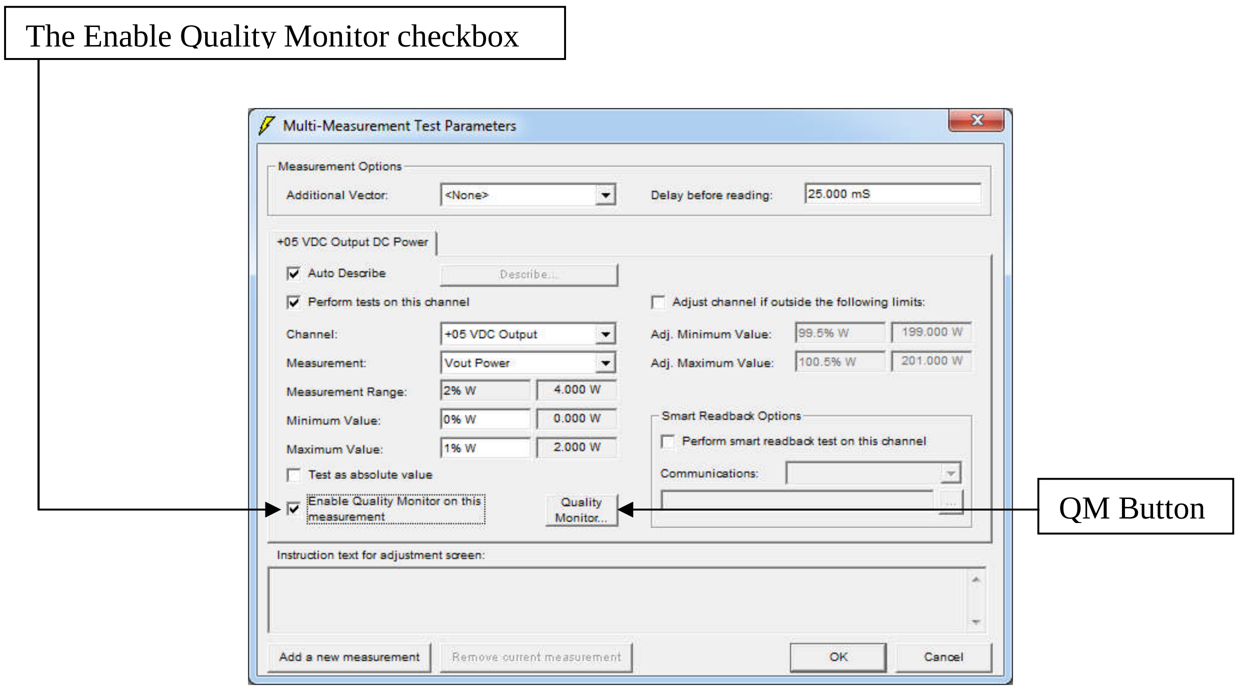


Figure 5 – The Multi-Measurement Test Parameter dialog window

Each Measurement being taken by a Test Routine will have its own tab in the Test Routine's Test Parameter dialog window, Figure 5 shows only one Measurement tab, the: +05 VDC Output DC Power.

Click the QM… button – the General Information dialog window, Figure 6, opens.

1.2 The General Information dialog window

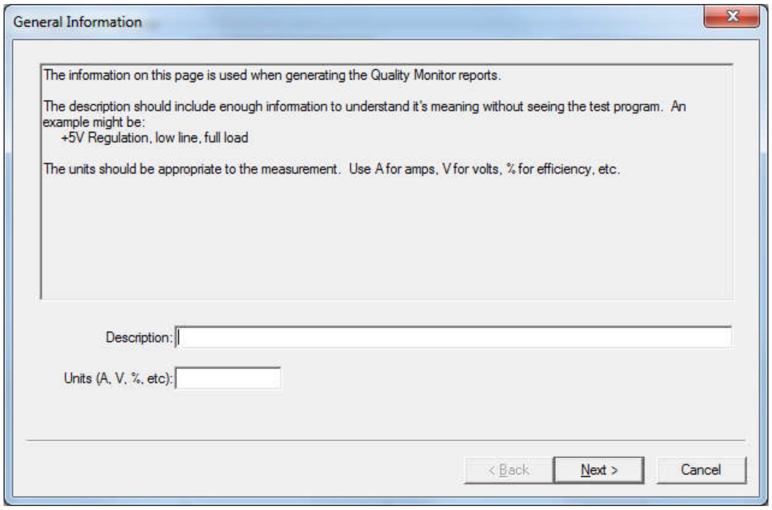


Figure 6 – The General Information dialog window

The Description field -

The text you enter in the Description field is just a label. You should enter a meaningful label because this label is used in the creation of the QM report, and it's the only connection between the QM report and this Measurement.

The text you enter in this field is also used as part of the QM report's filename, and must follow the Windows filename rules – for example, the forward slash character '/' cannot be part of the filename, although the dash character '-' can be.

Since I am collecting QM data on the only Measurement taken by the Test Step labeled: No Load Power Dissipation, with the Output Vector: No Load, and the Input Vector: Nom Line; I entered Power Dissipation (No Load - Nom Line) in the Description field, Figure 7.

The Units field -

The text you enter in the Units field is also just a label. You should enter an appropriate label for the units that your Test Routine is measuring, since this label is appended after values when the QM report is created.

Since, in this example, I am collecting QM data on a power Measurement, I entered 'W' in the Units field, Figure 7, for Watts.

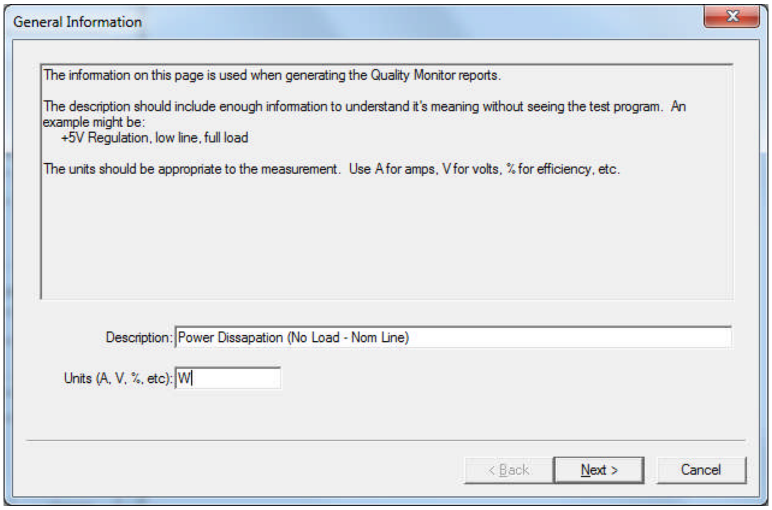


Figure 7 – The General Information dialog window

In the General Information dialog window -

Enter an appropriate label in the Description field.
Enter an appropriate label in the Units field.

Click the Next > button – the Active Alarms dialog window, Figure 8, opens.

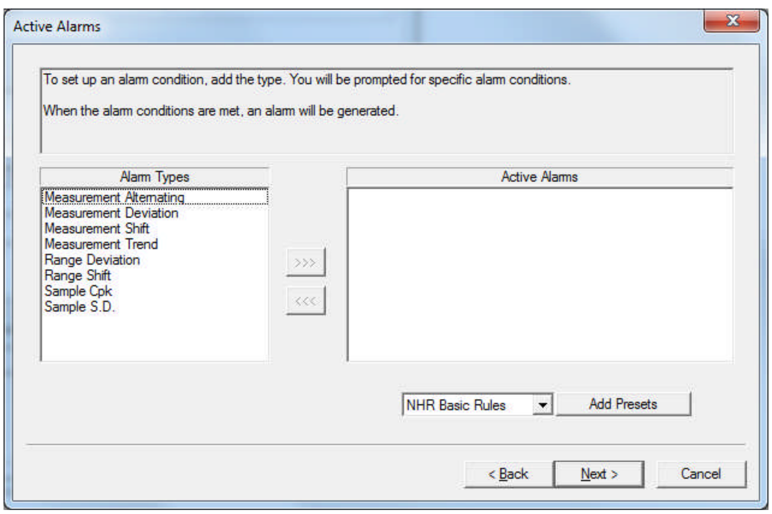


Figure 8 – The Active Alarms dialog window

Since we are only enabling the collection of QM data, we don't need to do anything in the Active Alarm dialog window.

Click the Next > button – the Statistic Setup dialog window, Figure 9, opens.

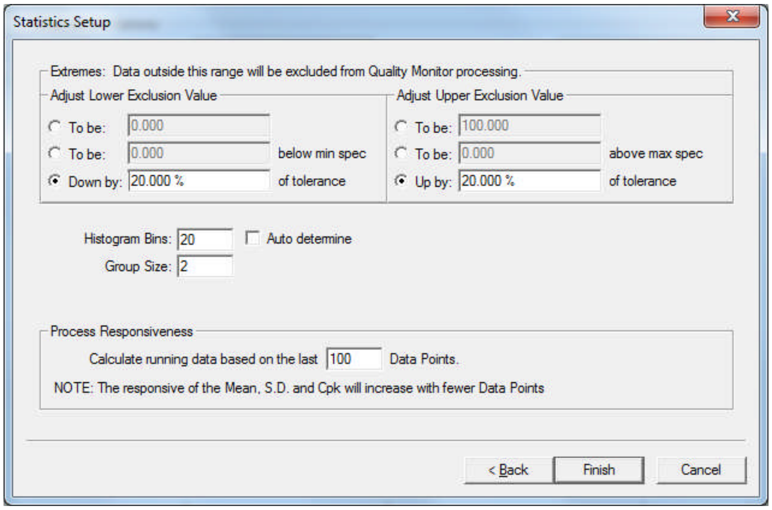


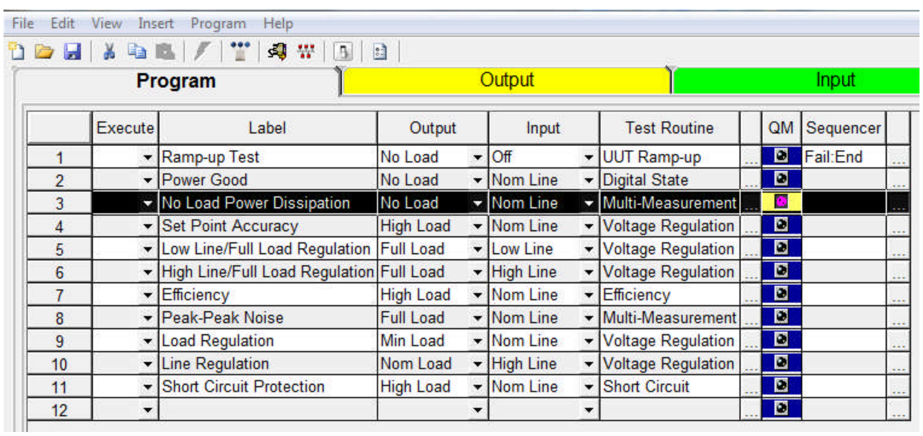
Figure 9 – The Statistics Setup dialog window

Since we are only enabling the collection of QM data, we don't need to do anything in the Statistic Setup dialog window.

Click the Finish > button – the Test Routine is now enabled to collect QM data.

In the Multi-Measurement Test Routine dialog window click the OK button.

Back in the EDIT/Program tab, the Test Step containing the Measurement you want to collect QM data on is highlighted, Figure 10.



	Execute	Label	Output	Input	Test Routine	QM	Sequencer
1		Ramp-up Test	No Load	Off	UUT Ramp-up		Fail:End
2		Power Good	No Load	Nom Line	Digital State		
3		No Load Power Dissipation	No Load	Nom Line	Multi-Measurement		
4		Set Point Accuracy	High Load	Nom Line	Voltage Regulation		
5		Low Line/Full Load Regulation	Full Load	Low Line	Voltage Regulation		
6		High Line/Full Load Regulation	Full Load	High Line	Voltage Regulation		
7		Efficiency	High Load	Nom Line	Efficiency		
8		Peak-Peak Noise	Full Load	Nom Line	Multi-Measurement		
9		Load Regulation	Min Load	Nom Line	Voltage Regulation		
10		Line Regulation	Nom Load	High Line	Voltage Regulation		
11		Short Circuit Protection	High Load	Nom Line	Short Circuit		
12							

Figure 10 – The EDIT/Program tab

Clicking any other row in the spreadsheet shows that the light in the QM column for that row is now lighted.

The selected Test Routine will now collect QM data on the configured Measurement when the Test Program is run with TEST.

1.3 Opening the QM Configuration dialog window (General tab)

With a Test Program open in EDIT:

Left-click Program in the EDIT menu bar – the Program menu, Figure 11, opens.

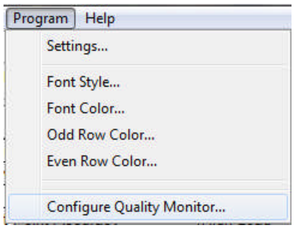


Figure 11 – The Program menu

Select the Configure Quality Monitor… option – the QM Configuration dialog window (General tab), Figure 12, opens.

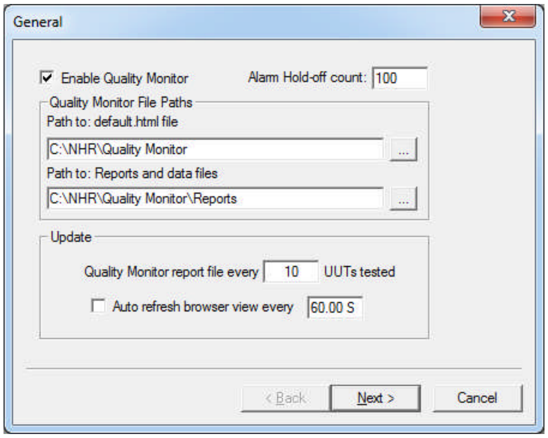


Figure 12 – The QM Configuration dialog window (General tab)

1.4 Opening a Test Routine's Test Parameter dialog window

For this example, I'm going to open the Test Parameter dialog window (Multi-Measurement Test Routine) in Test Step 3 of the Test Program shown in Figure 92.

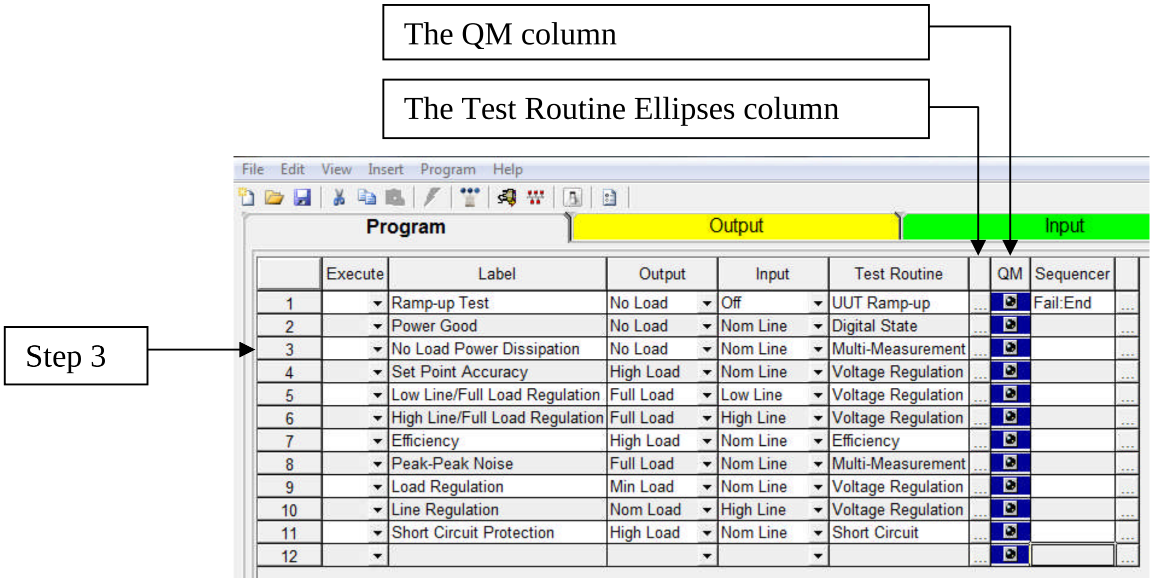


Figure 13 – The EDIT/Program tab

In the EDIT/Program tab, Figure 92:

Click the Test Routine Ellipses button of Test Step 3 – the Multi-Measurement Test Parameter dialog window, Figure 93, opens.

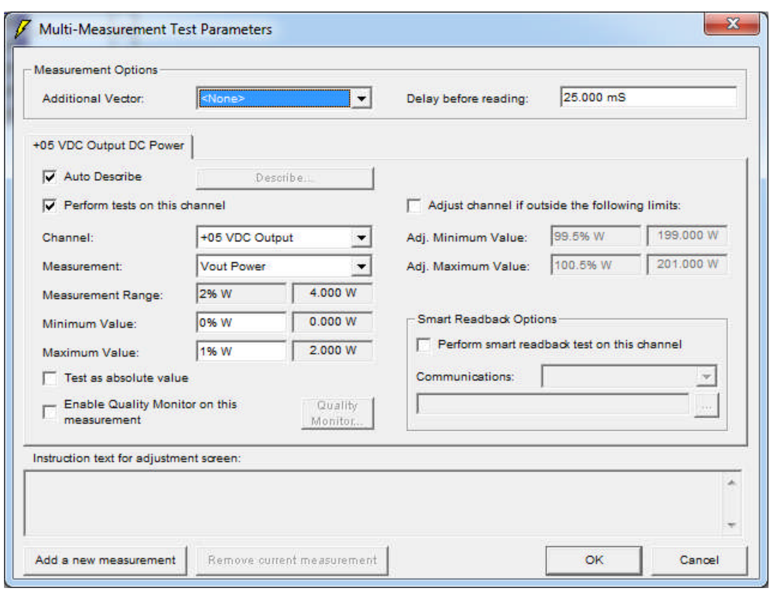


Figure 14 – The Multi-Measurement Test Parameter dialog window

All Test Parameter dialog windows are opened following the same method.

2. RUNNING A TEST PROGRAM WITH TEST

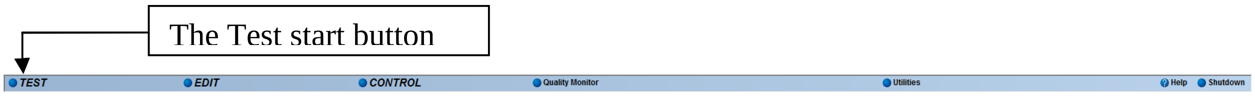


Figure 15 – The *emPower*** ® toolbar (TEST start)**

In the *em**Power*** ® toolbar, Figure 15:

Click the TEST button – the TEST dialog window, Figure 16, opens.

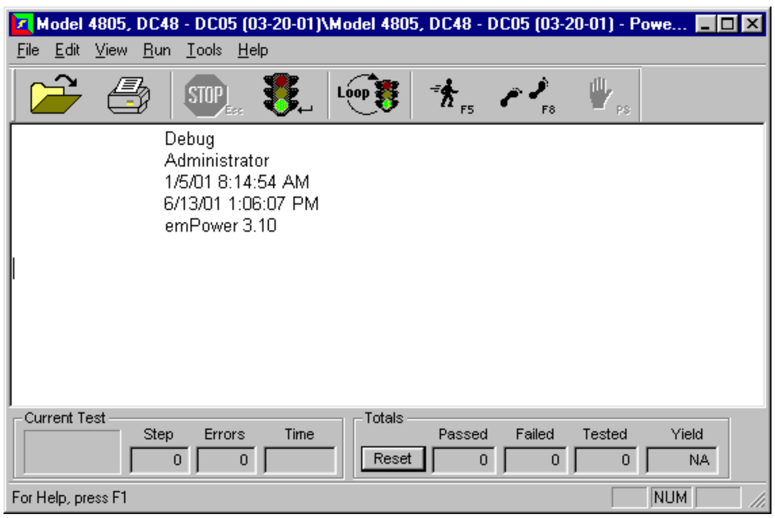


Figure 16 – The TEST dialog window

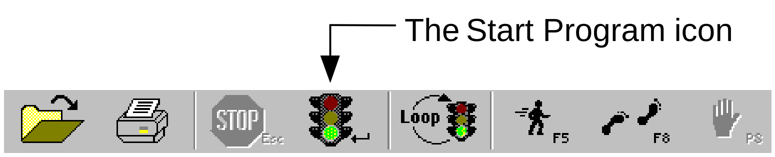


Figure 17 – The TEST toolbar (Start Program icon)

In the TEST toolbar, Figure 17:

Click the Start Program icon – the Test Information Entry dialog window, Figure 18, opens.

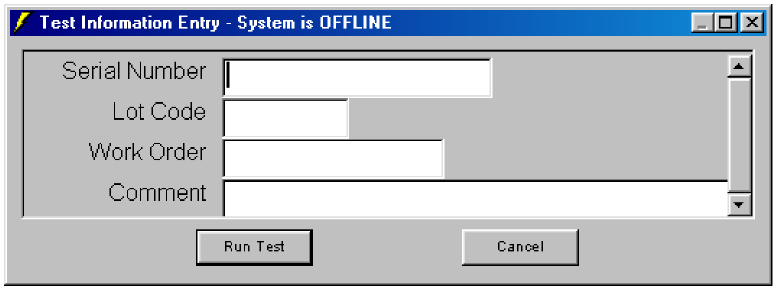


Figure 18 – The Test Information Entry dialog window

In the Test Information Entry dialog window:

Enter the appropriate information in the fields.

Click the Run Test button – TEST executes your Test Program, and QM data is collected.

Although QM data is collected for every UUT tested, a QM report is created (by default) after every 10th UUT is tested.

2.1 Viewing the QM report

The QM report is created as an HTML page (**H**yper**T**ext **M**arkup **L**anguage), and viewed using a web-browser.

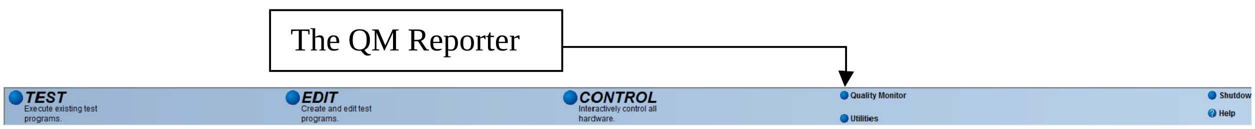


Figure 19 – The *emPower*** ® **toolbar (Quality Monitor button)**

In the *em**Power*** ® toolbar, Figure 19 -

Click the Quality Monitor button – your web-browser opens, Figure 20, with the Test Program’s report page loaded.

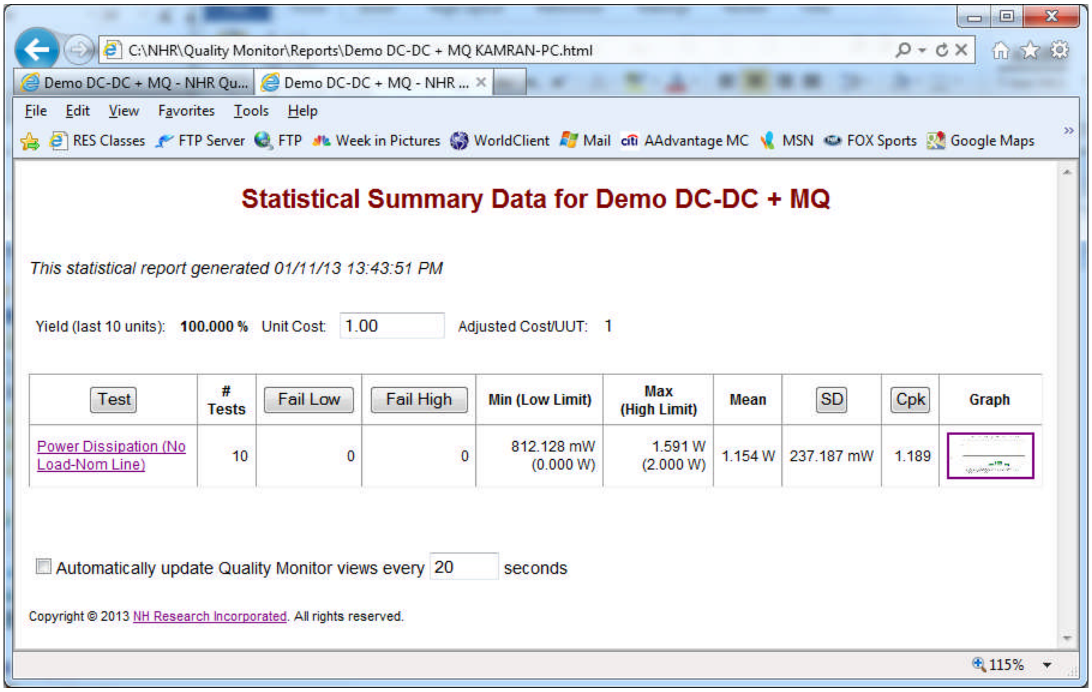


Figure 20 – The Test Routine's report page

See also:

1. Opening a Test Program's QM report page (page 25)

3. THE *em***Power** ® QUALITY MONITOR

3.1 The Quality Monitor – what is it?

The Quality Monitor allows you to monitor your manufacturing process in real-time. Because it works in real-time, the Quality Monitor does not keep historical QM data – rather it only keeps QM data from the recent past, giving you a, real-time, representative view of your manufacturing process.

The Quality Monitor is designed to give you meaningful feedback on you manufacturing process, not the performance of your UUTs, that's what the Datalog feature is for.

3.2 Opening a Test Program's QM report page

Once a QM enabled Test Program has been run in TEST enough times to have a QM report created, that QM report can be viewed.

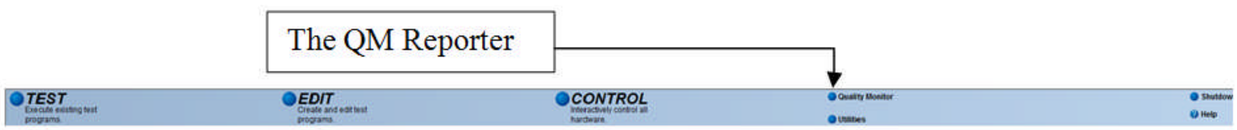


Figure 21 – The *em*Power ® toolbar (Quality Monitor button)

With a Test Program loaded in TEST:

Click the Quality Monitor button, Figure 21 – the Test Program's QM report page for that Test Program, Figure 22, opens.

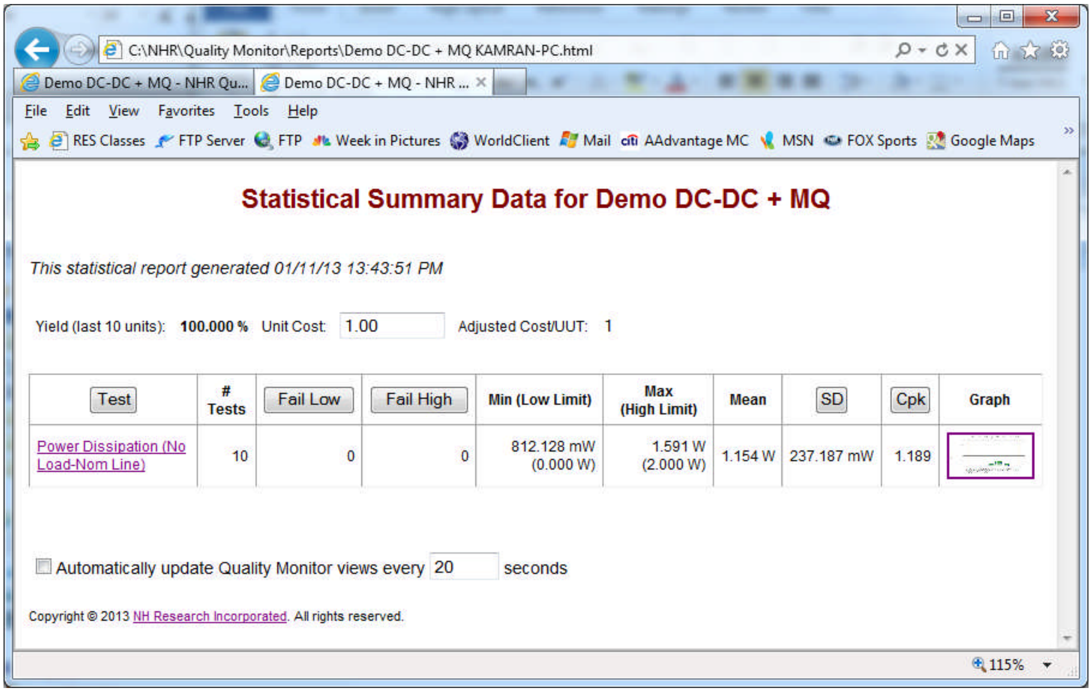


Figure 22 – The Test Program's QM report page

The Test Program's QM report page filename -

The filename of the Test Program's QM report page appears in the web-browser's address dropdown, Figure 22, and is constructed from:

1. The name of the Test Program
2. The name of the Test System
3. The file extension .html

and takes the form:

<Test Program name><Test System name>.html

More on the filename of the Test Program's QM report page.

In the case of the Test Program's QM report page shown in Figure 22, the report's filename is:

Model 4805, DC48 - DC05 (03-20-01) SWENG.html

Where:

Model 4805, DC48 – DC05 (03-20-01) is the name of the Test Program

SWENG is the name of the Test System

The parts of the Test Program's QM report page -

The Yield (last 100 units) value

The value shown here is the UUT yield for the last 100 UUTs. If the last 100 UUTs passed, the Yield (last 100 units) value will be 100%. If 1 in 10 UUTs in the last 100 UUTs failed, the Yield (last 100 units) value will be 90%.

The Unit Cost field

In the Unit Cost field, you enter the cost of manufacturing of each UUT.

The Adjusted Cost/UUT: value

The Adjusted Cost/UUT: value is a calculated value, and it shows the adjusted manufacturing cost of each passing UUT reflecting the Yield (last 100 units) value. As the Yield (last 100 units) value drops, the adjusted cost of manufacturing of each passing UUT will rise.

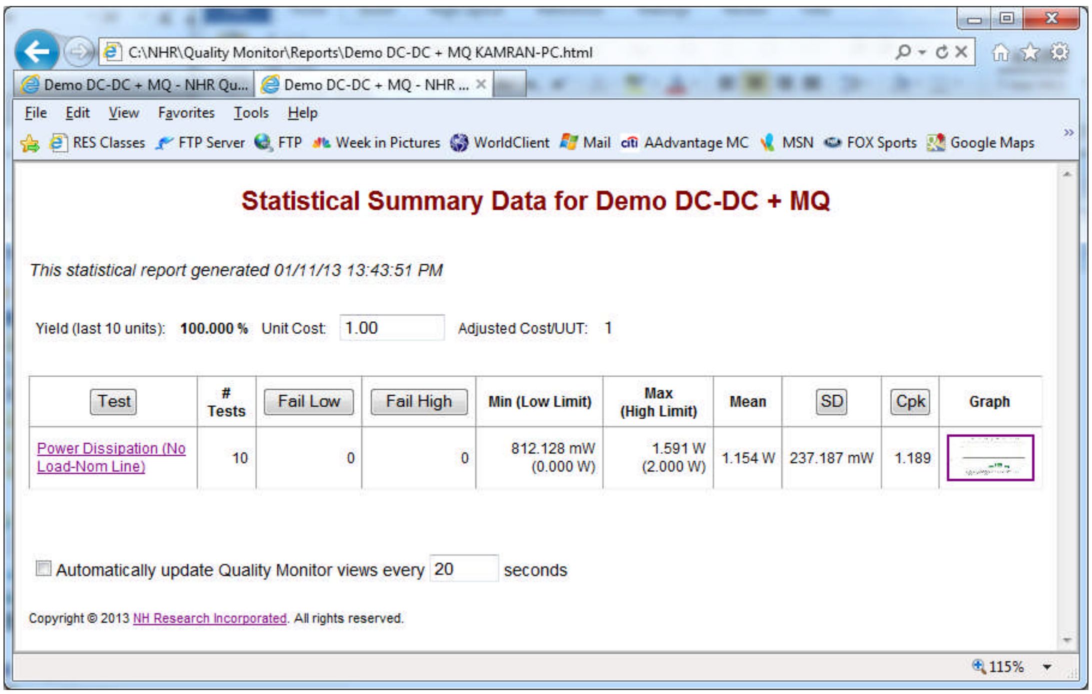


Figure 23 – The Test Program's QM report page

The example Test Program's QM report page in Figure 23 shows that each UUT costs $2.25 to manufacture, and the Yield (last 100 units) value has dropped to almost: 81.5%, this adjusts the manufacturing cost of each passing UUT to a little more than: $2.75.

The Test Program's report table

Each *em***Power**® Test Program may contain many Test Routines.

Each Test Routine may take many Measurements.

Each Measurement may have QM data collected on it. Each Measurement that has QM data collected on it will have a link in the Test column of the table shown in Figure 23.

Each link in the table will be using the label entered in the Description field of the General Information dialog window, Figure 7.

Clicking any of the links in the Test column of the table shown in Figure 22, will open a QM report page for that measurement similar to that shown in Figure 24.

3.3 The Measurement's QM report page

The Measurement's QM report page filename -

The name of a Measurement's QM report page is constructed from:

1. The name of the Test Program – in the example, Figure 24, it is: Model 4805, DC48 – DC05 (03-20-01)

2. The name of the Test System – in the example, Figure 24, it is: SWENG

3. The text label you entered in the Description field, Figure 7 – in the example, Figure 24, it is: Power Dissipation (No Load – Nom Line) inside parenthesis

4. The file extension .html

and takes the form:

<Test Program name><Test System name>(<label from the Description field, Figure 7>).html.

More on the filename of the Measurement's QM report page.

In the case of the Measurement's QM report page shown in Figure 24, the report's filename is: Model 4805, DC48 - DC05 (03-20-01) SWENG(Power Dissipation (No Load - Nom Line)).html

Where:

Model 4805, DC48 – DC05 (03-20-01) is the name of the Test Program

SWENG is the name of the Test System

(Power Dissipation (No Load - Nom Line)) is the measurement's descriptive label

The parts of the measurement's QM report page -

The Control Chart graph & image filename (Advanced Edition only)

The Control Chart graph is only created by the Advanced Edition of Quality Monitor.

The graphs shown in the Control Chart gives you an immediate Big Picture view of your manufacturing process. Each point shown in the Control Chart is a Data Point.

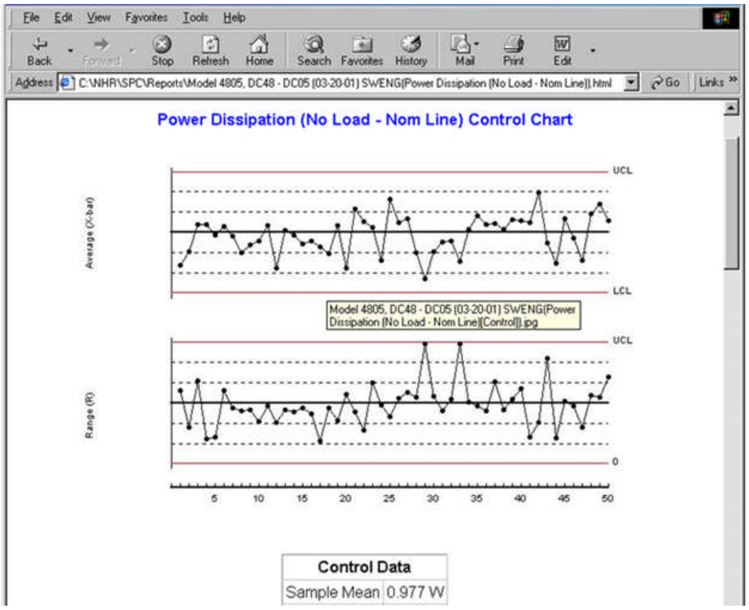


Figure 24 – The Test Routine's QM Report page

The Control Chart graph shown in Figure 24 is a .jpg file; its name is constructed from:

1. The QM report's filename
2. The label [Control]
3. The file extension .jpg

and takes the form:

<Test Program name><Test System name>(<label from the Description field, Figure 7>[Control]).jpg.

In the case of the measurement's QM report page shown in Figure 24, the image's filename is:

Model 4805, DC48 - DC05 (03-20-01) SWENG(Power Dissipation (No Load - Nom Line)[Control]).jpg

Where:

Model 4805, DC48 – DC05 (03-20-01) is the name of the Test Program

SWENG is the name of the Test System

(Power Dissipation (No Load - Nom Line)) is the Measurement's descriptive label

[Control] is the graph name

The Average (X-bar) graph -

The Average (X-bar) graph shows where each Data Point is in relation to the current Mean.

The Range (R) graph -

The Range (R) graph show the difference between the highest, and lowest measured value in each Data Point.

The Control Data table -

The Control Data table shows the current value of the Mean.

The Running Data graph & image filename

The Running Data graph shows you the distribution of the most recent Data Points, with the details of that data shown in the Running Data table.

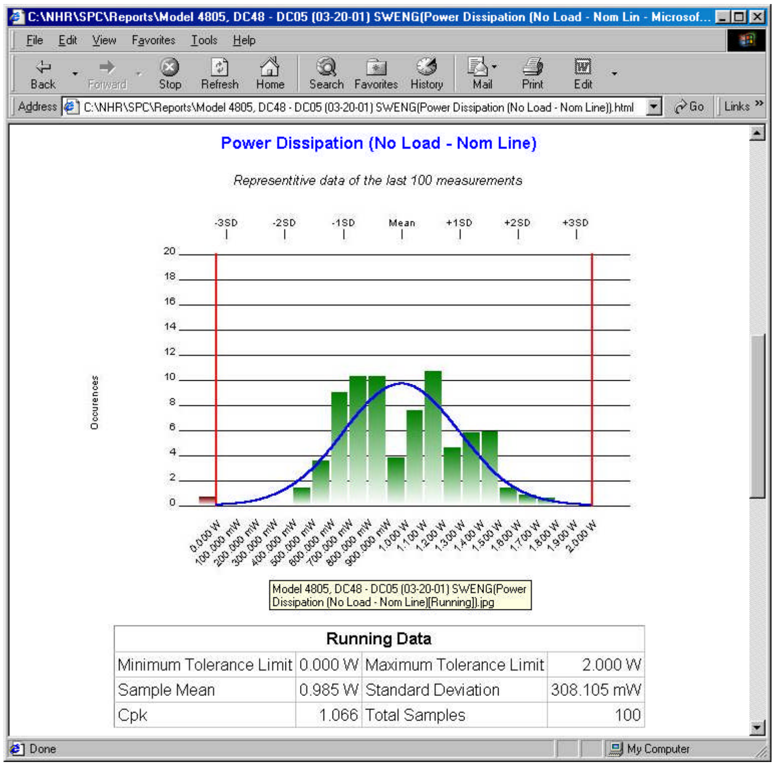


Figure 25 – The Running Data graph

The Running Data graph shown in Figure 25 is a *.jpg file, its name is constructed from:

1. The QM report's filename
2. The label [Running]
3. The file extension .jpg

and takes the form:

<Test Program name><Test System name>(<label from the Description field, Figure 7>[Running]).jpg

In the case of the Measurement's QM report page shown in Figure 24, the image's filename is:

Model 4805, DC48 - DC05 (03-20-01) SWENG(Power Dissipation (No Load - Nom Line)[Running]).jpg

Where:

Model 4805, DC48 – DC05 (03-20-01) is the name of the Test Program

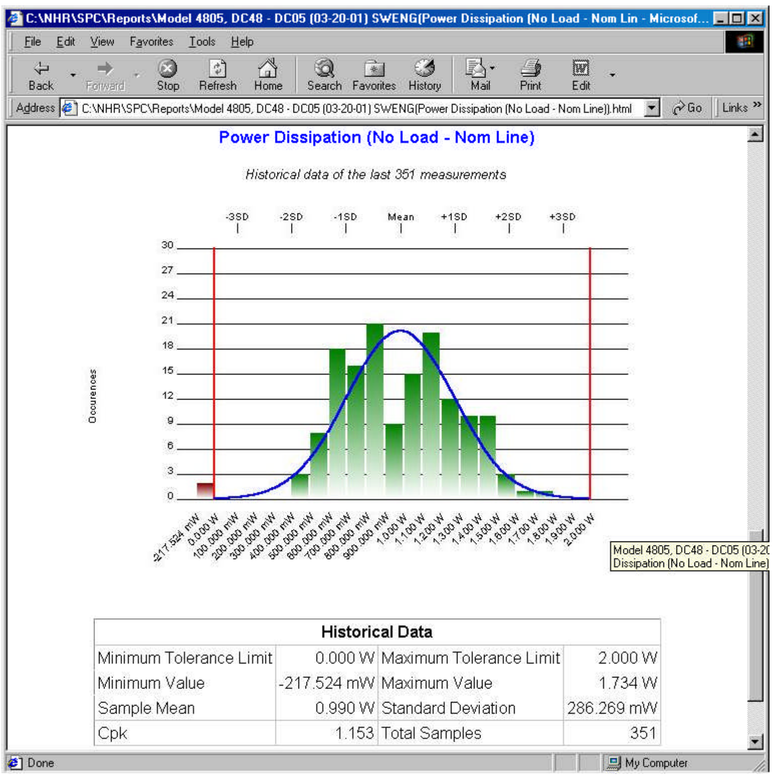
SWENG is the name of the Test System

(Power Dissipation (No Load - Nom Line)) is the Measurement's descriptive label

[Running] is the graph name

The Historical Data graph & image filename

The Historical Data graph shows you the distribution of all the Measurement data collected after the Test Program and Test Routine were configured to collect QM data, with the details of that historical data shown in the Historical Data table.



Historical Data			
Minimum Tolerance Limit	0.000 W	Maximum Tolerance Limit	2.000 W
Minimum Value	-217.524 mW	Maximum Value	1.734 W
Sample Mean	0.990 W	Standard Deviation	286.269 mW
Cpk	1.153	Total Samples	351

Figure 26 – The Historical Data graph

The Historical Data graph shown in Figure 26 is a *.jpg file, its name is constructed from:

1. The QM report's filename
2. The label [Historical]
3. The file extension .jpg

and takes the form:

<Test Program name><Test System name>(<label from the Description field, Figure 7>[Historical]).jpg.

In the case of the measurement's QM report page shown in Figure 26, the image's filename is:

Model 4805, DC48 - DC05 (03-20-01) SWENG(Power Dissipation (No Load - Nom Line)[Historical]).jpg.

Where:

Model 4805, DC48 – DC05 (03-20-01) is the name of the Test Program

SWENG is the name of the Test System

(Power Dissipation (No Load - Nom Line)) is the Measurement's descriptive label

[Historical] is the graph name

The browser auto refresh rate

Once opened the QM report pages will not be updated unless you click the web-browser's Refresh/Reload button.

Meanwhile, the QM report files are updated every so often, and the web-browser is still showing the old view.

By checking the Automatically update QM views every… checkbox (located at the bottom of the Measurement's QM report page) Figure 27, the view shown by the web-browser will be automatically updated with the most recent report file. The value you enter in the Automatically update QM views every… field, is the number of seconds (you want) between updates of the web-browser's view.

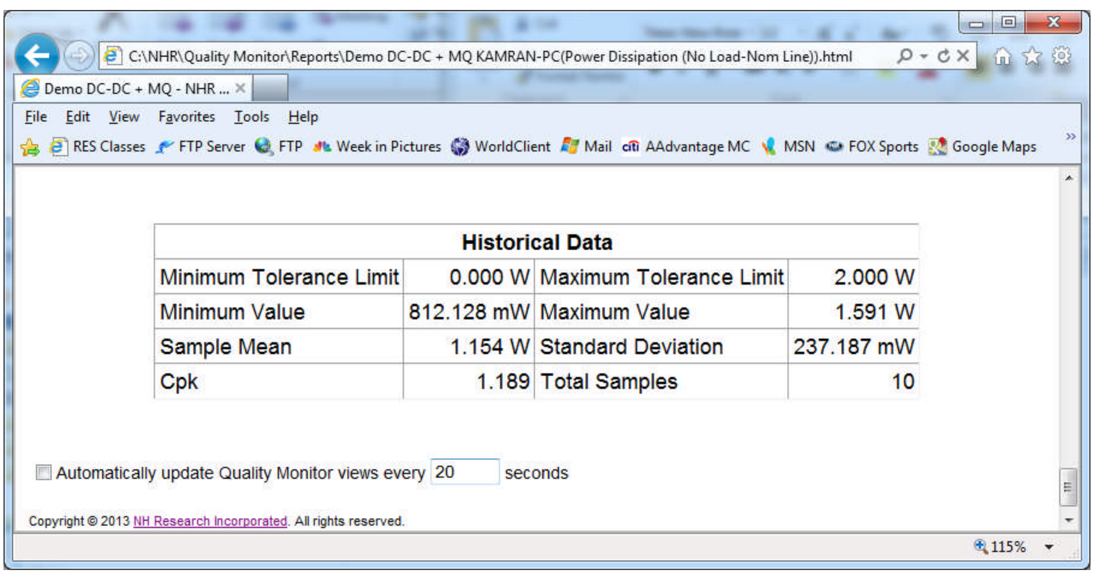


Figure 27 – The Automatically update QM views every… checkbox

Setting the browser auto refresh rate

Check the Automatically update QM views every… checkbox.

In the Automatically update QM views every… field:

Enter the number of seconds you want between each update of the web-browser view.
Click the OK button.

In the Automatically update QM views every… field, you must enter:

1. An integer value

2. Greater-than 0

The browser auto refresh rate rule-of-thumb -

There is no point in auto refreshing the browser view more often than the QM report files are updated.

So, if your Test Program takes 20 seconds to test a UUT, and you're using the default value of 10 in the QM report file every … UUTs tested field, then the QM report file will be updated by every 200 seconds or so.

In that case, there is no point entering a value less-than 200 in the Automatically update QM views every… field.

3.4 The default.html file

If you do not have a Test Program loaded in TEST, clicking the Quality Monitor button will open the default.html file.

The default.html QM Report page, Figure 28, contains a list of links to all the QM report pages for each Test Program on the Test System that have collected, or are collecting QM data.

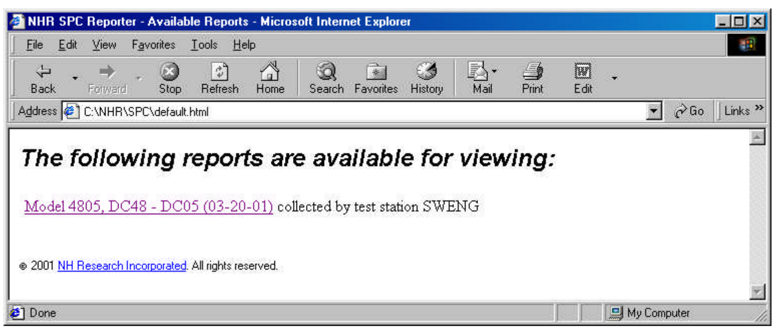


Figure 28 – The default.html QM report page

3.5 The report files created with the Basic Edition of Quality Monitor

When TEST runs a QM enabled Test Program, along with the pages -

default.html

<Test Program name><Test System name>.html

an *.html page containing two *.jpg files (the graph images) is created for every QM enabled Measurement in the Test Program.

These files are named in the form:

<Test Program name><Test System name>(<label from the Description field, Figure 7>).html.
<Test Program name><Test System name>(<label from the Description field, Figure 7>[running]).jpg.
<Test Program name><Test System name>(<label from the Description field, Figure 7>[historical]).jpg.

3.6 The report files created with the Advanced Edition (only) of Quality Monitor

When TEST runs a QM enabled Test Program, along with the pages -

default.html

<Test Program name><Test System name>.html

an *.html page containing three *.jpg files (the graph images) is created for every QM enabled measurement in the Test Program.

These files are named in the form:

<Test Program name><Test System name>(<label from the Description field, Figure 7>).html.
<Test Program name><Test System name>(<label from the Description field, Figure 7>[control]).jpg.
<Test Program name><Test System name>(<label from the Description field, Figure 7>[running]).jpg.
<Test Program name><Test System name>(<label from the Description field, Figure 7>[historical]).jpg.

The first *.jpg file in the above list:

<Test Program name><Test System name>(<label from the Description field, Figure 7>[control]).jpg.

is not created with the Basic Edition of Quality Monitor.

4. THE QM ACTIVE ALARMS (ADVANCED EDITION)

The QM Properties dialog window (Active Alarms tab) shown in Figure 29, is only available in the Advanced Edition of Quality Monitor.

Most of the Active Alarms described in this section are only available in the Advanced Edition of Quality Monitor.

These Active Alarms will warn you if your manufacturing process appears to be producing UUTs outside your specifications.

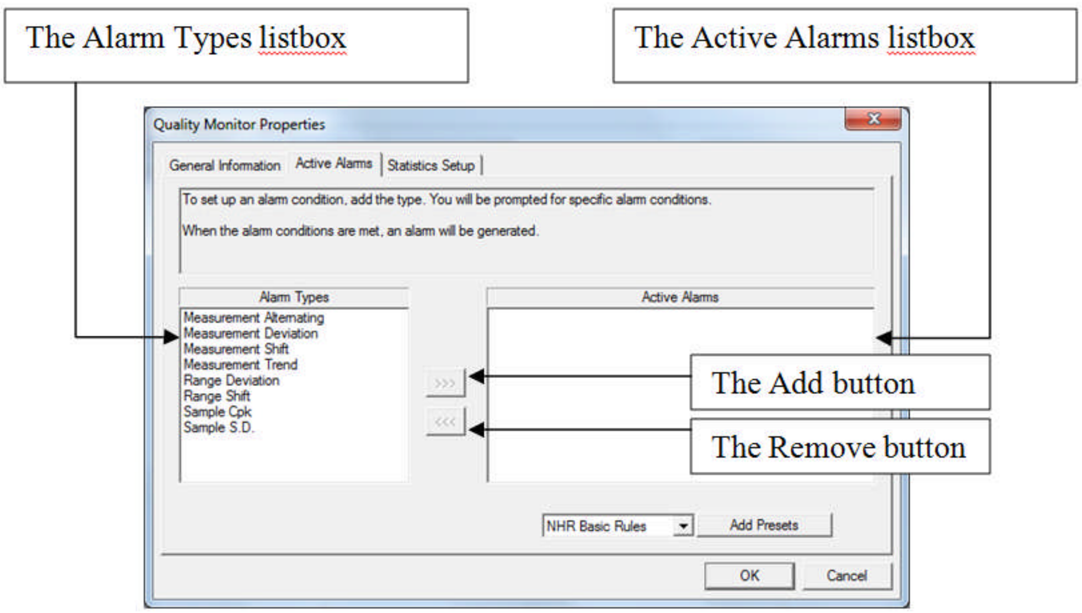


Figure 29 – The QM Properties dialog window (Active Alarms tab)

4.1 The Measurement Alternating alarm

The alarm trigger -

This alarm will be triggered when a set number of consecutive Data Points alternate about the mean. Figure 30 shows an example.

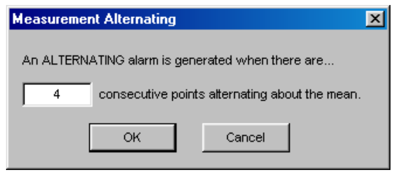


Figure 30 – The Measurement Alternation dialog window

Figure 31 shows the QM Alarm dialog window that opens when the value in Figure 30 is used.

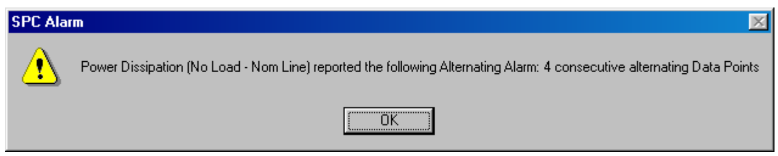


Figure 31 – The QM Alarm dialog window

When this Active Alarm is generated with the value in Figure 30, the close-up of the measurement's Control Chart (see The Control Chart graph & image filename, page 28) for that Measurement will appear similar to Figure 32.

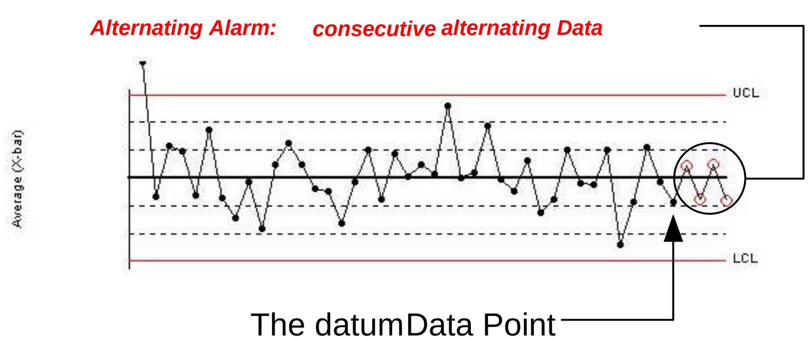


Figure 32 – The Measurement Alternating Control Chart

This alarm requires that there are 5 consecutive Data Points alternating about the Mean, the first being the datum Data Point, is not counted.

Adding the Measurement Alternating alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Measurement Alternating alarm to:
Open the QM Properties dialog window (Active Alarms tab), Figure 33 – instructions on page 77.

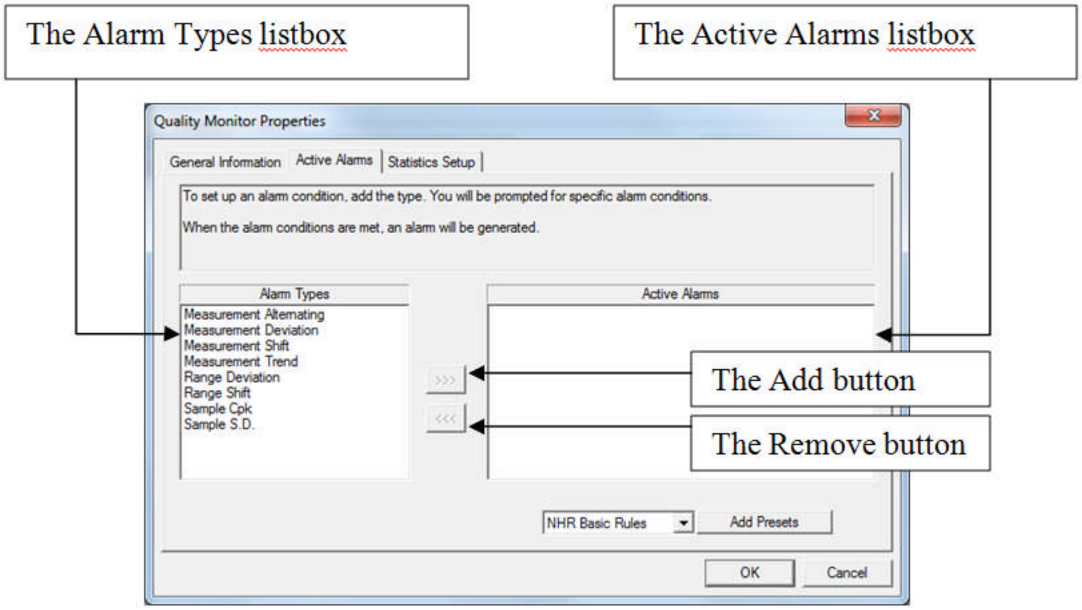


Figure 33 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox -

Select, by single clicking, the Measurement Alternating alarm – the Add button becomes active. Click the Add button – the default Measurement Alternating dialog window, Figure 34, opens.

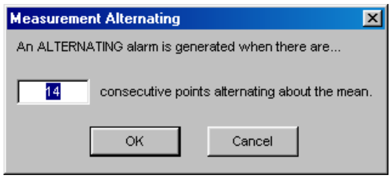


Figure 34 – The Measurement Alternating dialog window

The default value in the Consecutive Points field is 14. You may change this value to suit your needs (although, it must be an integer greater than 0, and less than 1,000,001).
Click the OK button – the Measurement Alternating alarm is added to the Active Alarms listbox, Figure 35.

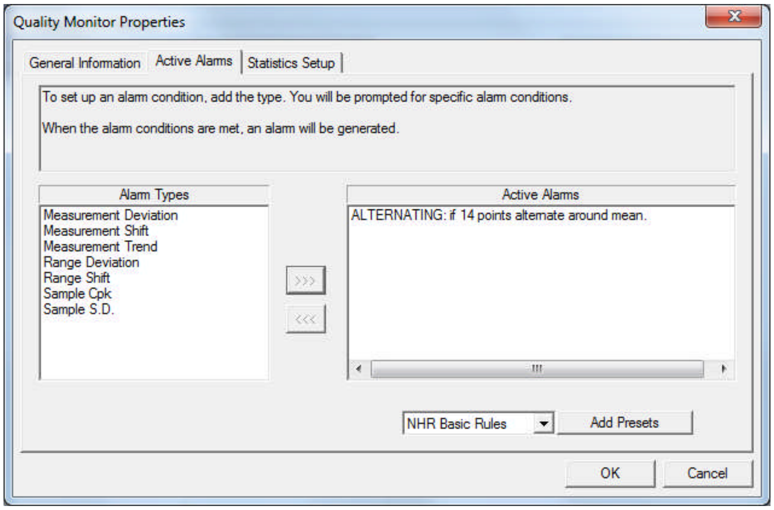


Figure 35 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Test Parameters dialog window click the OK button

4.2 The Measurement Deviation alarm

The alarm trigger -

This alarm will be triggered when a set number of Data Points, in a set of Continuous Data Points are Inside/Outside the set value of Standard Deviation. Figure 36 shows an example.

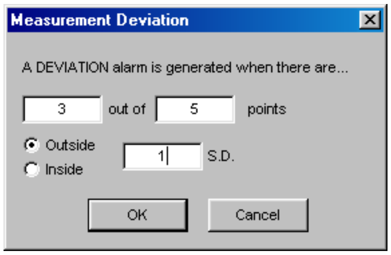


Figure 36 – The Measurement Deviation dialog window

Figure 37 shows the QM Alarm dialog window that opens when the values in Figure 36 are used.

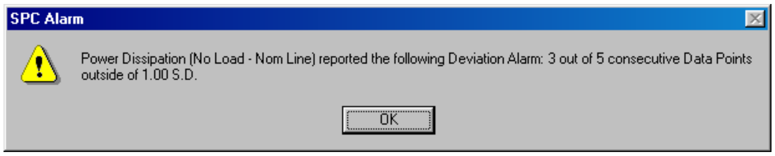


Figure 37 – The QM Alarm dialog window

When this Active Alarm is generated with the values in Figure 36, the close-up of the Measurement’s Control Chart (see The Control Chart graph & image filename, page 28) for that Measurement will appear similar to Figure 38.

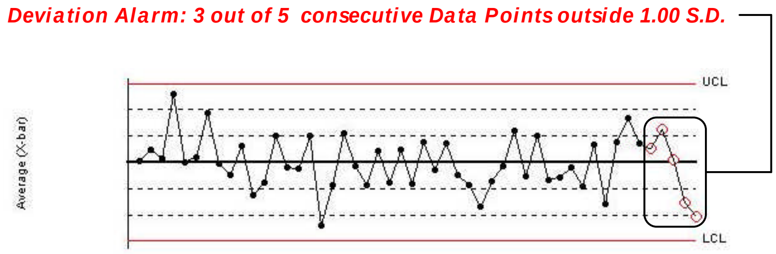


Figure 38 – The Measurement Deviation Control Chart

Adding the Measurement Deviation alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I’m going to assume that your Measurement is already enabled to collect QM data, if not see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Measurement Deviation alarm to:

Open the QM Properties dialog window (Active Alarms tab), Figure 39 – instructions on page 77.

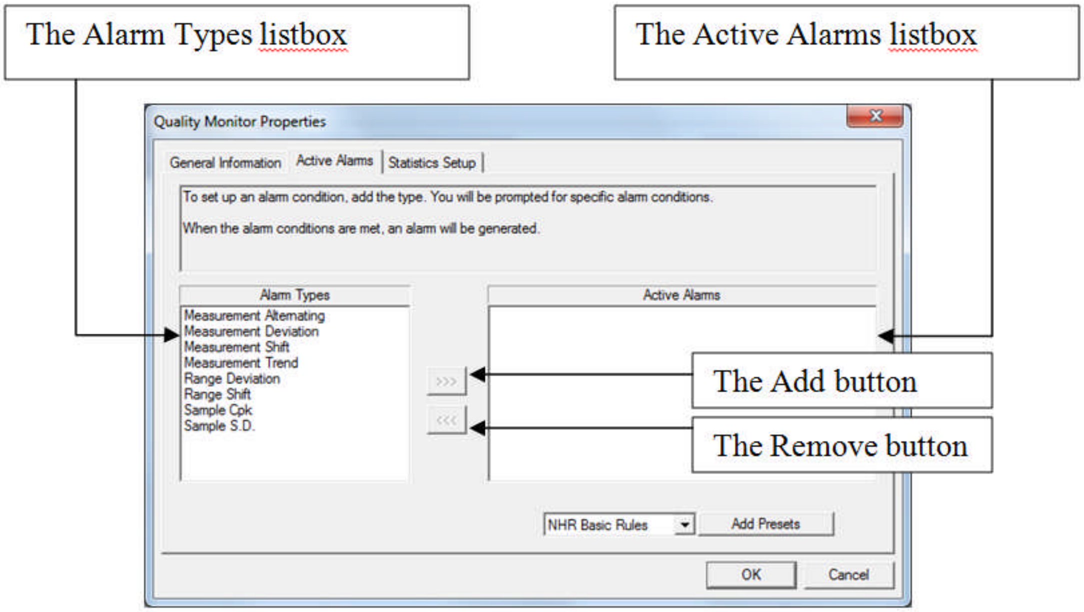


Figure 39 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox

Select, by single clicking, the Measurement Deviation alarm – the Add button becomes active. Click the Add button – the default Measurement Deviation dialog window, Figure 40, opens.

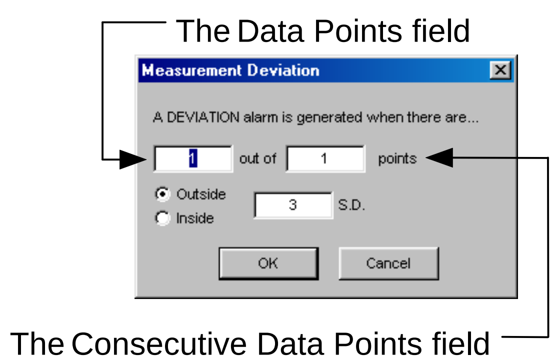


Figure 40 – The Measurement Deviation dialog window

The value you enter in the Data Points field must be:

1. An integer

2. Greater-than 0, and less-than 1,000,001

The value you enter in the Consecutive Data Points field must be:

1. An integer
2. Greater-than 0 and less-than 1,000,001
3. Greater-than, or equal-to the value entered in the Data Points field

The Outside/Inside options -

Choose whether you want the alarm to be trigged by the specified threshold Data Points being Outside/Inside the specified Standard Deviation.

The value you enter in the …S.D. field must be:

1. A floating-point number
2. If you chose the Outside option – any positive value less-than 101 (0 is valid)
3. If you chose the Inside option – greater-than 0 and less-than 101

As an example; if you wanted a Measurement Deviation alarm to be generated when 4 Data Points out of 6 Consecutive Data Points are Outside 2 Standard Deviations, your Measurement Deviation dialog window will look like Figure 41.

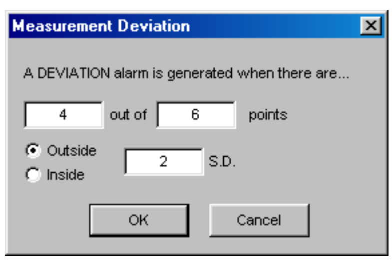


Figure 41 – The Measurement Deviation (example values) dialog window

Enter 4 in the Data Points field.
Enter 6 in the Consecutive Data Points field.
Enter 2 in the Standard Deviation field.
Click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 42; with the values you entered in the Measurement Deviation dialog window appearing in the Active Alarms listbox.

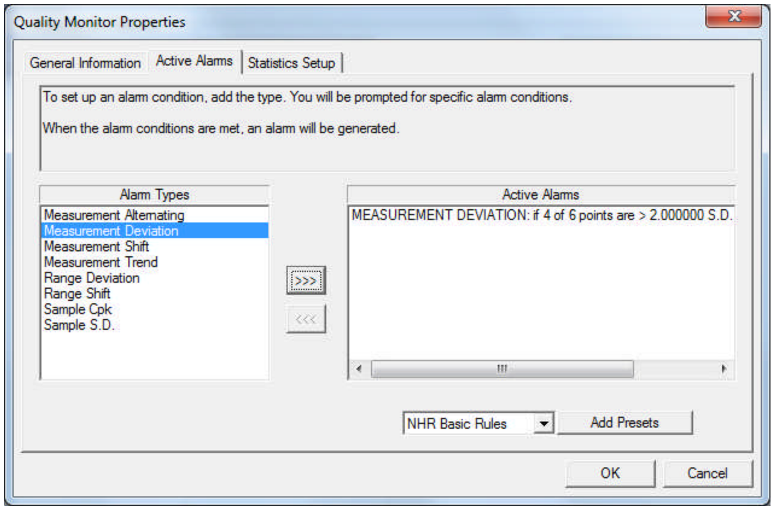


Figure 42 – The QM Properties dialog window (Active Alarms tab)

Click the OK button,

In the Test Parameters dialog window click the OK button

4.3 The Measurement Shift alarm

The alarm trigger -

This alarm will be triggered when a set number of Data Points, in a set of Continuous Data Points are on the same side of Mean, and Outside the set value of Standard Deviation, Figure 43 shows an example.

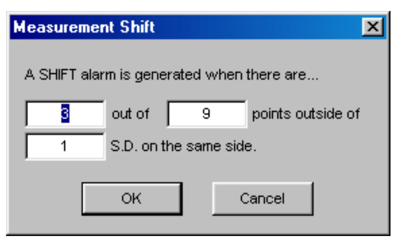


Figure 43 – The Measurement Shift dialog window

Figure 44 shows the QM Alarm dialog window that opens when the values in Figure 43 are used.

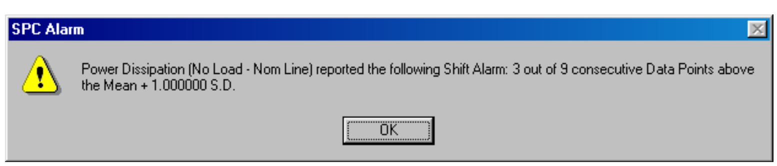


Figure 44 – The QM Alarm dialog window

When this Active Alarm is generated with the values in Figure 43, the close-up of the Measurement's Control Chart (see The Control Chart graph & image filename, page 28) for that Measurement will appear similar to Figure 45.

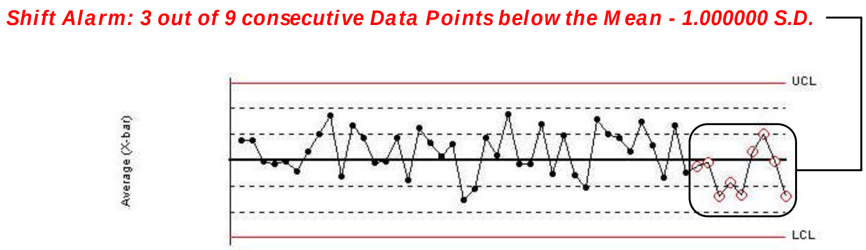


Figure 45 – The Measurement Shift Control Chart

Adding the Measurement Shift alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Measurement Shift alarm to:

Open the QM Properties dialog window (Active Alarms tab), Figure 46 – instructions on page 77.

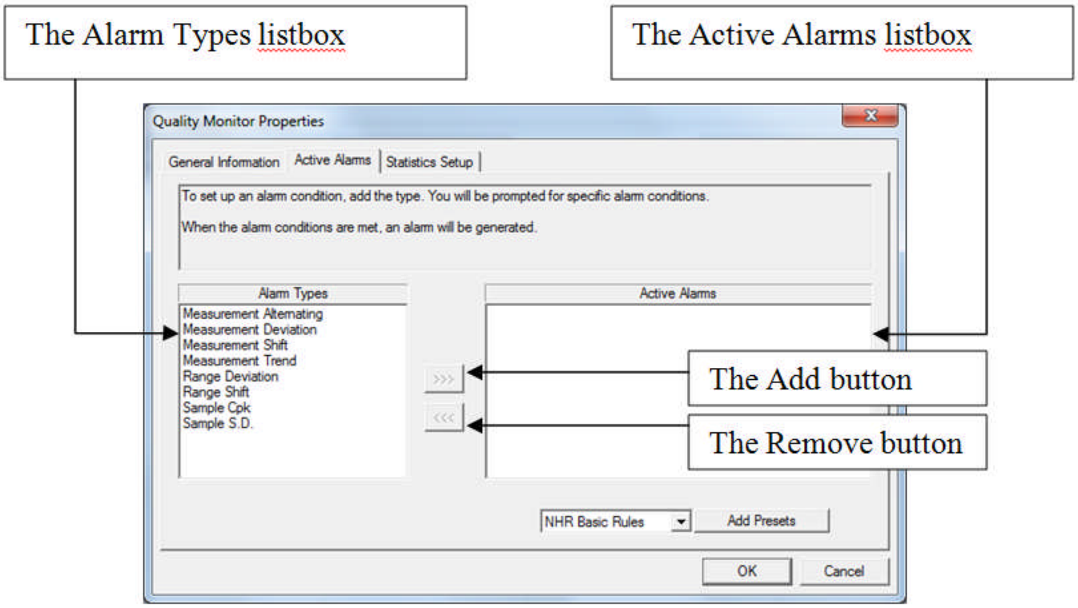


Figure 46 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox -

Select, by single clicking, the Measurement Shift alarm – the Add button becomes active. Click the Add button – the default Measurement Shift dialog window, Figure 47, opens.

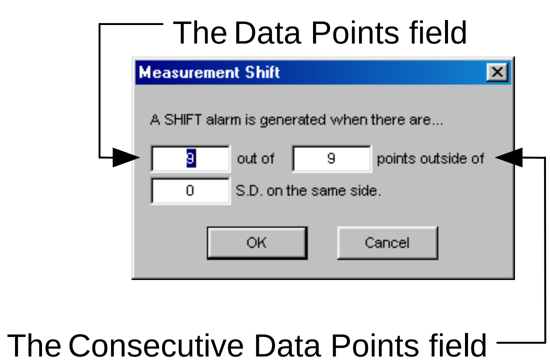


Figure 47 – The Measurement Shift dialog window

The value you enter in the Data Points field must be:

1. An integer
2. Greater-than 0, and less-than 1,000,001

The value you enter in the Consecutive Data Points field must be:

1. An integer
2. Greater-than 0 and less-than 1,000,001
3. Greater-than, or equal-to the value entered in the Data Points field

The value you enter in the Standard Deviation field must be:

1. A floating-point number
2. Any positive value less-than 101

As an example: if you wanted a Measurement Shift alarm to be generated when 6 Data Points out of a 9 Consecutive Data Points are outside 2 Standard Deviations on the same side of Mean, your Measurement Shift dialog window will look like Figure 48.

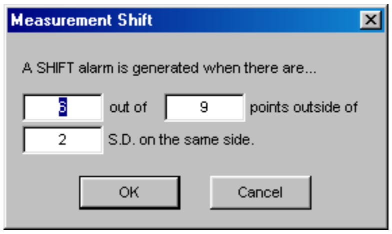


Figure 48 – The Measurement Shift dialog window

Enter 6 in the Data Point field.
Enter 9 in the Consecutive Data Points field.
Enter 2 in the … S.D. on the same side field.
Click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 49, with the values you entered in the Measurement Shift dialog window appearing in the Active Alarms listbox.

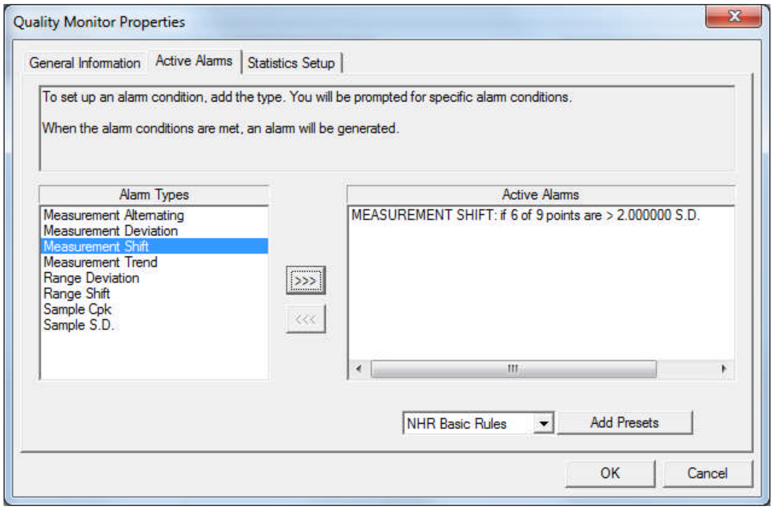


Figure 49 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Multi-Measurement Test Parameters dialog window click the OK button.

4.4 The Measurement Trend alarm

The alarm trigger -

This alarm will be triggered when a set number of Consecutive Data Points are trending (their value is increasing or decreasing). Figure 50 shows an example.

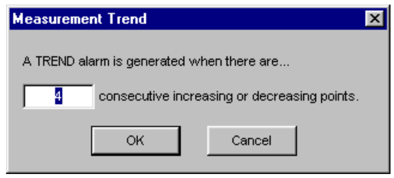


Figure 50 – The Measurement Trend dialog window

Figure 51 shows the QM Alarm dialog window that opens when the values in Figure 50 are used.

Figure 51 – The QM Alarm dialog window

When this Active Alarm is generated with the values in Figure 50, the close-up of the Measurement's Control Chart (see The Control Chart graph & image filename, page 28) for that Measurement will appear similar to Figure 52.

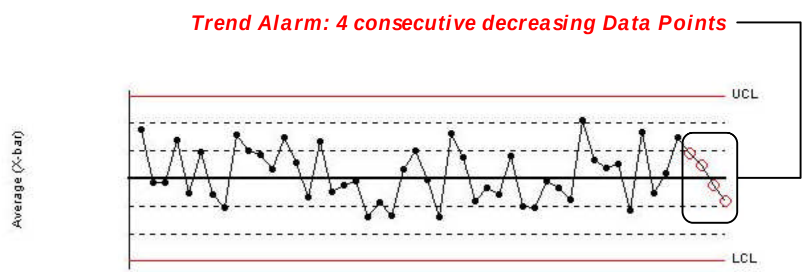


Figure 52 – The Measurement Trend Control Chart

Adding the Measurement Trend alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Measurement Trend alarm to:

Open the QM Properties dialog window (Active Alarms tab), Figure 53 – instructions on page 77.

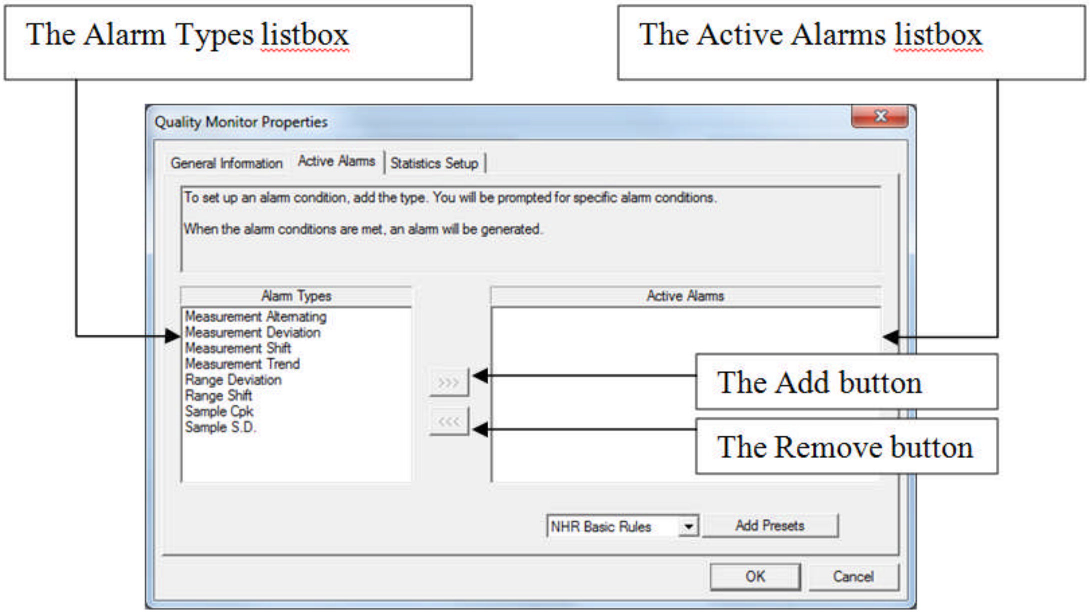


Figure 53 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox -

Select, by single clicking, the Measurement Trend alarm – the Add button becomes active.
Click the Add button – the default Measurement Trend dialog window, Figure 54, opens.

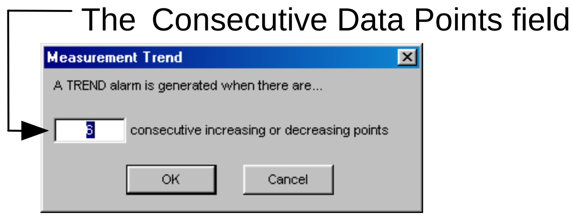


Figure 54 – The Measurement Trend dialog window

The value you enter in the Consecutive Data Points field must be:

1. An integer

2. Greater-than 0 and less-than 1,000,001

As an example, if you wanted a Measurement Trend alarm to be generated when 4 Consecutive Data Points on the same side of Mean were trending towards, or away from Mean, your Measurement Trend dialog window will look like Figure 55.

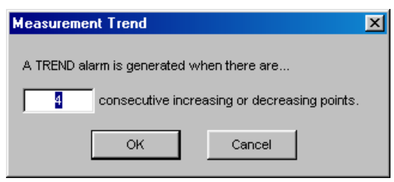


Figure 55 – The Measurement Trend dialog window

Enter 4 in the Consecutive Data Points field click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 56, with the values you entered in the Measurement Trend dialog window appearing in the Active Alarms listbox.

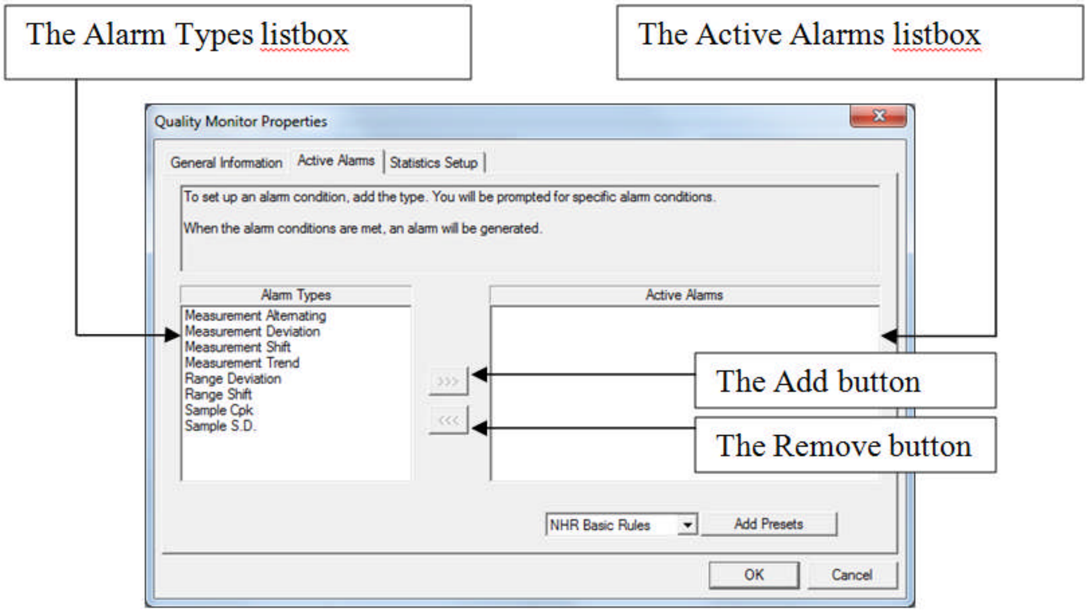


Figure 56 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Test Parameters dialog window click the OK button.

4.5 The Data Point Range Deviation alarm

A Data Point consists of at least one Measurement, but usually many. The Data Point Range is the difference in between the highest and lowest Measurement in a Data Point; therefore a Data Point containing a single Measurement is meaningless for this Active Alarm.

The alarm trigger -

This alarm will be triggered when a set number of Data Points, in a set of Continuous Data Points are Inside/Outside the set value of Standard Deviation. Figure 57 shows an example.

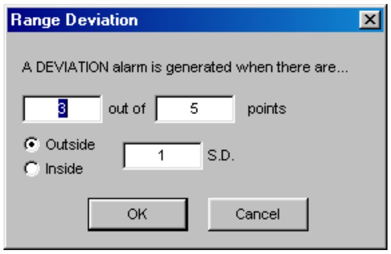


Figure 57 – The Range Deviation dialog window

Figure 58 shows the QM Alarm dialog window that opens when the values in Figure 57 are used.

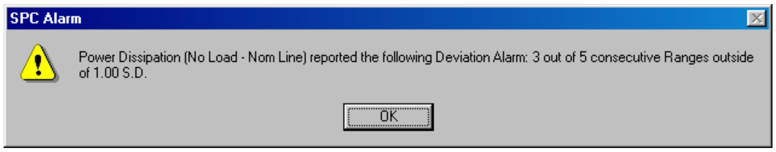


Figure 58 – The QM Alarm (Range Deviation) dialog window

When this Active Alarm is generated with the values in Figure 57, the close-up of the Measurement's Control Chart (Range (R)) graph (see The Control Chart graph & image filename, page 28) for that Measurement will appear similar to Figure 59.

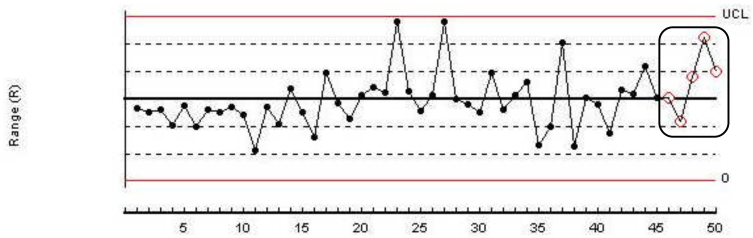


Figure 59 – The Range Deviation Control Chart (Range (R))

Adding the Range Deviation alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Range Deviation alarm to:

Open the QM Properties dialog window (Active Alarms tab), Figure 60 – instructions on page 77.

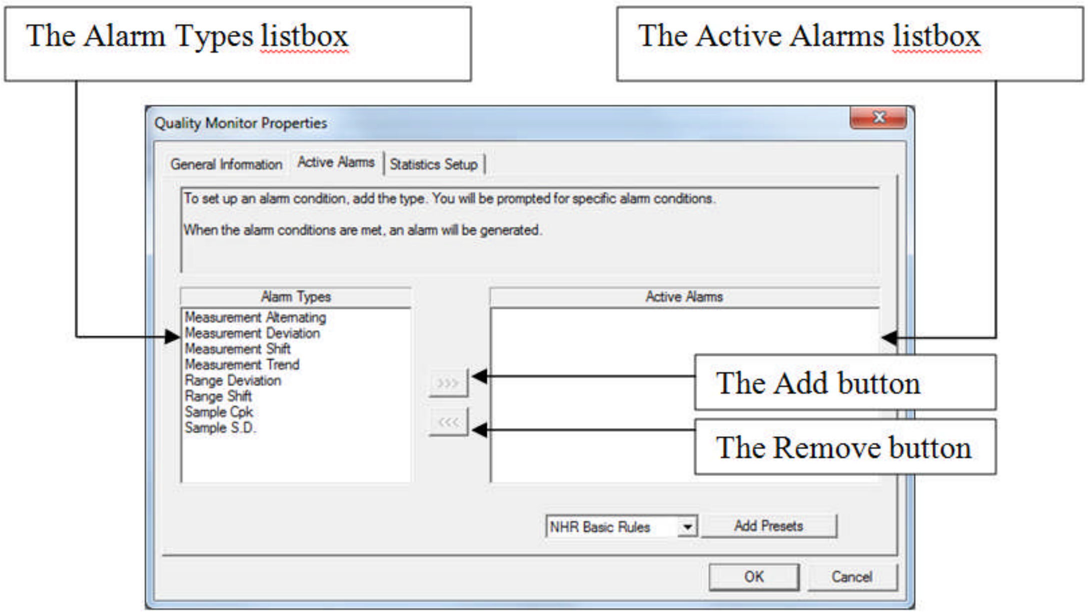


Figure 60 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox –

Select, by single clicking, the Range Deviation alarm – the Add button becomes active
Click the Add button – the default Range Deviation dialog window, Figure 61, opens.

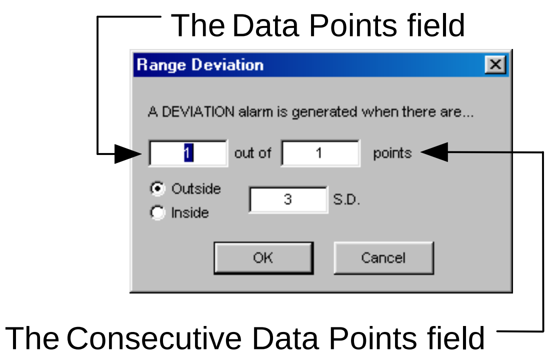


Figure 61 – The Range Deviation dialog window

The values you enter in the Data Points, and Consecutive Data Points field must be:

1. Integers

2. Greater-than 0 and less-than 1,000,001

The value you enter in the … S.D. field must be:

1. Floating point number
2. Greater-than 0

As an example; if you wanted a Range Deviation alarm to be generated when 3 Data Points out of 5 Consecutive Data Points outside 1 Standard Deviation, the Range Deviation dialog window will look like Figure 62.

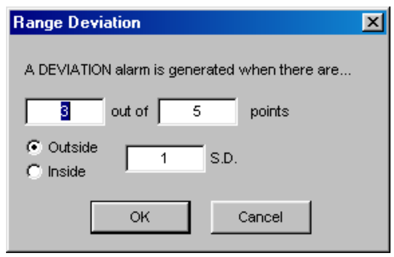


Figure 62 – The Range Deviation dialog window

Enter 3 in the Data Points field.
Enter 5 in the Consecutive Data Points field.
Leave the Outside option selected.
Enter 1 in the … S.D. field.
Click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 63, with the values you entered in the Range Deviation dialog window appearing in the Active Alarms listbox.

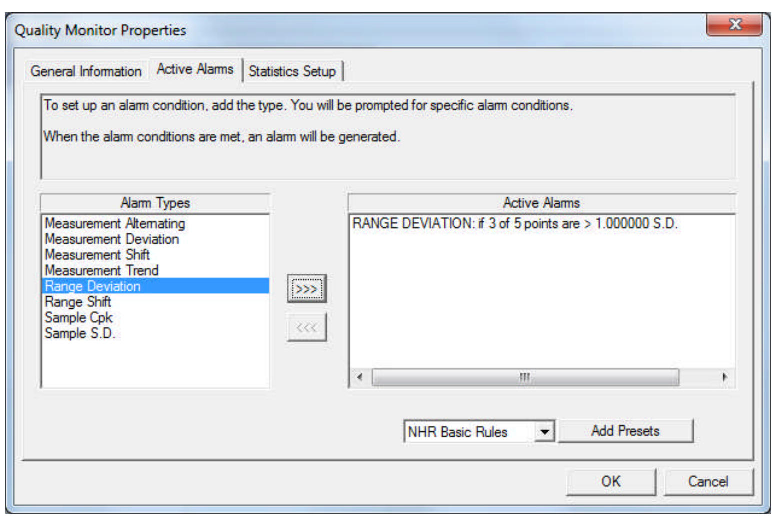


Figure 63 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Test Parameters dialog window -

Click the OK button.

4.6 The Data Point Range Shift alarm

A Data Point consists of at least one Measurement, but usually many. The Data Point Range is the difference in between the highest and lowest Measurement in a Data Point; therefore a Data Point containing a single Measurement is meaningless for this Active Alarm.

The alarm trigger -

This alarm will be triggered when a set number of Data Points, in a set of Continuous Data Points are Inside/Outside the set value of Standard Deviation. Figure 64 shows an example.

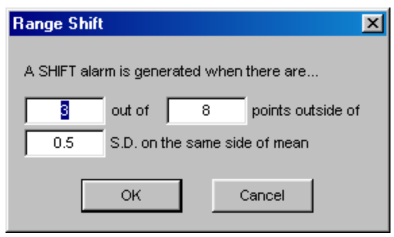


Figure 64 – The Range Deviation dialog window

Figure 65 shows the QM Alarm dialog window that opens when the values in Figure 64 are used.

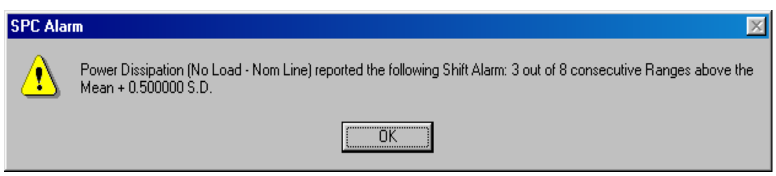


Figure 65 – The QM Alarm (Range Shift) dialog window

When this Active Alarm is generated with the values in Figure 64, the close-up of the Measurement's Control Chart (Range (R)) graph (see The Control Chart graph & image filename, page 28) for that Measurement will appear similar to Figure 66.

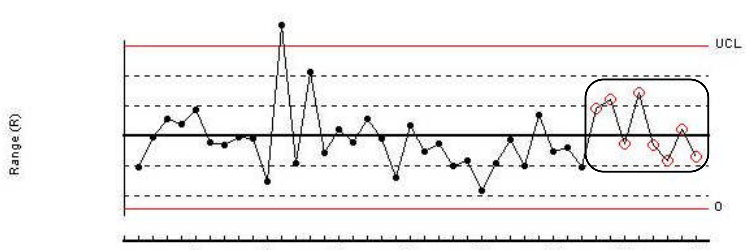


Figure 66 – The Range Shift Control Chart (Range (R))

Adding the Data Point Range Shift alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Range Shift alarm to:

Open the QM Properties dialog window (Active Alarms tab), Figure 67 – instructions on page 77.

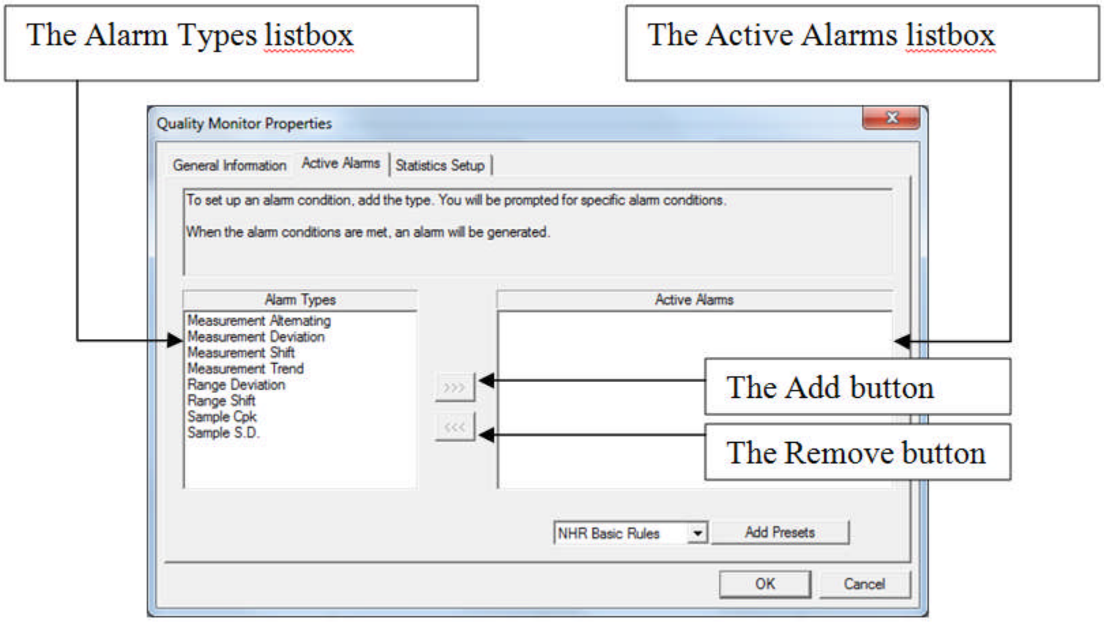


Figure 67 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox -

Select, by single clicking, the Range Shift alarm – the Add button becomes active.
Click the Add button – the default Range Shift dialog window, Figure 61, opens.

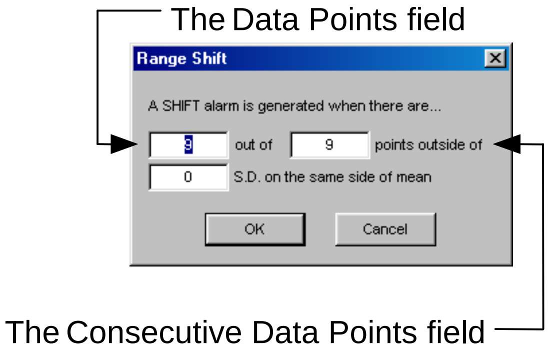


Figure 68 – The Data Point Range Shift dialog window

The values you enter in the Data Points, and Consecutive Data Points field must be:

1. Integers
2. Greater-than 0 and less-than 1,000,001

The value you enter in the … S.D. on the same side of mean field must be:

1. Floating-point numbers
2. Greater-than 0

As an example; if you wanted a Range Deviation alarm to be generated when 3 Data Points out of 8 Consecutive Data Points outside 0.5 Standard Deviation, the Range Deviation dialog window will look like Figure 69.

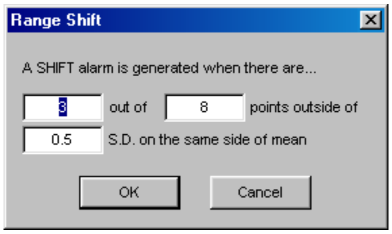


Figure 69 – The Range Deviation dialog window

Enter 3 in the Data Points field.
Enter 8 in the Consecutive Data Points field.
Enter 0.5 in the … S.D. on the same side of mean field.
Click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 70, with the values you entered in the Range Deviation dialog window appearing in the Active Alarms listbox.

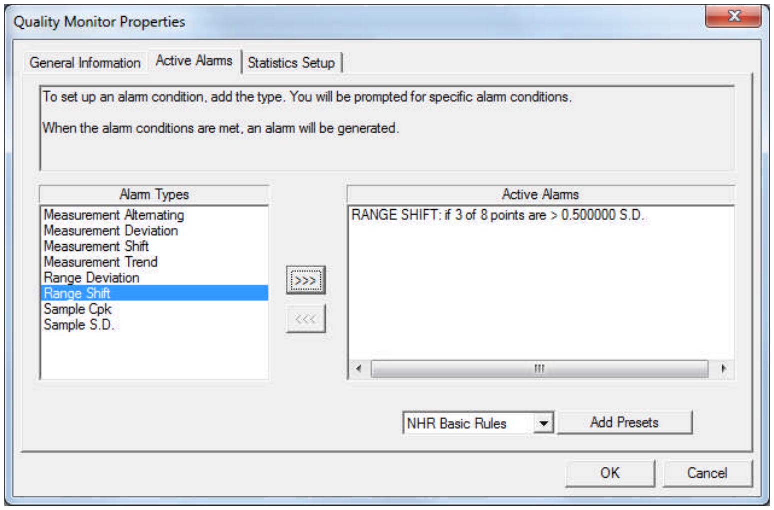


Figure 70 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Test Parameters dialog window click the OK button.

4.7 The Sample Cpk alarm

The alarm trigger -

This alarm will be triggered when the Sample Cpk value goes above the Maximum Cpk, or below the Minimum Cpk, Figure 71 shows an example.

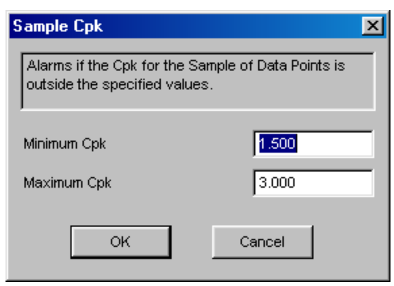


Figure 71 – The Sample Cpk dialog window

Figure 72 shows the QM Alarm dialog window that opens when the values in Figure 71 are used.

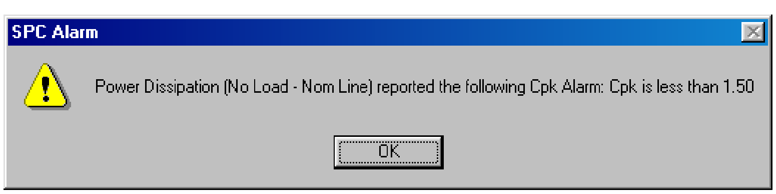


Figure 72 – The QM Alarm dialog window

This Active Alarm is a statistical alarm, when it is generated no Data Points are highlighted in the measurement's Control Chart.

Adding the Sample Cpk alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Sample Cpk alarm to:
Open the QM Properties dialog window (Active Alarms tab), Figure 53 – instructions on page 77

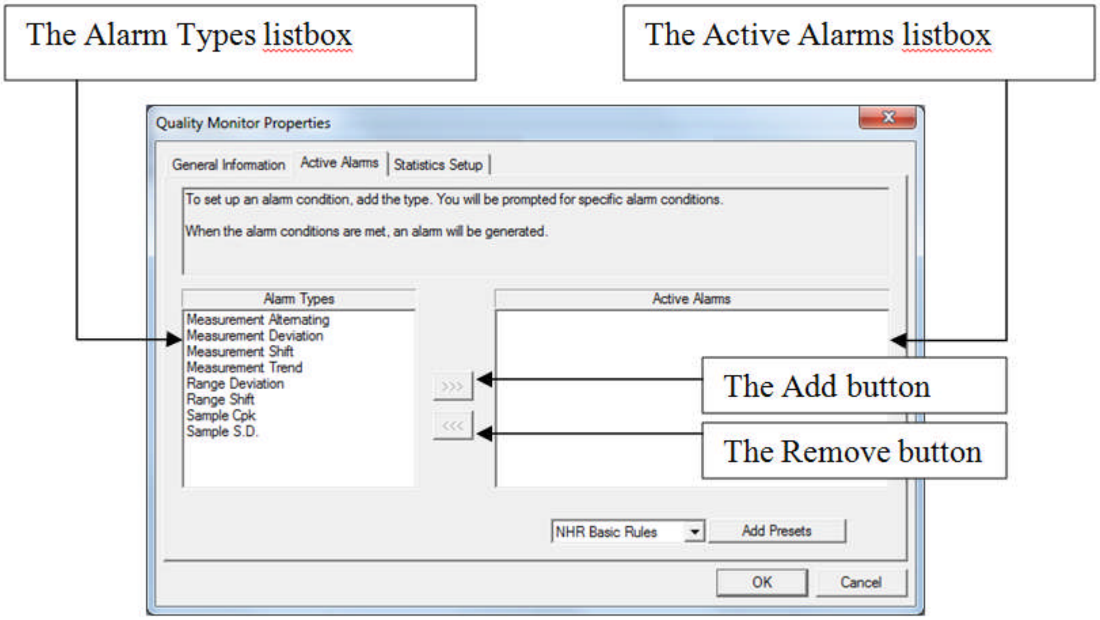


Figure 73 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox -

Select, by single clicking, the Sample Cpk alarm – the Add button becomes active.
Click the Add button – the default Sample Cpk dialog window, Figure 74, opens.

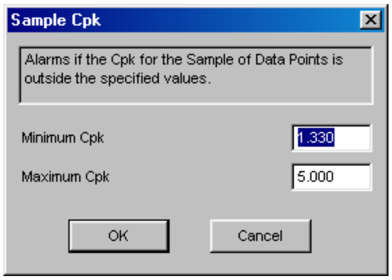


Figure 74 – The Sample Cpk dialog window

The value you enter in the Minimum Cpk field must be:

1. A floating-point number

2. Greater-than 0

The value you enter in the Maximum Cpk field must be:

1. A floating-point number
2. Greater-than the value entered in the Minimum Cpk field

As an example; if you wanted a Sample Cpk alarm to be generated when the Minimum Cpk is 1.5, and the Maximum Cpk is 3, your Sample Cpk dialog window will look like Figure 75.

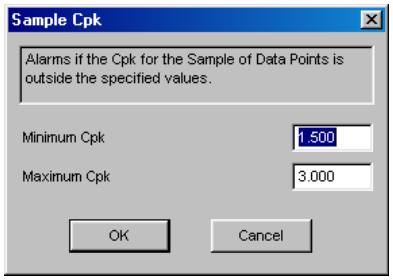


Figure 75 – The Sample Cpk dialog window

Enter 1.5 in the Minimum Cpk field.
Enter 3 in the Maximum Cpk field.
Click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 76; with the values you entered in the Sample Cpk dialog window appearing in the Active Alarms listbox.

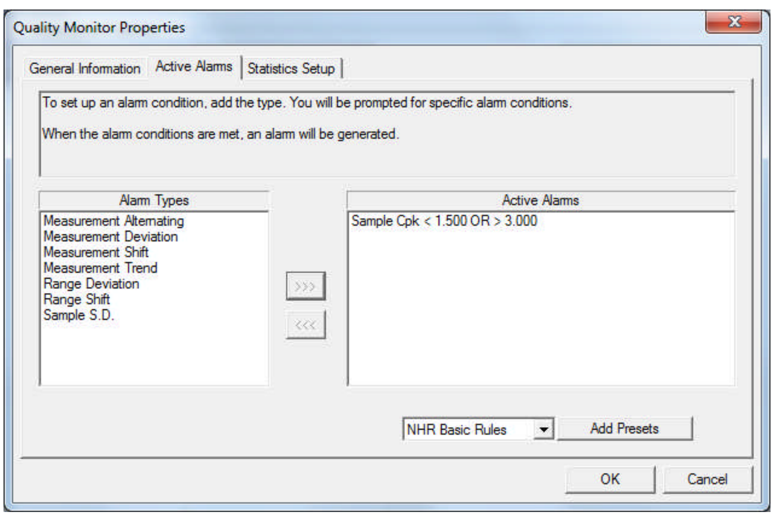


Figure 76 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Multi-Measurement Test Parameters dialog window click the OK button.

4.8 The Sample S.D. alarm

The alarm trigger -

This alarm will be triggered when the Sample Standard Deviation value goes beyond the value entered for Maximum Standard Deviation. Figure 77 shows an example.

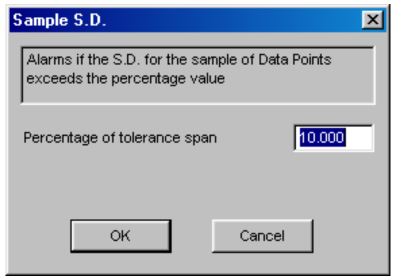


Figure 77 – The Sample S.D. dialog window

Figure 78 shows the QM Alarm dialog window that opens when the value in Figure 77 is used.

Figure 78 – The QM Alarm dialog window

This Active Alarm is a statistical alarm, when it is generated no Data Points are highlighted in the Measurement's Control Chart.

Adding the Sample S.D. alarm -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the Sample S.D. alarm to:

Open the QM Properties dialog window (Active Alarms tab), Figure 79 – instructions on page 77.

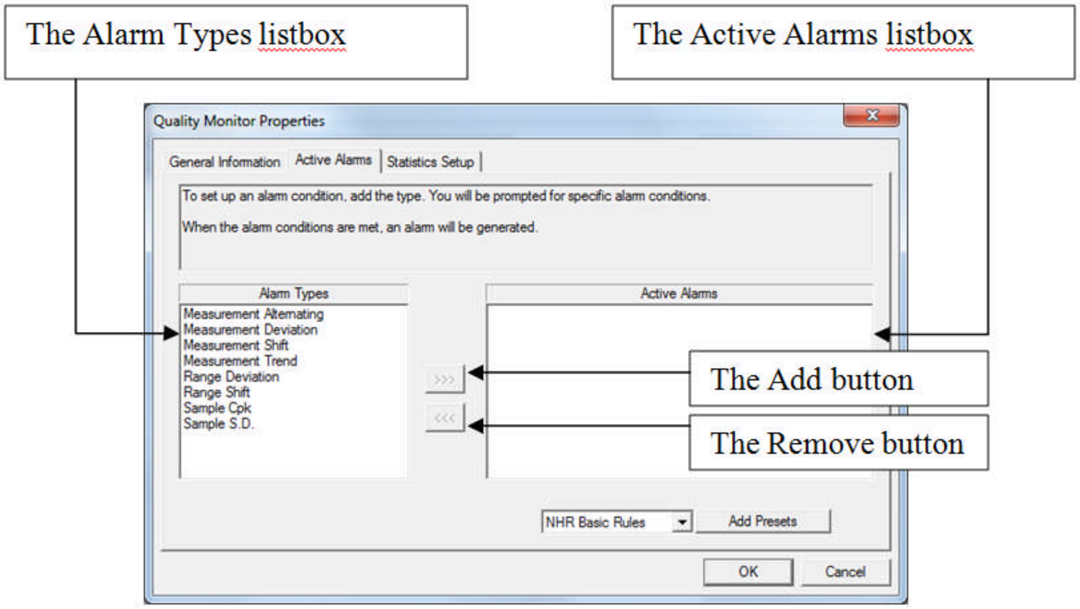


Figure 79 – The QM Properties dialog window (Active Alarms tab)

In the Alarm Types listbox:

Select, by single clicking, the Sample S.D. alarm – the Add button becomes active.
Click the Add button – the Sample S.D. dialog window, Figure 80, opens.

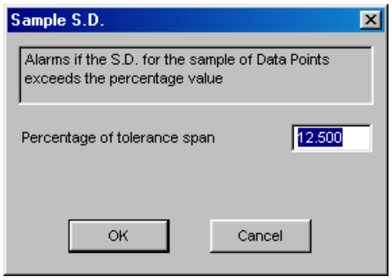


Figure 80 – The Sample S.D. dialog window

The value you enter in the Percentage of tolerance span… field must be:

1. A floating-point number
2. Greater-than 0

As an example; if you wanted a Sample S.D. alarm to be generated when the Sample S.D. exceeds 10% of the Tolerance Span (see page 87) your Sample S.D. dialog window will look like Figure 81.

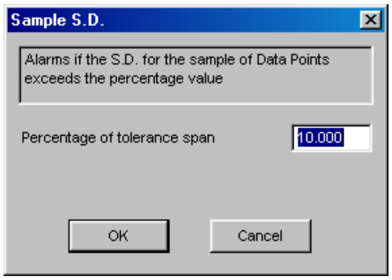


Figure 81 – The Sample S.D. dialog window

Enter 10 in the Percentage of tolerance span… field click the OK button.

The QM Properties dialog window (Active Alarms tab) now looks like, Figure 82, with the values you entered in the Sample S.D. dialog window appearing in the Active Alarms listbox.

If this Measurement is measuring voltage, and the Tolerance Span on this voltage is calculated as being 1 Volt, and you enter 10% in the Percentage of tolerance span… field then the value used for its Maximum Standard Deviation will be 0.1 Volt.

See also:

The Tolerance Span (page 87)

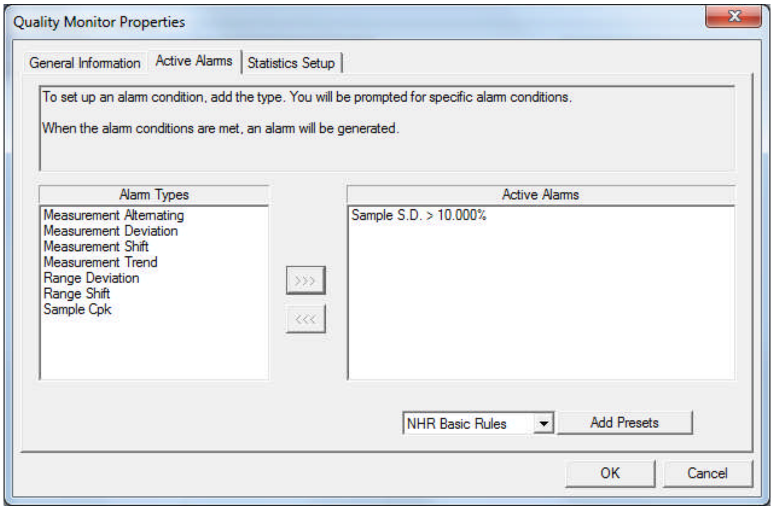


Figure 82 – The QM Properties dialog window (Active Alarms tab)

Click the OK button.

In the Test Parameters dialog window click the OK button.

4.9 Adding the preset Active Alarms

Adding the NHR Basic Rules Active Alarms -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the preset NHR Basic Rules Active Alarms:
Open the QM Properties dialog window (Active Alarms tab), Figure 83 – instructions on page 77.

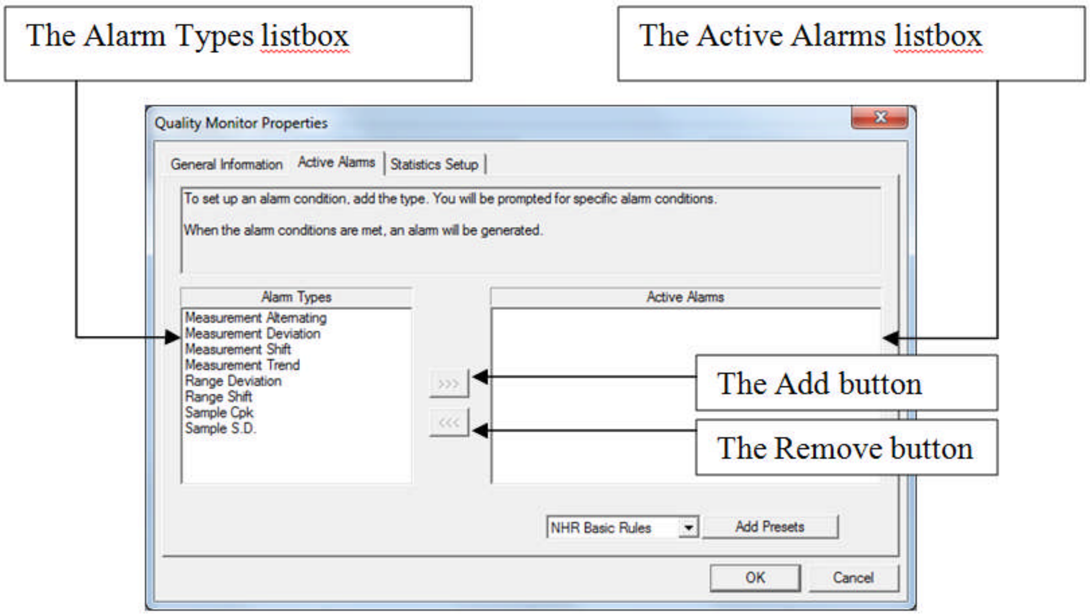


Figure 83 – The QM Properties dialog window (Active Alarms tab)

In the Rules dropdown:

Select the NHR Basic Rules.
Click the Add Presets button.

The set of NHR Basic Rules Active Alarms are added to the Active Alarm listbox of the QM Properties dialog window (Active Alarms tab), Figure 84.

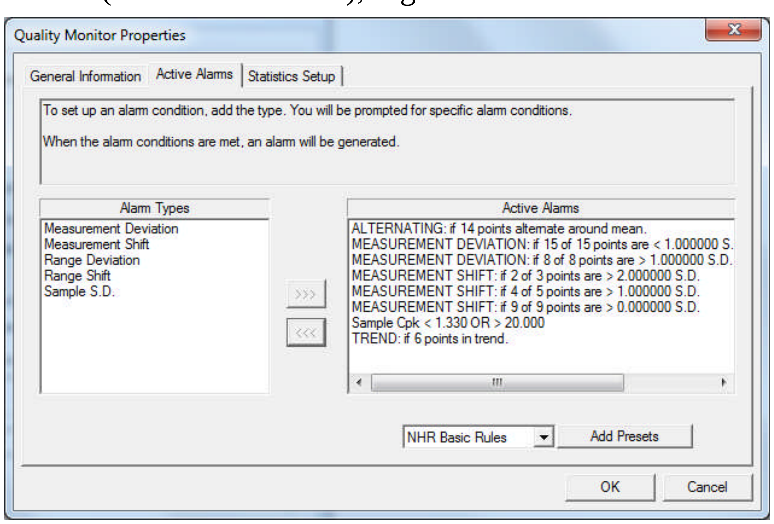


Figure 84 – The QM Properties dialog window (Active Alarms tab)

Adding the Western Electric Rules Active Alarms -

You can only add Active Alarms to a Measurement enabled to collect QM data. In this example, I'm going to assume that your Measurement is already enabled to collect QM data, if not, see:

Configuring a Measurement to collect QM data (page 14).

For the Measurement you want to add the preset Western Electric Active Alarms:

Open the QM Properties dialog window (Active Alarms tab), Figure 83 – instructions on page 77.

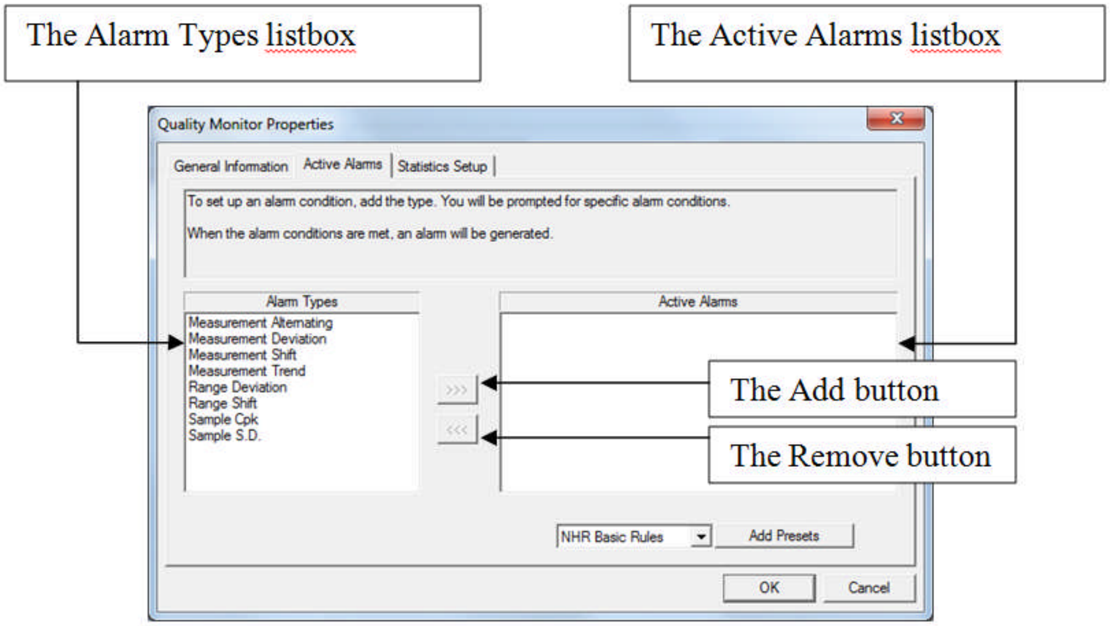


Figure 85 – The QM Properties dialog window (Active Alarms tab)

In the Rules dropdown:

Select the Western Electric Rules.
Click the Add Presets button.

The set of Western Electric Rules Active Alarms are added to the Active Alarm listbox of the QM Properties dialog window (Active Alarms tab), Figure 86.

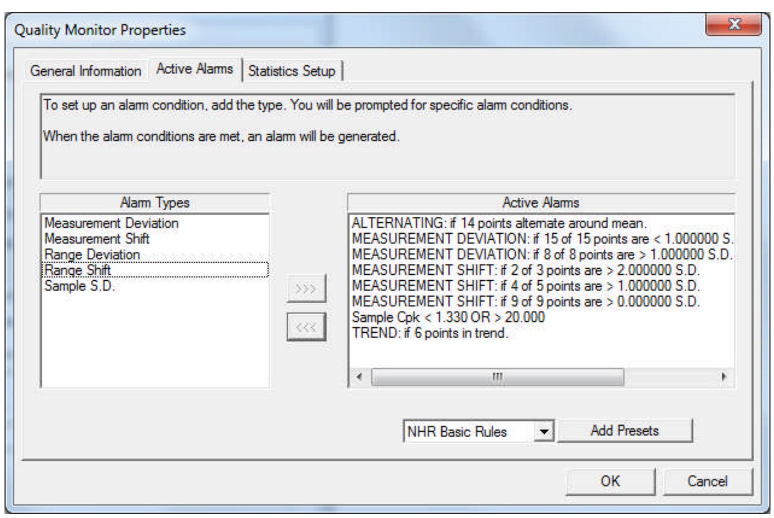


Figure 86 – The QM Properties dialog window (Active Alarms tab)

5. THE QM ACTIVE ALARMS (BASIC EDITION ONLY)

The QM Properties dialog window (Active Alarms tab) shown in Figure 87, is only available in the Basic Edition of Quality Monitor.

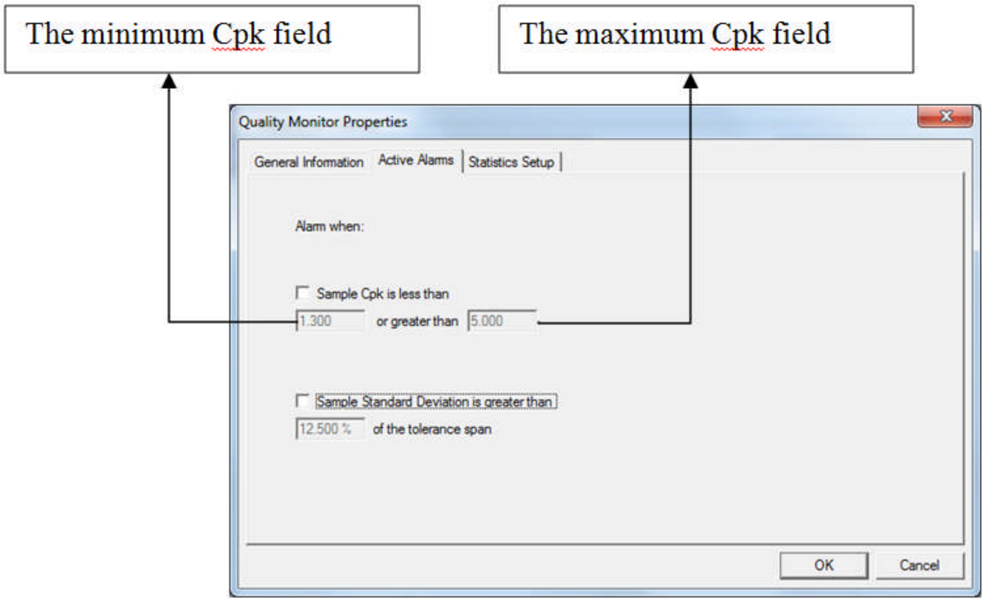


Figure 87 – The QM Properties dialog window (Active Alarms tab)

5.1 The Sample Cpk alarm

The alarm trigger -

This alarm will be triggered when the Sample Cpk is less than checkbox is checked, and the Sample Cpk value goes below the value entered in the Minimum Cpk field, or above the value entered in the Maximum Cpk field, Figure 88 shows an example.

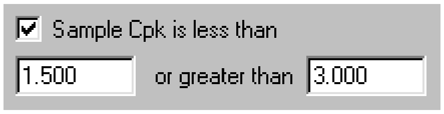


Figure 88 – The Sample Cpk alarm fields (close up)

Figure 89 shows the QM Alarm dialog window that opens when the values in Figure 88 are used.

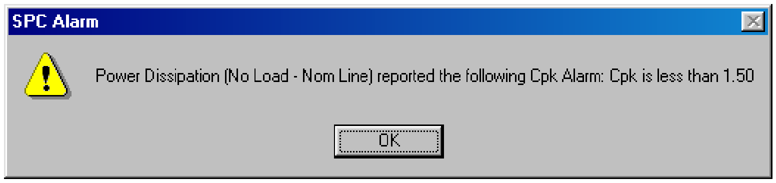


Figure 89 – The QM Alarm dialog window

Adding the Sample Cpk alarm -

Open the QM Properties dialog window (Active Alarms tab), Figure 87 – instructions on page 77.

Check the Sample Cpk is less than checkbox.
Enter a value for the Minimum Cpk in the Minimum Cpk field.
Enter a value for the Maximum Cpk in the Maximum Cpk field.
Click the OK button.

In the Test Routine's Test Parameter dialog window click the OK button.

5.2 The Sample Standard Deviation alarm

The alarm trigger -

This alarm will be triggered when the Sample Standard Deviation value goes beyond the value entered in the … of the tolerance span field, Figure 90 shows an example.

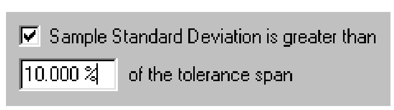


Figure 90 – The Sample Standard Deviation alarm field (close up)

If this Measurement is measuring voltage, and the Tolerance Span on this voltage is calculated as being 1 Volt, and you enter 10% in the … of the tolerance span field, then the value used for its Maximum Standard Deviation will be 0.1 Volt.

See also:

The Tolerance Span (page 87)

Figure 91 shows the QM Alarm dialog window that opens when the value in Figure 90 is used.

Figure 91 – The QM Alarm dialog window

Adding the Sample Standard Deviation alarm -

Open the QM Properties dialog window (Active Alarms tab), Figure 87 – instructions on page 77.

Check the Sample Standard Deviation is greater than checkbox.
Enter a value in the … of the tolerance span field.
Click the OK button.

In the Test Routine's Test Parameter dialog window click the OK button.

5.3 Opening the QM Properties dialog window (Active Alarms tab)

For this example, I'm going to open the QM Properties dialog window (Active Alarms tab) of the Multi-Measurement Test Routine in Test Step 3 of the Test Program shown in Figure 92.

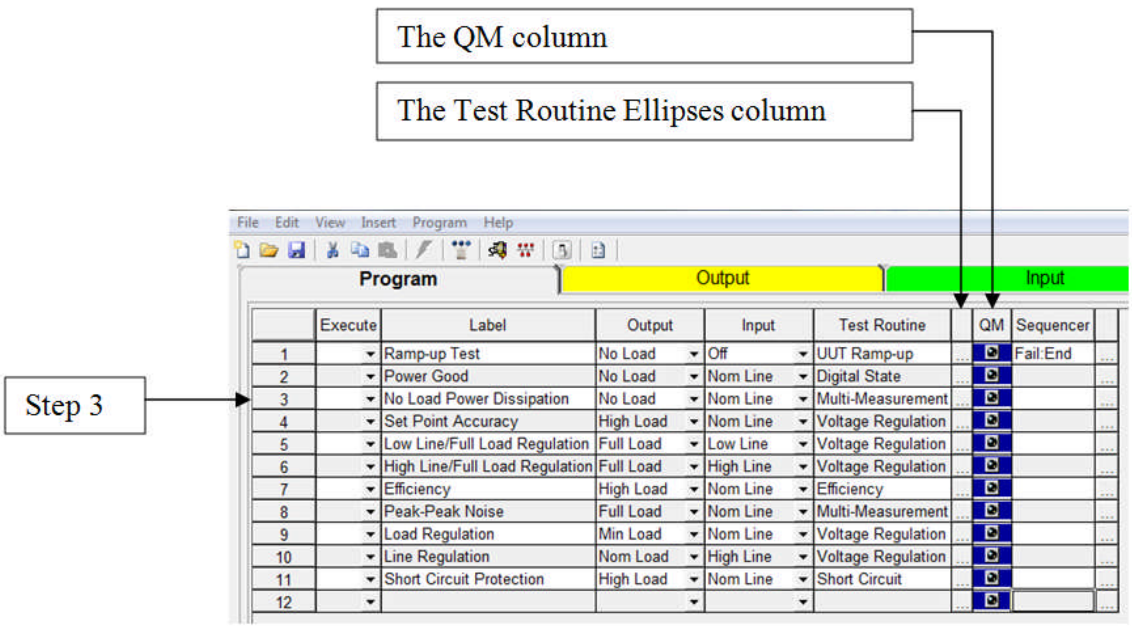


Figure 92 – The EDIT/Program tab

In the EDIT/Program tab, Figure 92 -

Click the Test Routine Ellipses button of Test Step 3 – the Multi-Measurement Test Parameter dialog window, Figure 93, opens.

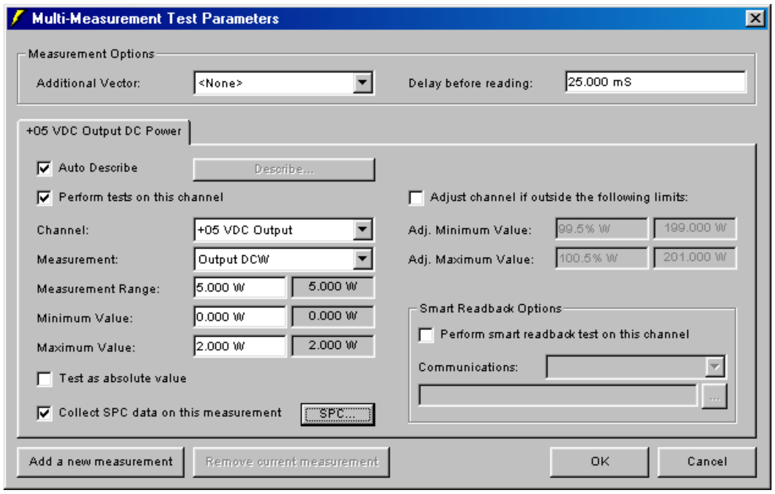


Figure 93 – The Multi-Measurement Test Parameter dialog window

All Test Parameter dialog windows are opened following the same method.

Click the QM… button – the QM Properties dialog window (General Information tab), Figure 94, opens.

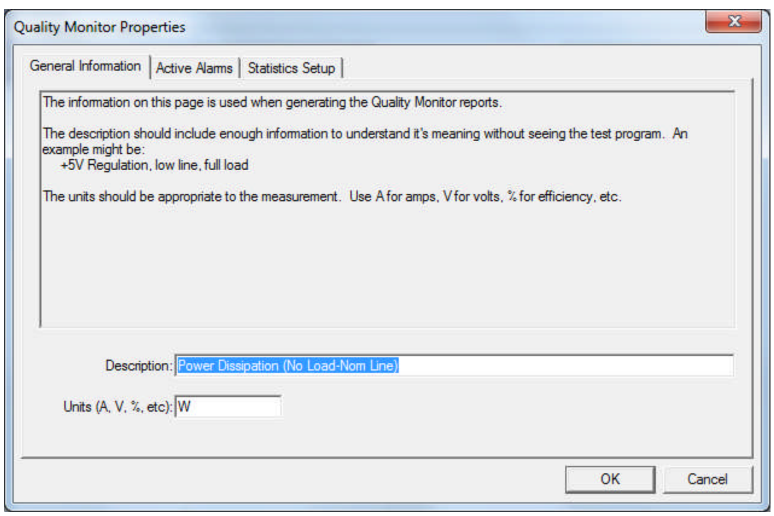


Figure 94 – The QM Properties dialog window (General Information tab)

In the QM Properties dialog window (General Information tab) -

Click the Active Alarms tab – the QM Properties dialog window (Active Alarms tab) opens.

If you have the Advanced Edition of Quality Monitor then the QM Properties dialog window (Active Alarms tab) in Figure 95 will open. If you have the Basic Edition of Quality Monitor then the QM Properties dialog window (Active Alarms tab) in Figure 96 will open.

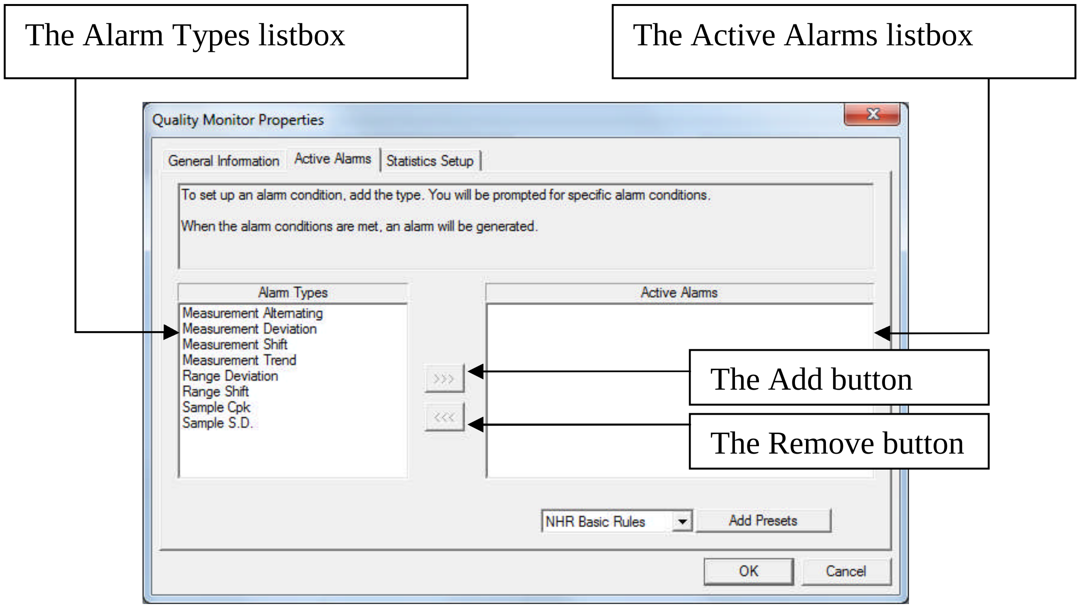


Figure 95 – The QM Properties dialog window (Active Alarms tab, Advanced Edition)

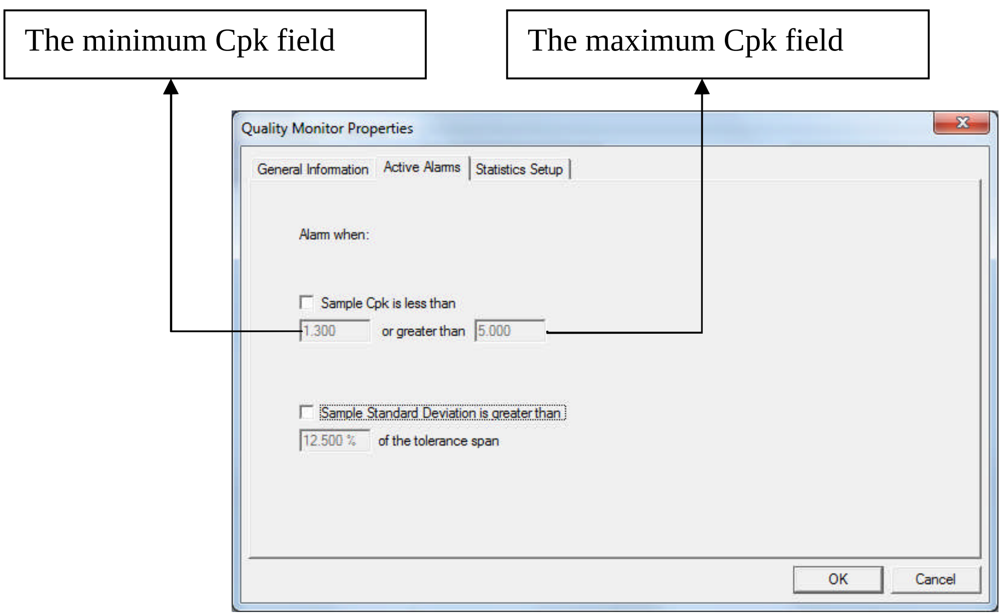


Figure 96 – The QM Properties dialog window (Active Alarms tab, Basic Edition)

6. THE QM PROPERTIES DIALOG WINDOW (STATISTICS SETUP TAB)

6.1 Nominal, Minimum, Maximum values, and specifications

As a standard example for this section, I will be using a 50 Volt DC output, with a tolerance of ± 1%.

When I created the Output Container for this example output, I named it +50 VDC Output, and entered 50 V in the Nominal Voltage field of the +50 VDC Output Properties dialog window (Description tab), Figure 97.

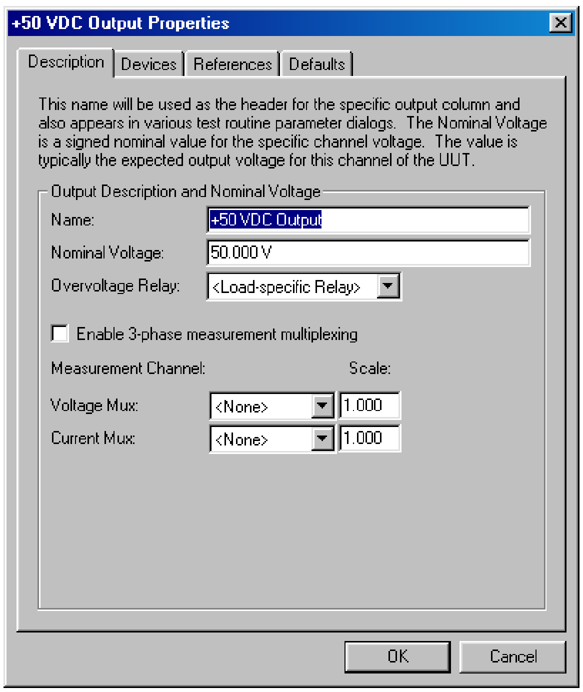


Figure 97 – The +50 VDC Output Properties dialog window (Description tab)

Then I added a Test Routine to my Test Program to measure this +50 Volt DC Output. In the Minimum Value field of the Test Routine's Test Parameter dialog window, Figure 98, I entered 99%, and in the Maximum Value field I entered 101% (both values are based on the specified tolerance for this output).

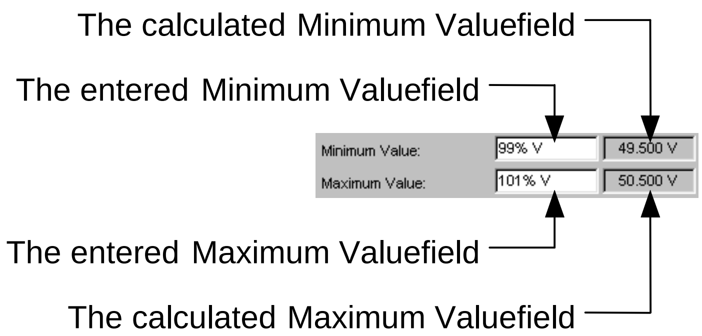


Figure 98 – A Test Routine's Test Parameter dialog window (close up view)

Beside the Minimum Value, and Maximum Value fields, Figure 98, are the calculated Minimum Value, and calculated Maximum Value fields. It is these calculated fields that are referred to from the Extremes frame, of the QM Properties dialog window (Statistics tab) Figure 99.

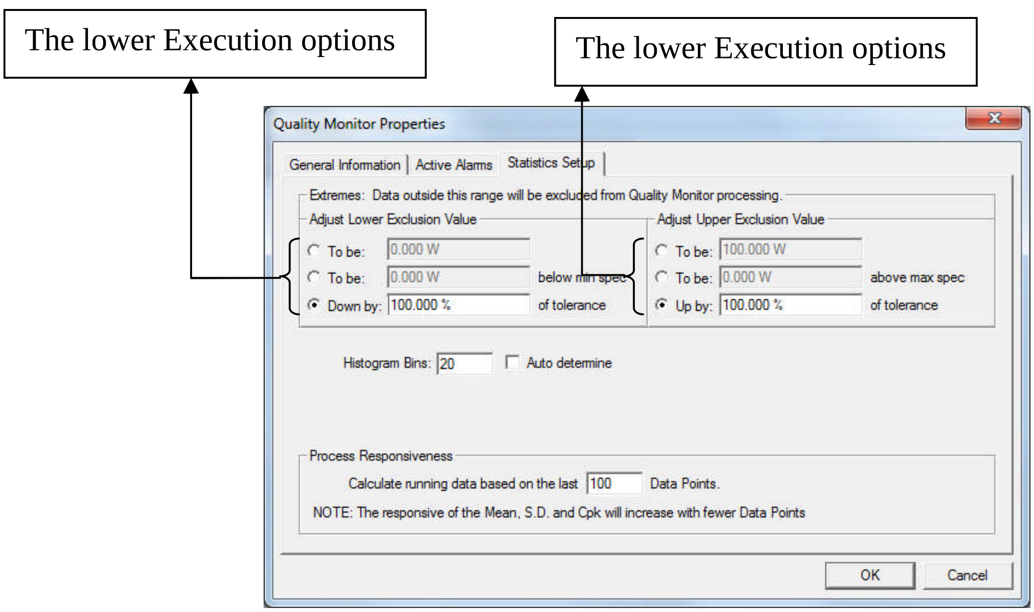


Figure 99 – The QM Properties dialog window (Statistics Setup tab)

6.2 The Extremes frame

In the Extremes frame, you have the ability to set/adjust the Lower Exclusion Value, and the Upper Exclusion Value. All measurements below the Lower Exclusion Value, and above the Upper Exclusion Value are categorized as Extreme measurements and will be excluded from the QM report.

What causes Extreme measurements?

Any measurement taken by a Test Routine may be so extremely high, or so extremely low that it could only be produced by a faulty UUT, or faulty fixturing.

If these extreme measurements are used, they will distort your QM data making it un-representative of your manufacturing process. This is why you'd want to ignore any extreme measurements.

It's only bad data that's being excluded from the QM report, any bad UUTs tested by *em***Power** ® will still be failed by *em***Power** ®.

What is an extreme Measurement?

In general, it is any Measurement outside a range that you specify.

Obviously, any Measurement taken from a UUT by a Test Routine should be within the specification of the UUT.

Referring to the standard example output above, any measured voltage between 49.50 Volts & 50.50 Volts would be within specifications.

For example, if a Measurement measured:

- 49.60 Volts (a good value) you'd obviously want Quality Monitor to include the measured value

- 50.40 Volts (a good value) you'd obviously want Quality Monitor to include the measured value

- 0 Volts (a bad value) you'd obviously want Quality Monitor to exclude the measured value

- 100 Volts (a bad value) you'd obviously want Quality Monitor to exclude the measured value

The difficulty comes when the measured voltage is close to the specifications.

Question: **Should you exclude measured voltages of 49.40 Volts, or 50.60 Volts from the QM data?**

Answer: **Perhaps not, but only you can make that decision.**

The exclusion rule-of-thumb

The exclusion rule-of-thumb is to double your specifications (to ± 2% in our standard example) and exclude measurements that fall outside that range (49.00 Volts & 51.00 Volts in this example).

6.3 Setting/Adjusting the Lower Exclusion Value, and the Upper Exclusion Value

Below is a close up view of the Minimum Value, and Maximum Value fields of a Multi-Measurement Test Program dialog window.

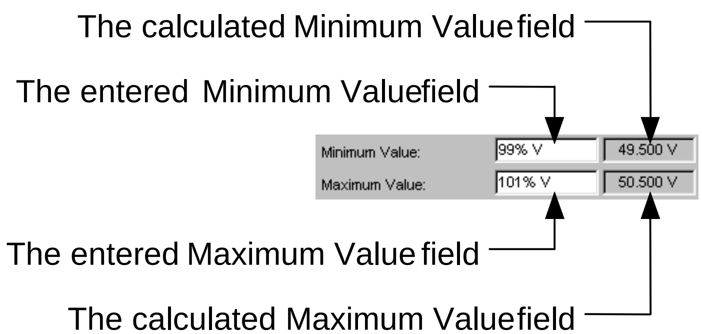


Figure 100 – A Test Routine's Test Parameter dialog window (close up view)

The values in the calculated Minimum Value, and the calculated Maximum Value fields of the Test Routine's Test Program dialog window, Figure 100, are the values referred to from the Extremes frame of the QM Properties dialog window (Statistics Setup tab), Figure 101.

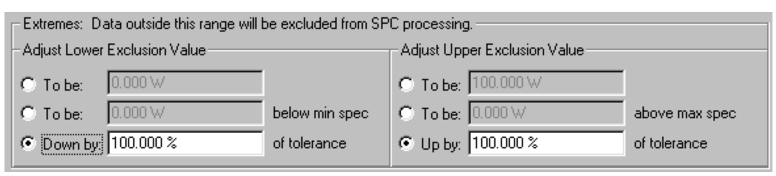


Figure 101 – The Extremes fame (close up view)

Option 1 – Setting the Lower Exclusion Value to be a hard-value

In the Adjust Lower Exclusion Value frame, Figure 101; checking the To be: … option means that the value you enter in the To be: … field will be used as the actual Lower Exclusion Value. This overrides all other values.

If you enter 49 in the To be: … field, the actual Lower Exclusion Value will be 49 Volts, and all measurements less-than 49 Volts will be excluded from the QM data.

An example – Setting the Lower Exclusion Value (noise)

Suppose your Test Routine is measuring noise on a UUT's output. Obviously a measured noise of 0 or less (that being impossible), could only be caused by some fault.

For this example you would choose the To be: … option, and enter 0 in the field (or other reasonable value). Any measured noise less-than 0 would be excluded from the QM data.

For this example, the rule-of-thumb would work well for setting the Upper Exclusion Value.

Option 1 – Setting the Upper Exclusion Value to be a hard-value

In the Adjust Upper Exclusion Value frame, Figure 101; checking the To be: … option means that the value you enter in the To be: … field will used as the actual Upper Exclusion Value. This overrides all other values.

If you enter 51 in the To be: … field, the actual Upper Exclusion Value will be 51 Volts, and all measurements greater-than 51 Volts will be excluded from the QM data.

Hard-value example (efficiency)

Suppose your Test Routine is measuring the efficiency of a UUT. Obviously a measured efficiency of 100% or above could only be caused by some fault.

For this example you would choose the To be: … option, and enter 100% in the field (or other reasonable value). Any measured efficiency greater-than 100% would be excluded from the QM data.

For this example, the rule-of-thumb would work well for setting the Lower Exclusion Value.

Option 2 – Adjust Lower Exclusion Value by subtracting a hard-value

In the Adjust Lower Exclusion Value frame; checking the To be: … below min spec option means that the Lower Exclusion Value will be calculated by subtracting the entered hard-value from the calculated Minimum Value field in the Test Routine's Test Parameter dialog window, Figure 102.

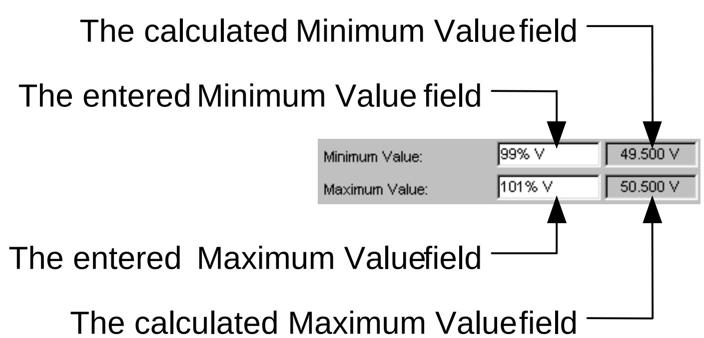


Figure 102 – A Test Routine's Test Parameter dialog window (close up view)

The calculation is:

Calculated Minimum Value + hard-value = Lower Exclusion Value.

Using the standard example, let's assume that I want to adjust the Lower Exclusion Value downward by 1 Volt, so that all measured voltages more than 1 Volt below the calculated Minimum Value will be excluded from the QM data.

In the Adjust Lower Exclusion Value fame -

1. Choose the To be: … below min spec option

2. Enter 1 in the field

Plugging in the values from our standard example, gives us:

Calculated Minimum Value (49.50 Volts) – hard-value (1 Volt) = Lower Exclusion Value (48.50 Volts).

The adjusted Lower Exclusion Value is now 48.50 Volts, and all measurements below this adjusted Lower Exclusion Value will be excluded from the QM data.

Option 2 – Adjust Upper Exclusion Value by adding a hard-value

In the Adjust Upper Exclusion Value frame; checking the To be: … above max spec option means that the Upper Exclusion Value will be calculated by adding the entered hard-value to the calculated Maximum Value field in the Test Routine's Test Parameter dialog window, Figure 102.

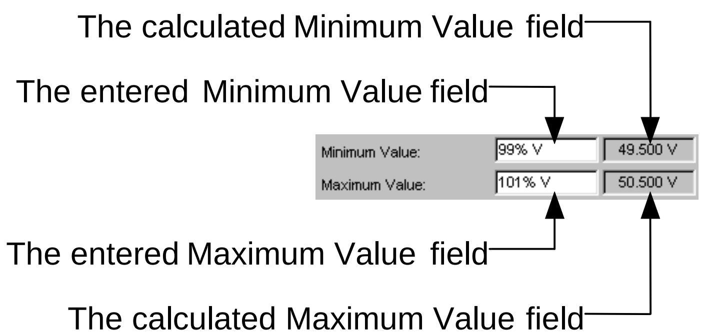


Figure 103 – A Test Routine's Test Parameter dialog window (close up view)

The calculation is:

Calculated Maximum Value – hard-value = Upper Exclusion Value

Using the standard example, let's assume that I want to adjust the Upper Exclusion Value upward by 1 Volt, so that all measured voltages more than 1 Volt above the calculated Maximum Value will be excluded from the QM data.

In the Adjust Upper Exclusion Value frame:

1. Choose the To be: … above max spec option

2. Enter 1 in the field

Plugging in the values from our standard example, gives us:

Calculated Maximum Value (50.50 Volts) + hard-value (1 Volt) = Upper Exclusion Value (51.50 Volts)

The adjusted Upper Exclusion Value is now 51.50 Volts, and all measurements above this adjusted above Exclusion Value will be excluded from the QM data.

The Tolerance Span

In our standard example, a: 50 Volt DC output, with a tolerance of ± 1%, has a Tolerance Span of 1 Volt (2% of 50 Volts = 1 Volt).

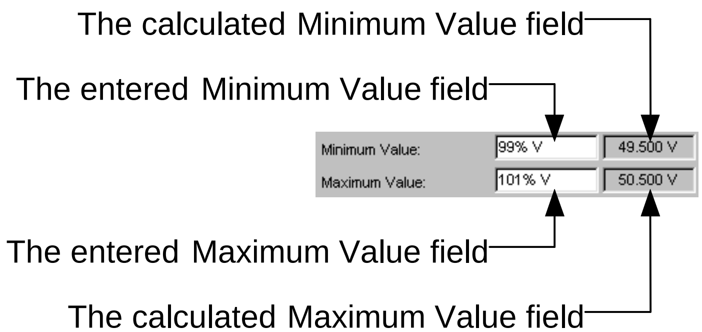


Figure 104 – A Test Routine's Test Parameter dialog window (close up view)

The Quality Monitor calculates the Tolerance Span, based on the difference between the calculated Minimum Value field, and the calculated Maximum Value field in the Test Routine's Test Parameter dialog window, Figure 104.

calculated Maximum Value – calculated Minimum Value = Tolerance Span

Plugging in the values from our standard example, gives us:

calculated Maximum Value (50.50) – calculated Minimum Value (49.50) = Tolerance Span (1)

Option 3 – Adjust Lower Exclusion Value by a percentage of the Tolerance Span

In the Adjust Lower Exclusion Value frame; choosing the Down by: … of tolerance option allows you to adjust the Lower Exclusion Value downward by a percentage of the Tolerance Span.

Suppose we decided to adjust the Lower Exclusion Value by applying the Exclusion rule-of-thumb to the Lower Exclusion Value only. That is; adjust the Lower Exclusion Value downward by half (50%) of the Tolerance Span.

In the Adjust Lower Exclusion Value frame:

1. Choose the Down by: … of tolerance option
2. Enter 50 in the field

The Quality Monitor will then:

1. Calculate 50% of the Tolerance Span – (50% of 1 Volt = 0.5 Volt)
2. Adjust the Lower Exclusion Value by subtracting this 0.5 Volt from the calculated Minimum Value (49.50 Volts)

The adjusted Lower Exclusion Value is now 49.00 Volts, and all measurements below this adjusted Lower Exclusion Value will be excluded from the QM data.

Option 3 – Adjust Upper Exclusion Value by a percentage of the Tolerance Span

In the Adjust Upper Exclusion Value frame; choosing the Up by: … of tolerance option allows you to adjust the Upper Exclusion Value upward by a percentage of the Tolerance Span.

Suppose we decided to adjust the Upper Exclusion Value by applying the Exclusion rule-of-thumb to the Upper Exclusion Value only. That is; adjust the Upper Exclusion Value upward by half (50%) of the Tolerance Span.

In the Adjust Upper Exclusion Value frame;

1. Choose the Up by: … of tolerance option

2. Enter 50 in the field

The Quality Monitor will then:

1. Calculate 50% of the Tolerance Span – (50% of 1 Volt = 0.5 Volt)

2. Adjust the Upper Exclusion Value by adding this 0.5 Volt to the calculated Maximum Value (50.50 Volts)

The adjusted Lower Exclusion Value is now 51.00 Volts, and all measurements above this adjusted Upper Exclusion Value will be excluded from the QM data.

6.4 The Histogram Bins field & the Auto determine checkbox

In the Histogram Bins field, you enter the number of bins that you want Quality Monitor to use for collecting QM data. These Histogram Bins are all created between the calculated Minimum Value, and the calculated Maximum Value.

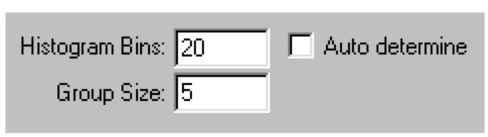


Figure 105 – The Histogram Bins field & Auto determine checkbox (close up)

In the Histogram Bins field, you must enter:

1. An integer value

2. Greater-than 0, and less-than 101 – Figure 106 shows the graph image created when 5 is entered in the Histogram Bins field

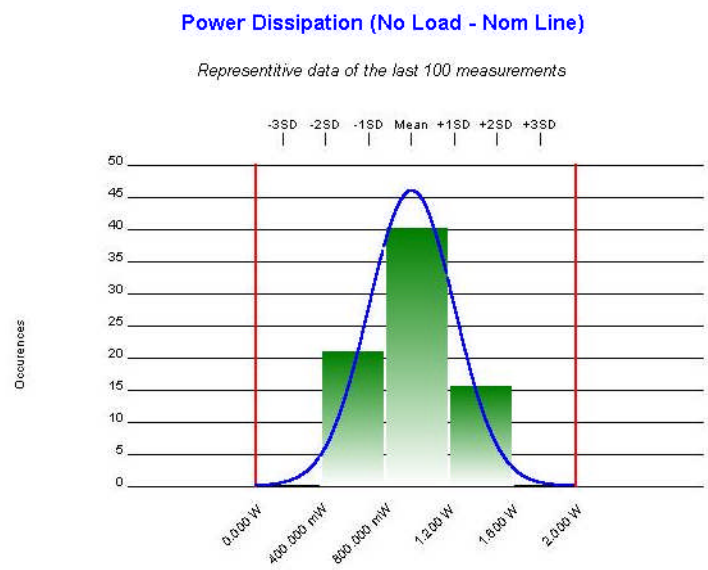


Figure 106 – Graph image with 5 Histogram Bins

or -

3. Check the Auto determine checkbox, allowing Quality Monitor to determine the number of Histogram Bins to use.

The Histogram Bins rule-of-thumb -

The rule-of-thumb for determining how many bins to use, when specifying this number yourself, is to use 3 bins per Standard Deviation + 1.

6.5 The Process Responsiveness frame

In the Calculate running data based on last … field, enter the number of Data Points you want to be used when calculating data for the QM reports.

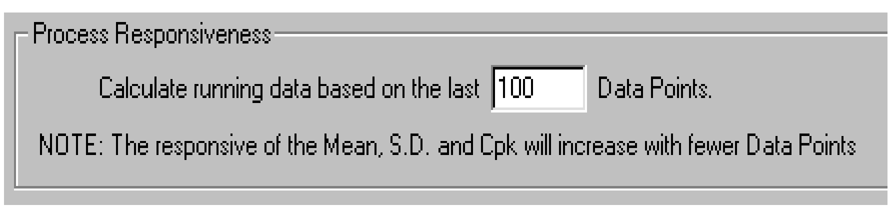


Figure 107 – The Process Responsiveness frame (close up)

6.6 Opening the QM Properties dialog window (Statistics Setup tab)

For this example, I'm going to open the QM Properties dialog window (Statistics Setup tab) of the Multi-Measurement Test Routine in Test Step 3 of the Test Program shown in Figure 108.

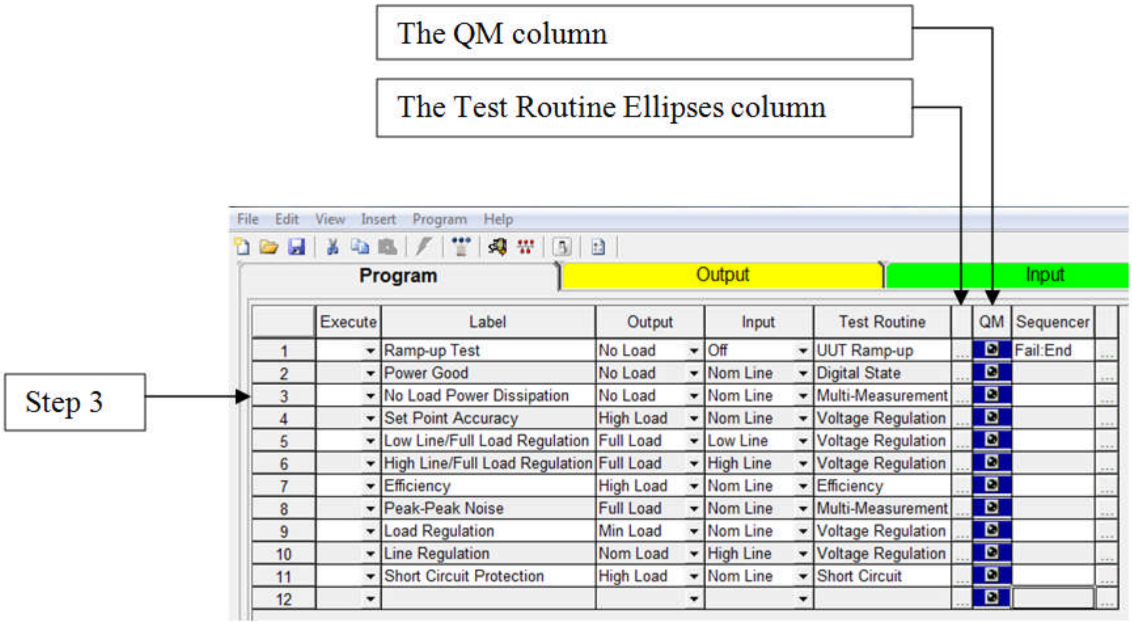


Figure 108 – The EDIT/Program tab

In the EDIT/Program tab, Figure 108:

Click the Test Routine Ellipses button of Test Step 3 – the Multi-Measurement Test Parameter dialog window, Figure 109, opens.

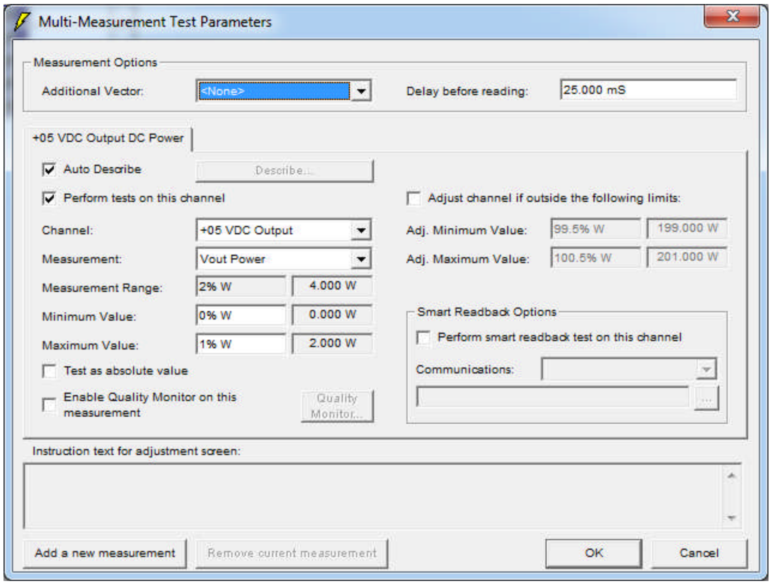


Figure 109 – The Multi-Measurement Test Parameter dialog window

All Test Parameter dialog windows are opened following the same method.
Click the QM… button – the QM Properties dialog window (General Information tab), Figure 110, opens.

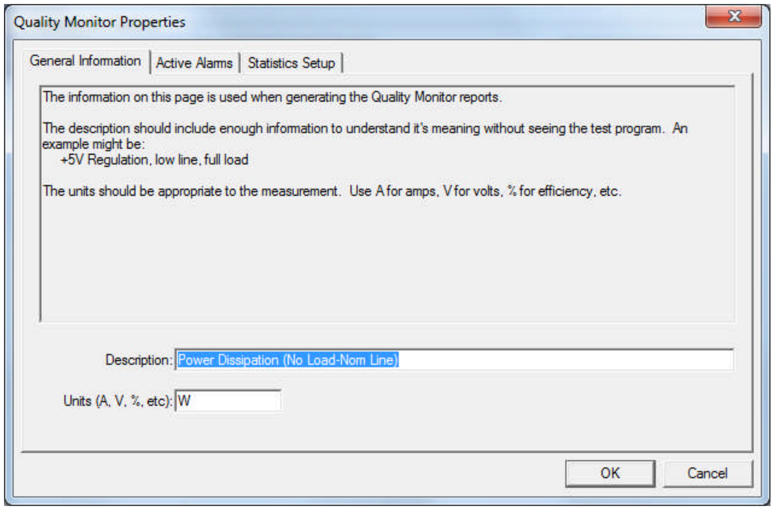


Figure 110 – The QM Properties dialog window (General Information tab)

In the QM Properties dialog window (General Information tab):

Click the Statistics Setup tab – the QM Properties dialog window (Statistics Setup tab), Figure 111, opens.

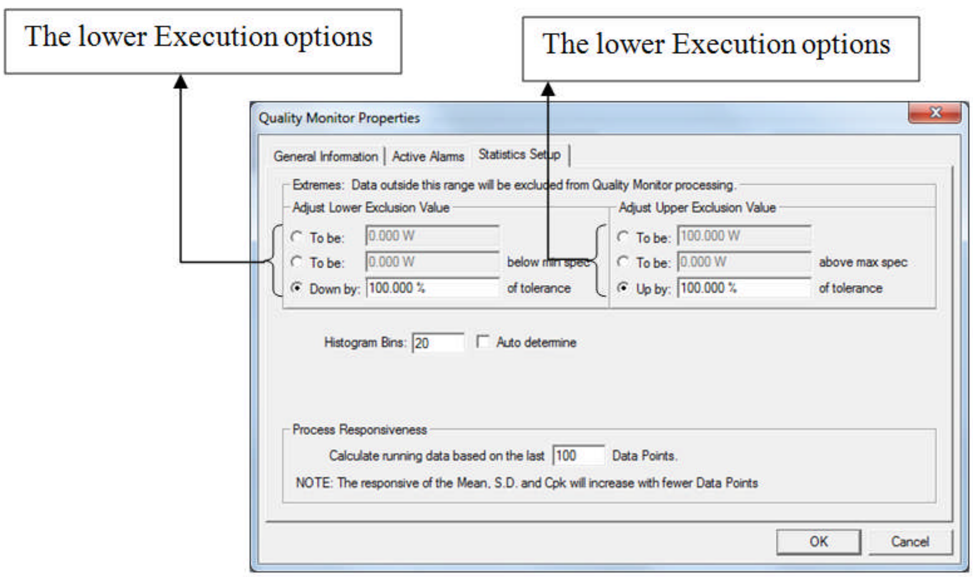


Figure 111 – The QM Properties dialog window (Statistics Setup tab)

7. THE QM CONFIGURATION DIALOG WINDOW (GENERAL TAB)

7.1 The Enable QM collection checkbox

With the Enable QM collection checkbox unchecked:

1. No QM data will be collected by your Measurement in spite of the fact that your Test Program has QM enabled Measurements

2. The fields and controls on the QM Configuration dialog window (General tab) are disabled

Enabling the collection of QM data -

Open the QM Configuration dialog window (General tab) – instructions on page 18.

Check the Enable QM collection checkbox – all the fields, and controls on the QM Configuration dialog window (General tab) are enabled.

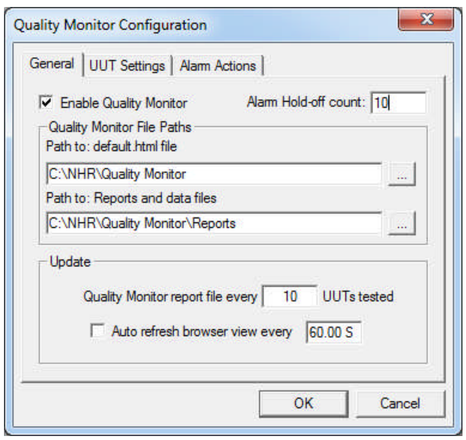


Figure 112 – The QM Configuration dialog window (General tab)

Click the OK button.

7.2 The Alarm Hold-off count field

Alarms are generated when a specified number of Data Points conform to a specified pattern. For example, the Measurement Shift alarm could be generated when 7 consecutive Data Points out of 10 are above 2 Standard Deviations.

If such a pattern exists, then the last Data Point will be the 7th out of the previous 10 Data Points, and the next Data Point is also likely to be the next 7th out of the next previous 10 Data Points, and so on. It is likely that every Data Point for a while will generate this same alarm, but one alarm on this Measurement is enough to alert you to a QM problem.

This being the case, you probably don't want to know about any alarms generated by the next few UUTs – this is what the Alarm Hold-off count field is for.

The value you enter in the Alarm Hold-off count field is a number of UUTs, and for that number of UUTs (following an alarm generation) alarms will not be generated. After those numbers of UUTs have been tested, alarms will begin to be generated normally.

Setting the Alarm Hold-off count -

Open the QM Configuration dialog window (General tab) – instructions on page 18.

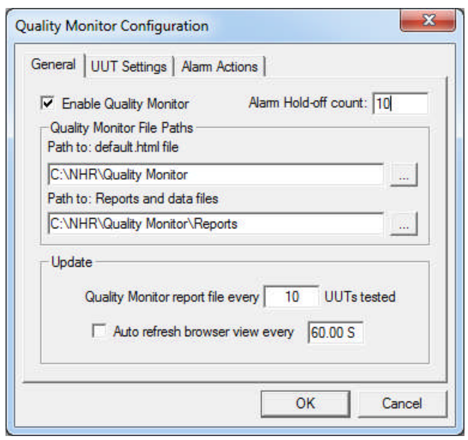


Figure 113 – The QM Configuration dialog window (General tab)

In the Alarm Hold-off count field:

Enter the number of UUTs you want TEST to test (following an alarm) without generating an alarm.

In the Alarm Hold-off count field, you must enter:

1. An integer value
2. Greater-than 0

7.3 The QM File Paths frame

In the QM File Paths frame, Figure 114, you select the storage locations for the Quality Monitor files.

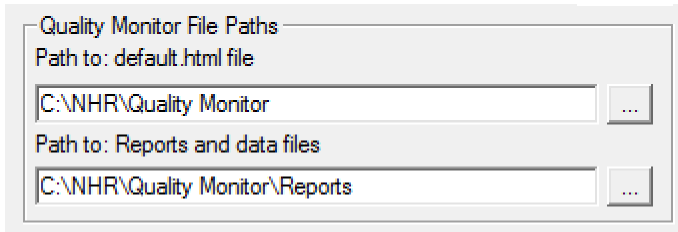


Figure 114 – The QM File Paths frame (close up)

The Path to: default.html file field -

This first Path is the Path to the file default.html (see The default.html file, page 34). You may set this Path to point to a folder on a local or networked drive.

The Path you set here will only be used by the Test Program you set it for, however, you may set this Path to point to the same networked folder in all your Test Program's so that you'll only have one default.html file.

You may also set this Path to be the same-networked folder for groups of Test Programs, giving you a default.html file for each of those groups.

For example:

1. If (for all Test Programs) you set this Path to be: N:\QM – you will have a single default.html file for all your Test Programs

2. If (for a group of Test Programs) you set this Path to be: N:\QM\Customer A – you will have a default.html file with links to all your Quality Monitor pages for all the UUTs you test with that group of Test Programs. This means you could have many default.html files on you network

Essentially you are making the choice here between:

1. One default.html file – in a fixed location for all your Test Programs

or

2. Many default.html files – how many, and where they are, is up to you. You could have a default.html file for each Test Program

The Path to: Reports and data files field

This second Path, is the Path to the folder that will contain the *.html report, and data files created by Quality Monitor for this Test Program. You may set this Path to point to a folder on a local or networked drive. You should set this Path to point to a sub-folder of the one pointed to by the Path in the Path to: default.html file field.

7.4 The Update frame

In the Update frame you make choices about how often the QM report pages are updated.

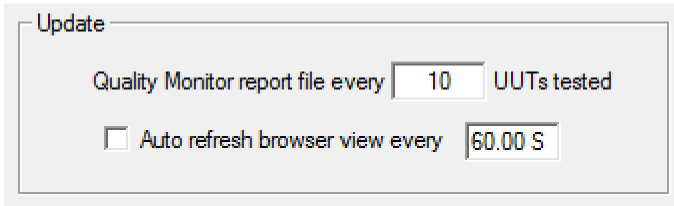


Figure 115 – The Update frame (close up)

The Quality Monitor's update rate -

The value that you enter in the QM report file every … UUTs tested field, is the number of UUTs that will be tested before the QM report will be updated. The default value for this field is 10, at this value the QM report will be updated every 10^{th} UUT.

Setting the rate that QM reports are updated
Open the QM Configuration dialog window (General tab) – instructions on page 18.

In the QM report file every … UUTs tested field:

Enter the number of UUTs you want to be tested before the QM report is updated.
Click the OK button.

In the QM report file every … UUTs tested field, you must enter:

1. An integer value

2. Greater-than 0, and less-than 1,000,001

The browser auto refresh rate -

The QM report is created in web-ready HTML (Hyper Text Markup Language) format, and viewed using a web-browser. Once opened, these pages will not be updated unless you click the browser's Refresh/Reload button. Meanwhile, the QM report files are updated every so often, and the web-browser is still showing the old view.

By checking the Auto refresh browser view every … checkbox, the view shown by the web-browser will be automatically updated with the most recent report file. The value you enter in the Auto refresh browser view every … field, is the number of seconds between updates of the web-browser's view.

Setting the browser auto refresh rate
Open the QM Configuration dialog window (General tab) – instructions on page 18
Check the Auto refresh browser view every … checkbox – the Auto refresh browser view every … field is enabled.

In the Auto refresh browser view every … field:

Enter the number of seconds you want between each update of the browser view.
Click the OK button.

In the Auto refresh browser view every … field, you must enter:

1. An integer value

2. Greater-than 0

The browser auto refresh rate rule-of-thumb

There is no point in auto refreshing the browser view more often than the QM report files are updated.

So, if your Test Program takes 20 seconds to test a UUT, and you're using the default value of 10 in the QM report file every … UUTs tested field, then the QM report file will be updated by every 200 seconds or so.

In that case, there is no point entering a value less-than 200 in the Auto refresh browser view every … field.

8. THE QM CONFIGURATION DIALOG WINDOW (UUT SETTINGS TAB)

8.1 The Exclude data from failed units checkbox

With the Exclude data from failed units checkbox checked:

1. All QM data collected (on UUTs that fail a Test Program) will be excluded from the QM report

2. All controls and fields on this tab are disabled.

Excluding data collected on failed UUTs from the QM report

Open the QM Configuration dialog window (General tab) – instructions on page 18.

Click the UUT Settings tab – the QM Configuration dialog window (UUT Settings tab), Figure 116, opens.

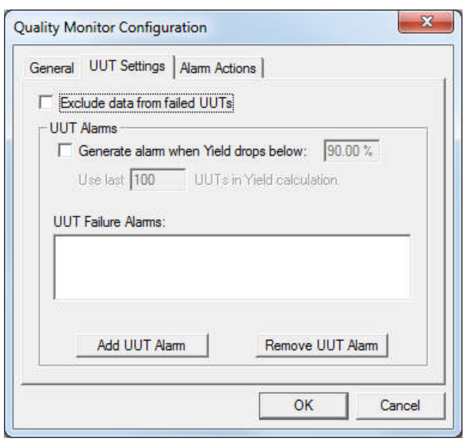


Figure 116 – The QM Configuration dialog window (UUT Settings tab)

Check the Exclude data from failed UUTs checkbox.
Click the OK button.

8.2 The UUT Failure Alarms frame

The Generate alarm when Yield drops below: checkbox -

With the Generate alarm when Yield drops below:… checkbox checked, the Yield alarm will be generated when the percentage of passing UUTs falls below the percentage you enter in the Generate alarm when Yield drops below:… field.

Setting the Yield alarm -

Open the QM Configuration dialog window (General tab) – instructions on page 18.

Click the UUT Settings tab – the QM Configuration dialog window (UUT Settings tab), Figure 117, opens.

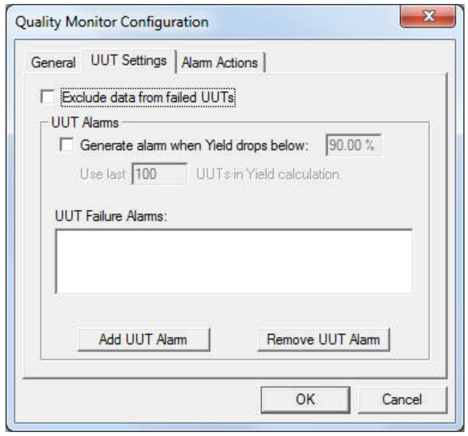


Figure 117 – The QM Configuration dialog window (UUT Settings tab)

Check the Generate alarm when Yield drops below: … checkbox.
Enter an appropriate percentage value in the Generate alarm when Yield drops below … field.
Click the OK button.

The Use last … UUTs in Yield calculation -

With the Generate alarm when Yield drops below: … checkbox checked, Figure 118, the Use last … UUTs in Yield calculation field is enabled.

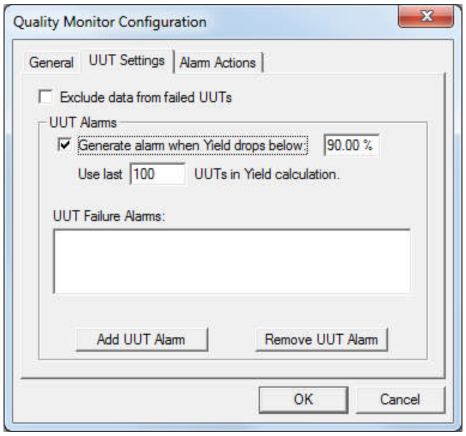


Figure 118 – The QM Configuration dialog window (UUT Settings tab)

In the Use last … UUTs in Yield calculation field you should enter the number of UUTs that you want to be used in the Yield calculation. By entering a low number in the Use last … UUTs in Yield calculation field the Yield alarm is more likely to be generated than if you enter a high number.

For example: If you have 90% in the Generate alarm when Yield drops below: … field, and 10 in the Use last … UUTs in Yield calculation field, then 1 UUT failure will drop your Yield from 100% to 90%, and cause the Yield alarm to be generated.

On the other hand: If you have 90% in the Generate alarm when Yield drops below: … field, and 100 in the Use last … UUTs in Yield calculation field, then 1 UUT failure will only drop your Yield from 100% to 99%, and won't cause the Yield alarm to be generated.

The UUT Failure Alarms -

A UUT Failure Alarm is generated when a set number of UUTs fail. Figure 119 shows an example.

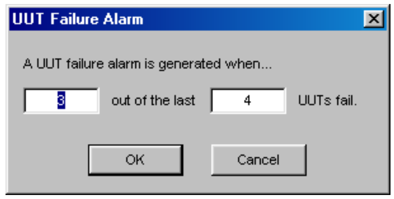


Figure 119 – The UUT Failure Alarm dialog window

The default values shown in Figure 119, mean that a UUT Failure Alarm will be generated when any 3 UUTs fail in any group of 4 UUTs.

Adding a UUT Failure Alarm

In the UUT Alarms frame:

Click the Add UUT Alarm button – the UUT Failure Alarm dialog window, Figure 119, opens.

Enter, in the first field, the number of failing UUTs you want to cause an alarm.
Enter, in the second field, the number of UUTs you want in the group.

Click the OK button – the UUT Failure Alarm is added to the UUT Failure Alarms listbox, Figure 120.

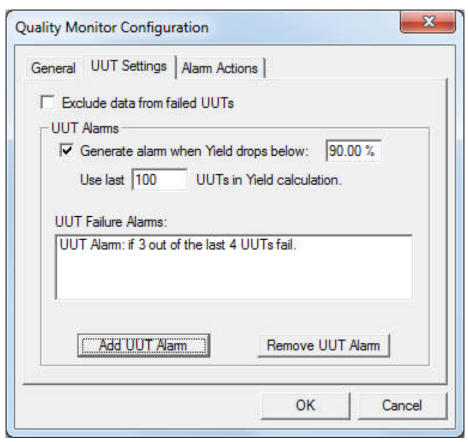


Figure 120 – The QM Configuration dialog window (UUT Settings tab)

You may add more than one UUT Failure Alarm to your Test Program. You'd do that because you want to catch different failure patterns. For example, you might want to add a UUT Failure Alarm to generate an alarm when 9 UUTs in a group of 18 fail, Figure 121.

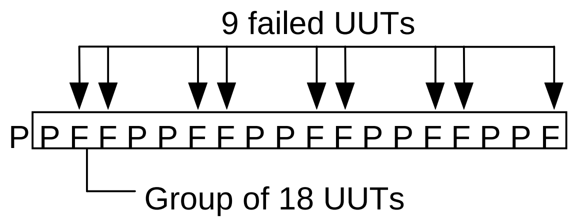


Figure 121 – 9 UUTs fail in a group of 18

or, when 3 UUTs in a group of 4 fail, Figure 122.

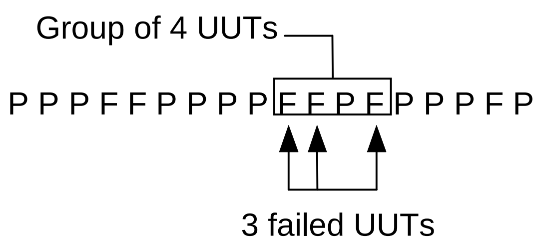


Figure 122 – 3 UUTs fail in a group of 4

Removing a UUT Failure Alarm

In the UUT Failure Alarms listbox:

Select the UUT Failure Alarm you want to remove, Figure 123.

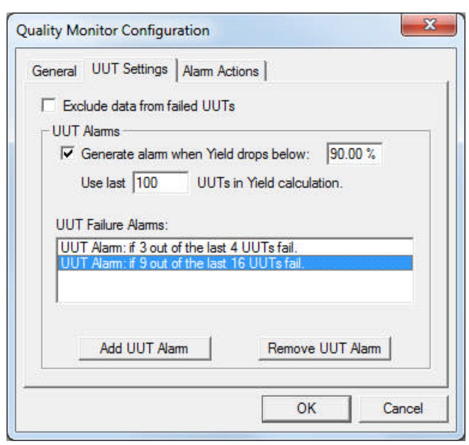


Figure 123 – The QM Configuration dialog window (UUT Settings tab)

Click the Remove UUT Alarm button – the UUT Failure Alarm is removed.
Click the OK button.

9. THE QM CONFIGURATION DIALOG WINDOW (ALARM ACTIONS TAB)

To open the QM Configuration dialog window (Alarm Actions tab) -

Open the QM Configuration dialog window (General tab) – instructions on page 18.
Click the Alarm Actions tab.

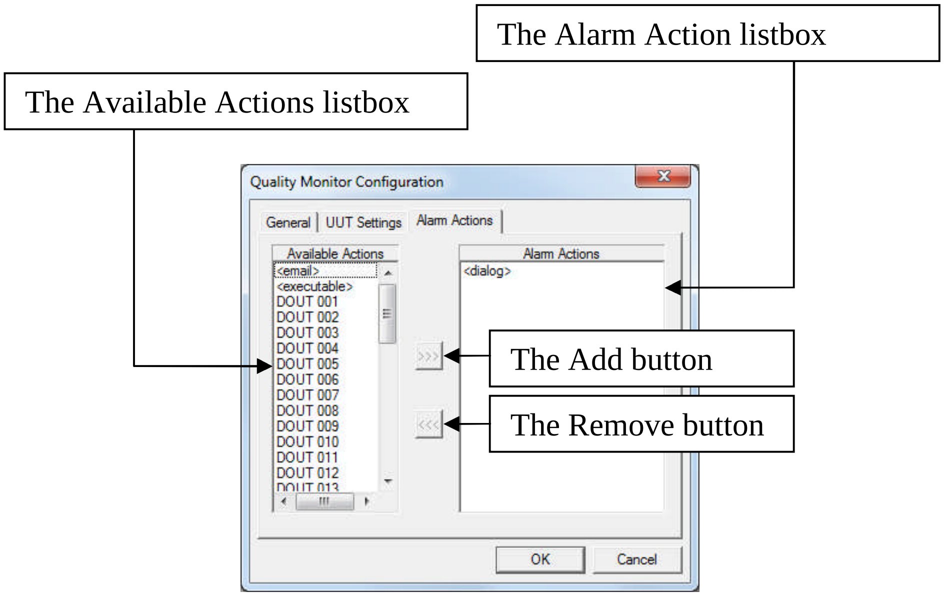


Figure 124 – The QM Configuration dialog window (Alarm Actions tab)

9.1 The <dialog> Alarm Action

As you can see (by opening the QM Configuration dialog window (Alarm Actions tab)) the <dialog> Alarm Action (being the default Alarm Action) is already listed in the Alarm Actions listbox. When an alarm is generated, an alarm dialog window will open.

You may delete the default <dialog> Alarm Action, but only if you have another Alarm Action configured in the Alarm Actions listbox first.

You must have at least one Alarm Action configured in the Alarm Actions listbox.

9.2 The <e-mail> Alarm Action

With the <e-mail> Alarm Action activated a list of recipients will be e-mailed when an alarm is generated.

Activating the <e-mail> Alarm Action -

Open the QM Configuration dialog window (General tab) – instructions on page 18.
Click the Alarm Actions tab.

In the Available Actions listbox: -

Select, by single clicking the <e-mail> entry.
Click the Add button – a dialog window opens.

The dialog window that you'll see at this point is dependent on what e-mail software you have installed on your Test System. If you have MS-Outlook Express installed, you'll see a dialog window like Figure 125.

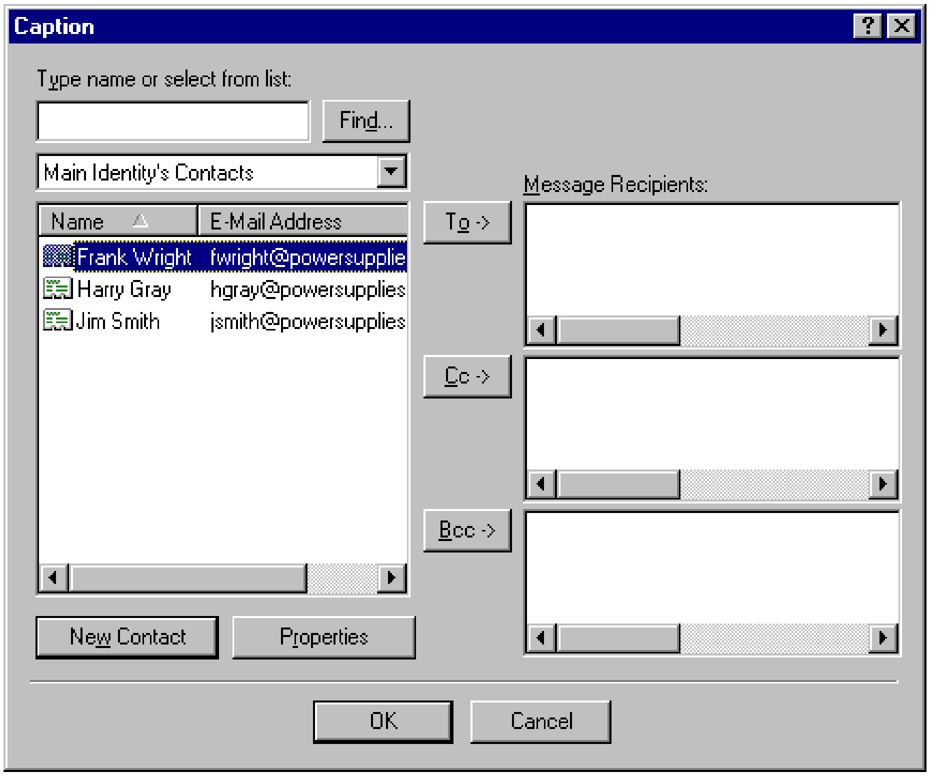


Figure 125 – The Outlook Express dialog window

Set up your To ->, and Cc -> recipient list -

Click the OK button – the QM Configuration dialog window (Alarm Actions tab) will appear similar to Figure 126.

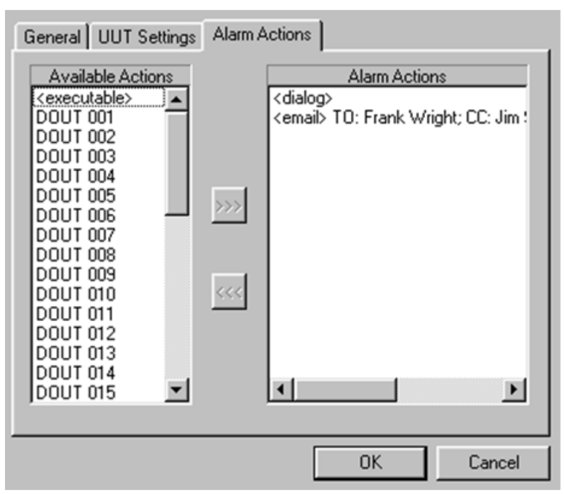


Figure 126 – The QM Configuration dialog window (Alarm Actions tab)

Click the OK button.

You can only have one <e-mail> Alarm Action, since many people can be e-mailed with one <e-mail> Alarm Action.

After activating the <e-mail> Alarm Action, the <e-mail> Alarm Action is removed from the Available Actions listbox.

9.3 The <executable> Alarm Action

With the **<**executable**>** Alarm Action activated, the executable file you specify will be run when an alarm is generated.

Activating the <executable> Alarm Action -

Open the QM Configuration dialog window (General tab) – instructions on page 18.
Click the Alarm Actions tab.

In the Available Actions listbox -

Select, by single clicking the **<**executable**>** entry.
Click the Add button – the Windows Open dialog window, Figure 127, opens.

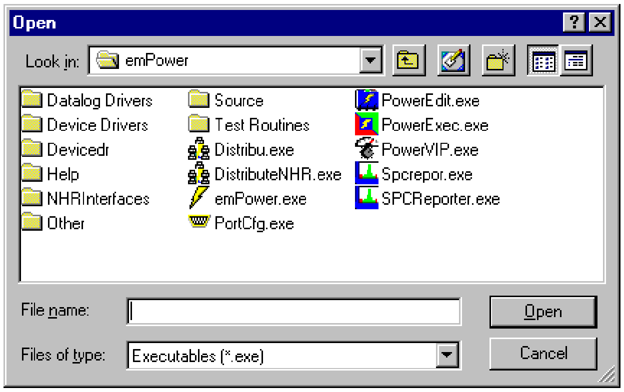


Figure 127 – The Windows Open dialog window

Navigate to the location of the executable program.
Select, by single clicking the executable program.

Click the Open button – the Windows Open dialog window closes, and the QM Configuration dialog window (Alarm Actions tab) will appear similar to Figure 128.

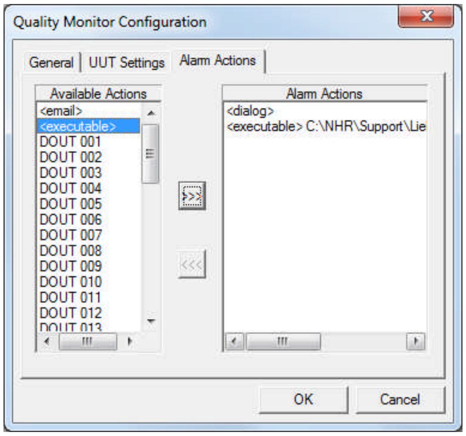


Figure 128 – The QM Configuration dialog window (Alarm Actions tab)

Click the OK button.

Each active <executable> Alarm Action can run only one executable file, but you may have many <executable> Alarm Actions.

After activating an <executable> Alarm Action, the <executable> Alarm Action remains listed in the Available Actions listbox.

9.4 The DOUT 00X (Digital Output) Alarm Action

With a DOUT 00X Alarm Action activated a digital High signal will be sent to the connected device when an alarm is generated.

Activating a DOUT 00X Alarm Action -

Open the QM Configuration dialog window (General tab) – instructions on page 18.
Click the Alarm Actions tab.

In the Available Actions listbox:

Select, by single clicking the appropriate DOUT 00X entry.

Click the Add button – the QM Configuration dialog window (Alarm Actions tab) will appear similar to Figure 129.

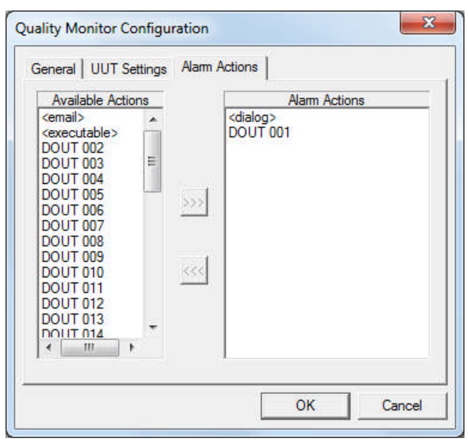


Figure 129 – The QM Configuration dialog window (Alarm Actions tab)

Click the OK button.

Each active DOUT 00X Alarm Action can send only one High signal, and after activation each is removed from the Available Actions listbox. All the DOUT 00X Alarm Actions may be activated in each Test Program.

9.5 The GPR 00X (General Purpose Relay) Alarm Action

With a GPR 00X Alarm Action activated a Close signal will be sent to the connected relay when an alarm is generated.

Activating a GPR 00X Alarm Action -

Open the QM Configuration dialog window (General tab) – instructions on page 18.
Click the Alarm Actions tab.

In the Available Actions listbox -

Select, by single clicking the appropriate GPR 00X entry.

Click the Add button – the QM Configuration dialog window (Alarm Actions tab) will appear similar to Figure 130.

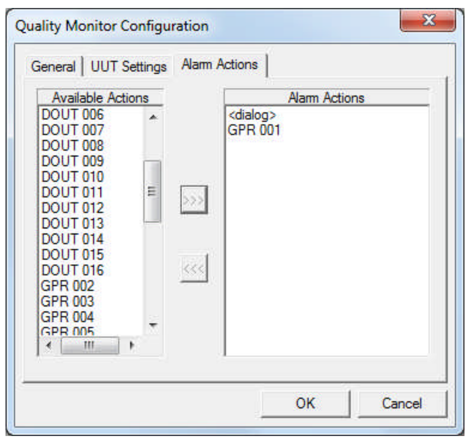


Figure 130 – The QM Configuration dialog window (Alarm Actions tab)

Each active GPR 00X Alarm Action can send only one Close signal, and after activation each is removed from the Available Actions listbox. All the GPR 00X Alarm Actions may be activated in each Test Program.