



MASsoft 10

RGA Series User Guide

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MASsoft 10 - RGA Series

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Amendment history

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Welcome

The purpose of this manual is give an introduction to the MASsoft 10 Software

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Warnings and Cautions

In this Manual, a **Warning** is an instruction that draws the operator's attention to the risk of injury or death; a **Caution** is an instruction that draws attention to the risk of damage to the product or process.

Warnings and Cautions are placed immediately before the text to which they refer; they are headed by **WARNING** or **CAUTION** respectively. The associated explanatory text is in **bold**. If several Warnings or Cautions apply at one point in the text, they are numbered with the most important appearing first.

Typographical conventions

For ease of identification the names of menu commands, keys, dialog items and screen text are typographically distinct from the ordinary text of this Manual. These distinctions are as follows:

Menu commands, dialog items, such as buttons and check boxes, and text that appears on the display screen are presented in bold typeface; thus **File** menu, **Enter** button.

Keys are presented in bold, italic text; thus ***Esc***, ***Return***, ***Space bar***.

Terminology

Terminology that accords with basic Windows principles may be included in this Manual.

Dimensions

The dimensions quoted in illustrations are millimetres, unless stated otherwise.

Instructions

For clarity, the instructions given in this Manual are presented in two columns. The left-hand column provides imperative instructions that are numbered sequentially to provide a step-by-step guide through the functions. The right-hand column describes the system's response (where appropriate) and gives any additional information that may be of relevance.

Importance of this Manual

This Manual should be regarded as part of the product described herein.

Technical assistance

Hidden Analytical Limited try to ensure the information presented in this manual is comprehensive, relevant and accurate. If the reader thinks there is a mistake, requires some clarification or needs further information please do not hesitate to contact Hidden.

Technical assistance can be obtained from the Hidden Analytical Limited Service Department which can be contacted on:

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www.HiddenAnalytical.com.Amendment history

Amendments

This manual will be updated, as necessary, to cover modifications to the product. Minor amendments may take the form of addenda, which will be located at the front of the manual.

1 MASsoft 10 - RGA Series

1.1 Overview

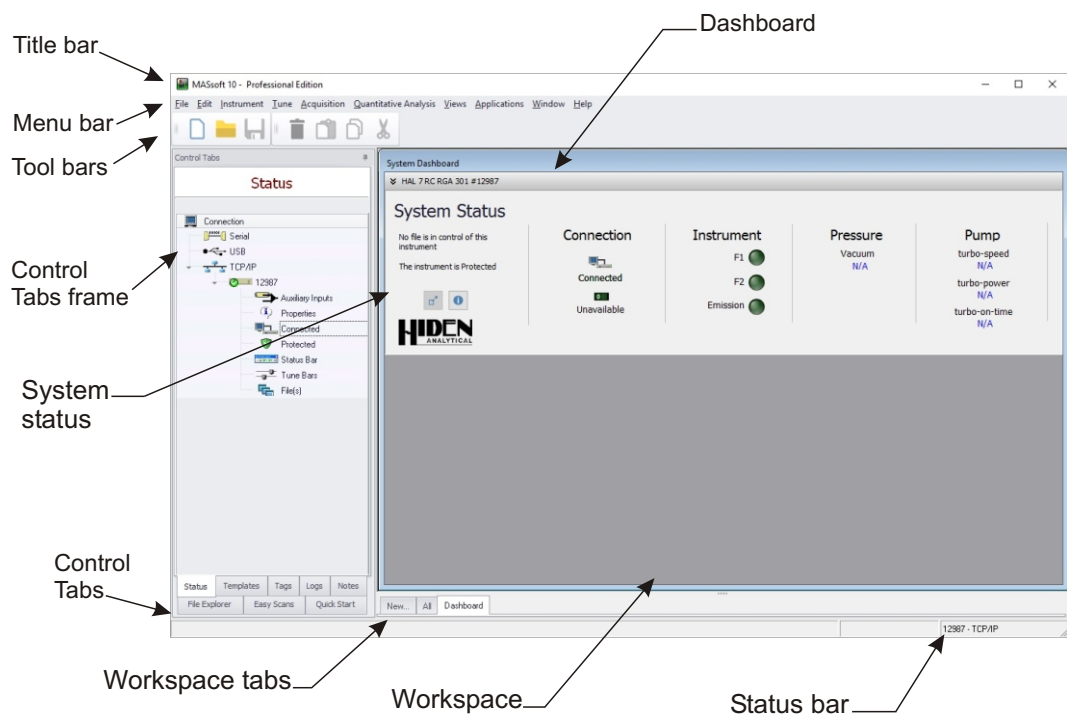
The purpose of this manual is to give an introduction to the basic operating principles of MASsoft 10. This manual should be read in conjunction with the MASsoft 10 Reference Manual, which can be found on the Hidden USB stick in .pdf format HA-085-167 or by using the software Help feature: Menu Bar - Help - Contents (F1).

1.2 Starting MASsoft 10

To start MASsoft 10:

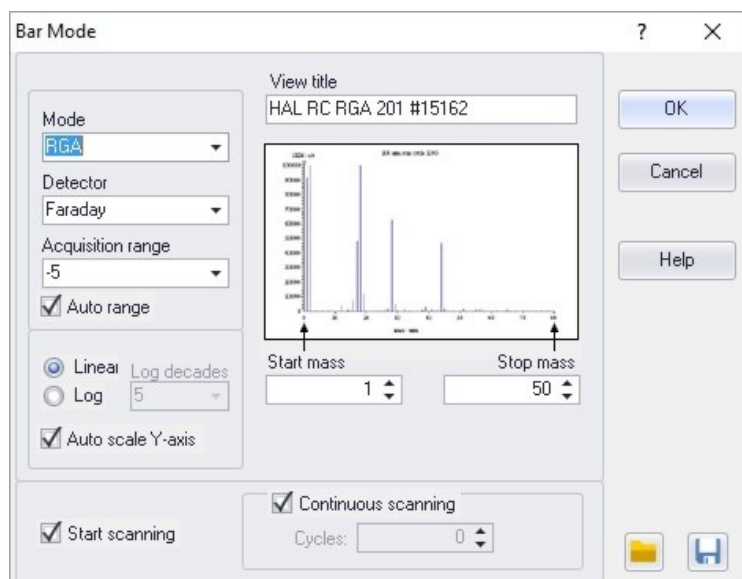
1. On the Windows taskbar click the **Start** button The **Start Menu** is displayed
2. Point to **Hidden Applications** and click **MASsoft 10**

MASsoft will start and begin to interrogate the RC Interface Unit. The MASsoft 10 Window is shown below.



1.3 Easy Scans - Bar Scan

Bar Scans allow a range of mass to charge ratios to be monitored.



To create a Bar Scan:

1. Click the **Control Tabs** frame and select the **Easy Scans** Tab
2. Select **Bar Scan**
3. Select the **Detector**
4. Select the **Acquisition Range**
5. Select the **Start** mass and **Stop** mass

The **Control Tabs** frame is located in the upper left corner

The **Bar Mode** dialog will appear

Initially use the **Faraday** detector to determine the gas composition, the **SEM** detector can be used in subsequent experiments to monitor smaller signals. The lifetime of the SEM detector is determined by the number of ions which impact its surface, therefore it is not advised to monitor large signals using the SEM detector

With **Auto range** selected the software will use an appropriate electrical amplifier to monitor the maximum peak within the mass range. Deselect **Auto range** and select a lower **Acquisition range** to monitor smaller intensity peaks that have a large peak within the desired mass range. In this mode larger peaks will saturate the amplifier and appear to be 'cropped' in the graphical display.

6. Select OK to start the scan

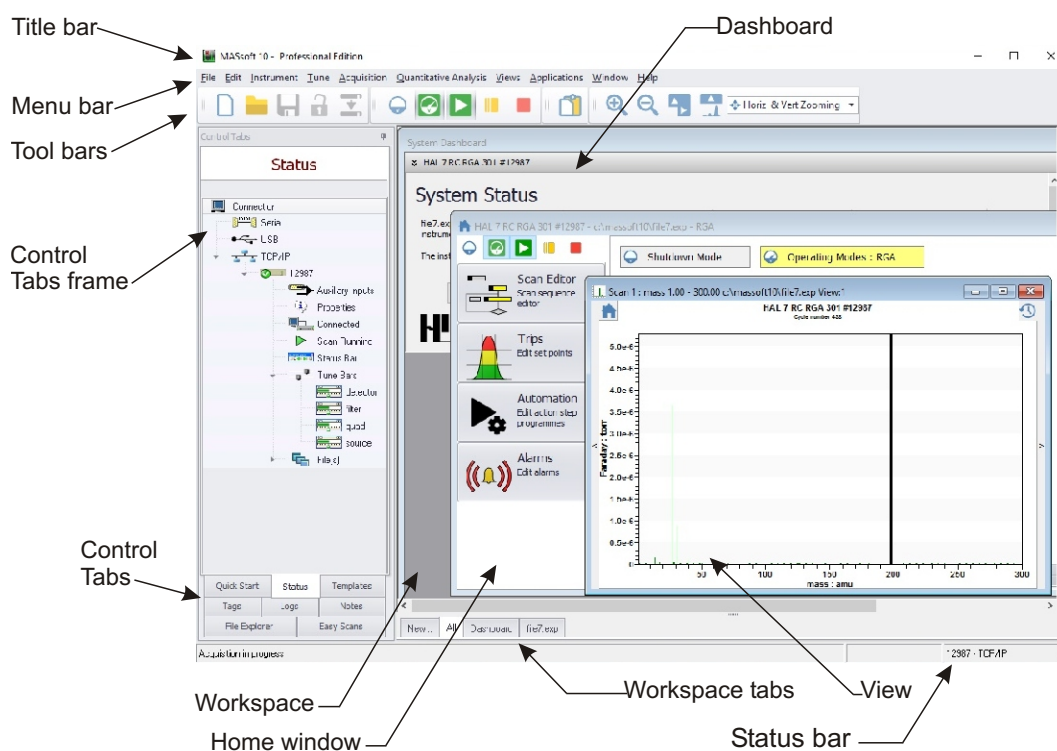
If **Start Scanning** is selected the scan will start immediately.

7. Click the Stop Icon located on the taskbar to end the scan

When **Continuous Scanning** is deselected the scan will automatically stop after the selected number of cycles.

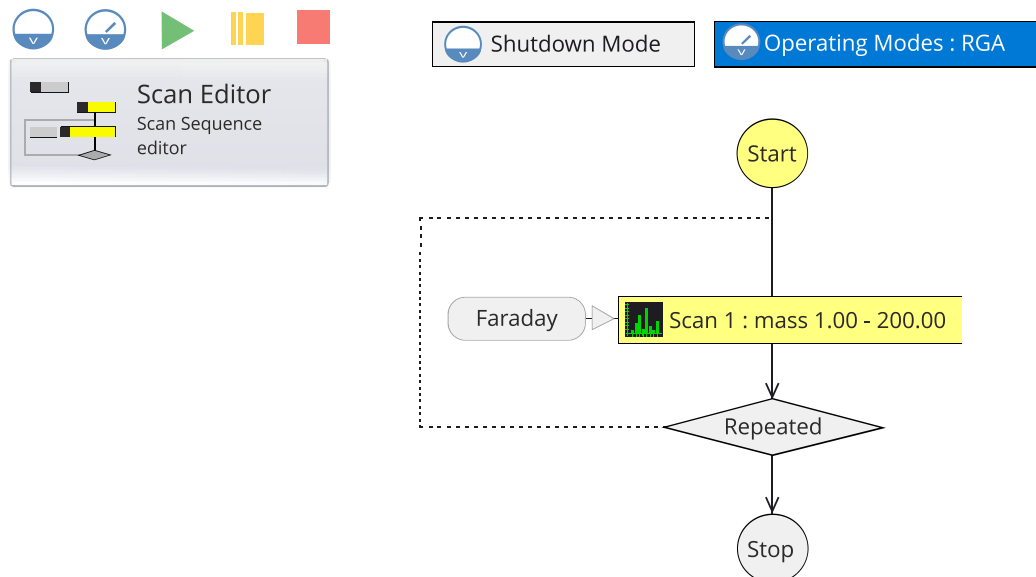


The Bar Mode Easy Scan has created a **Graphical View** and a **Home Window**. The Home Window contains the **Scan Sequence**.



1.4 Bar Scan - Scan Sequence

The Scan Sequence is contained on the **Scan Editor** page of the Home Window.

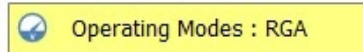


The Scan Sequence is the primary control of the Mass Spectrometer. A double left mouse click on any element within the Scan Sequence will open a dialog where settings can be altered.

The Scan Sequence can be configured independently of the Easy Scans tab and a new Scan Sequence can be created by selecting File - New

1.4.1 Operating Modes: RGA

To edit the Operating Modes: RGA settings double left click on the Operating Modes box.



This will open the **Operating Mode dialog**

A screenshot of the 'Operating Mode dialog' window. It has a tab labeled 'RGA' with a checkmark. Below the tab is a table with columns: Group, Name, Value, Units, and Inherits. The table is organized into expandable groups: Detector, Filter, Quad, Source, and other. Each group contains several settings with checkboxes. At the bottom, there are buttons for 'Filaments' (F1, F2), 'Calibrate', 'Export', 'Import', and 'Save Tune'.

Group	Name	Value	Units	Inherits
Detector	<input checked="" type="checkbox"/> multiplier	870	V	None
Filter	<input checked="" type="checkbox"/> focus	-90	V	None
Quad	<input checked="" type="checkbox"/> delta-m	0	%	None
	<input checked="" type="checkbox"/> resolution	0	%	None
Source	<input checked="" type="checkbox"/> cage	3.0	V	None
	<input checked="" type="checkbox"/> electron-energy	70.0	V	None
	<input checked="" type="checkbox"/> emission	1000.0	uA	None
other	<input checked="" type="checkbox"/> mass	5.5	amu	None
	<input checked="" type="checkbox"/> mode-change-delay	1000		None

Filaments : F1 F2 Calibrate Export Import Save Tune

The Operating Mode dialog contains many of the settings which will be applied when the scan begins. The default settings are optimised for the system and should usually not require alteration.

The variable **multiplier** is the voltage applied to the SEM detector during operation. The SEM detector needs to be periodically calibrated to ensure an equivalent signal response to the Faraday detector, this will increase the applied voltage over the lifetime of the SEM detector. A **Template** file has been created during the initial testing of the instrument which can be used to perform the calibration. Select the file from the Templates tab in the Control tab frame to perform the calibration.

In the event of a filament failure, a second filament is available to use until a filament replacement can be arranged. The **Filament Icon** will appear red when selected for use.

The Shutdown Mode box contains the settings which are applied once the scan stops.

1.4.2 Scan box

To edit the Scan box settings double left click on the Scan box



This will open the **Scan Editor Scan dialog**

Variable:

☒ Bar ☐ Profile ☐ MID

Scan Legend:

Start Value: amu

Stop Value: amu

Increment Value: amu

Steps:

Relative Sensitivity:

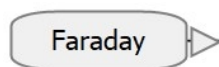
Relative SEM:

The Scan dialog contains several tabs which are related to the type of scan required, for Bar Scans the **Start Value** and **Stop Value** are the only inputs needed.

Mass is typically the variable to be scanned. However, other variables such as the position of a Linear Motion Device or the Electron Energy of ions produced in the mass spectrometer source region can also be controlled.

1.4.3 Input Device box

To edit the Input settings double left click on the Input Device box



This will open the **Input selection dialog**

The dialog box shows the 'Input Device' set to 'Faraday' with a description: 'Detects ions using a Faraday Cup and amplifies the signal'. It has two tabs: 'Variable Range' and 'High Dynamic Range'. The 'High Dynamic Range' tab is selected. Below the tabs, there is a text box explaining that Variable Range uses a single amplifier range and adjusts between Highest and Lowest Auto Range ranges, while High Dynamic Range uses multiple amplifiers. The 'Start' is set to 'x10E -5'. 'Dwell Time' is set to '100' with a radio button for '%' selected. 'Settle Time' is set to '100' with a radio button for '%' selected. There is a checkbox for 'Auto Range' which is checked. Below it, 'Highest' is set to 'x10E -5' and 'Lowest' is set to 'x10E -10'. At the bottom, there are checkboxes for 'Auto Zero' and 'Defer Auto Range', both of which are checked.

Faraday is the standard input device for analogue instruments.

Use the High Dynamic Range tab if you wish to monitor both large and small peak intensities, this mode takes measurements using multiple electrical amplifiers and then combines them into one reading, this will reduce the data acquisition speed but will increase the dynamic range of the instrument.

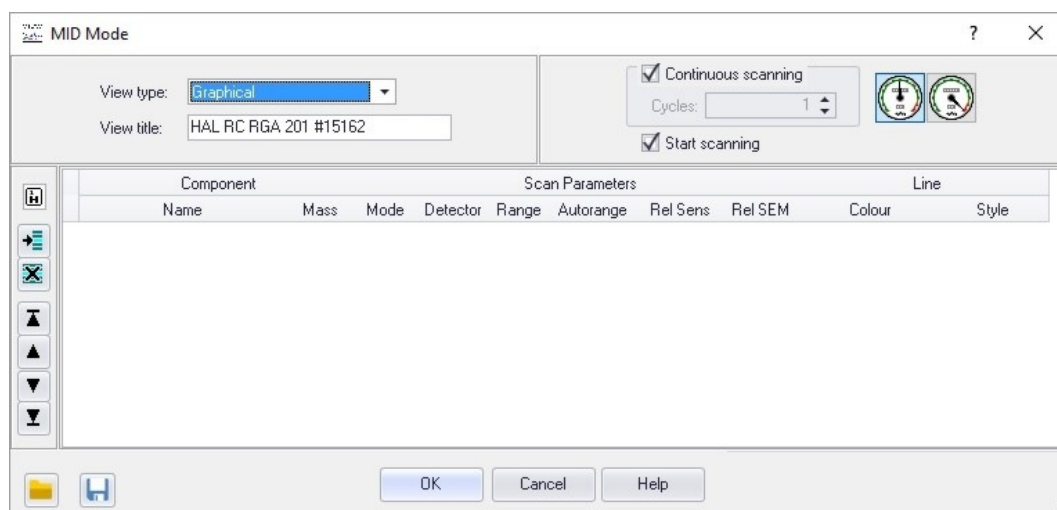
The input device **SEM** can be selected to monitor the lowest level signals.

The input device can also be used to monitor;

- 'Temperature' - Reading from a K Type thermocouple via the auxiliary input and a suitable Process Control Unit
- 'Vacuum' - The Ion gauge pressure reading via the Vacuum Control Unit.
- 'Inlet' - The gas inlet selected during data acquisition can be recorded for systems with the a Proteus 20, 40, 80 way Inlet or the 4, 8, 16 way Multi Selector Valve
- f(x) - A function can be used to display the results of calculations performed by an **Action Sequence**.


1.5 Easy Scans - MID Scan

Multiple Ion Detection (MID) scans allow individually selected mass to charge ratios to be monitored.



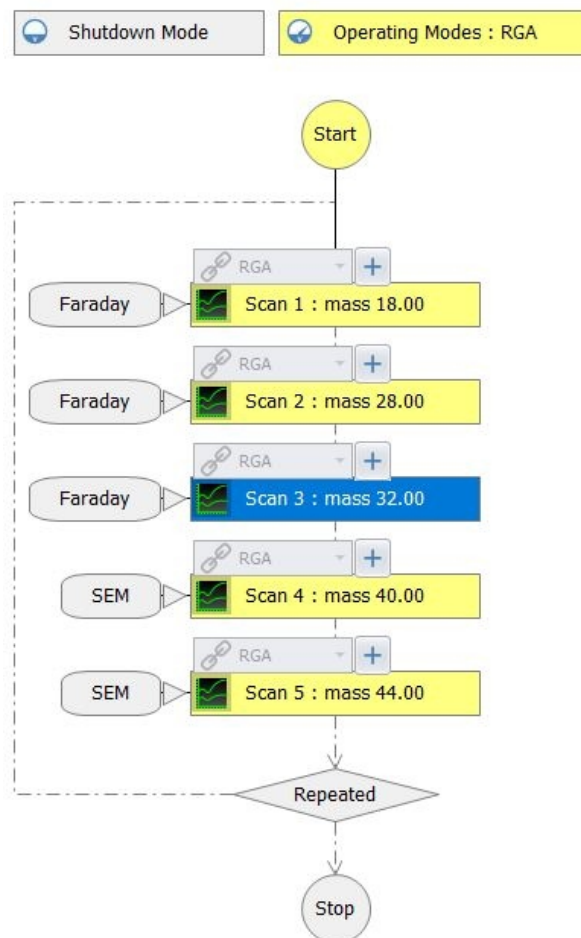
Easy Scan - MID Mode dialog

To create a MID Scan:


1. Click the **Control Tabs** frame and select the **Easy Scans** Tab
Control Tabs frame is located in the upper left corner
2. Select **MID Scan**
The **MID Mode dialog** will appear
3. Click the **Insert New Component** Icon 
Add the mass to charge ratio you wish to monitor, repeat the procedure to monitor multiple masses
4. Select **Detector** type and acquisition **Range**
Use the Faraday detector to monitor large signals and the SEM for lower level signals. **Autorange** will select the appropriate gain range for the measured signal, additionally, optimise for speed or optimise for accuracy can be selected
5. Select the View Type
Tabular, Graphical or one of each may be required

- | | |
|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| 6. Select OK to start scan | If Start Scanning is selected the scan will start immediately |
| 7. Click the Stop Icon located on the taskbar to end the scan | When Continuous Scanning is deselected the scan will automatically stop after the selected number of cycles |

1.6 MID Scan - Scan Sequence

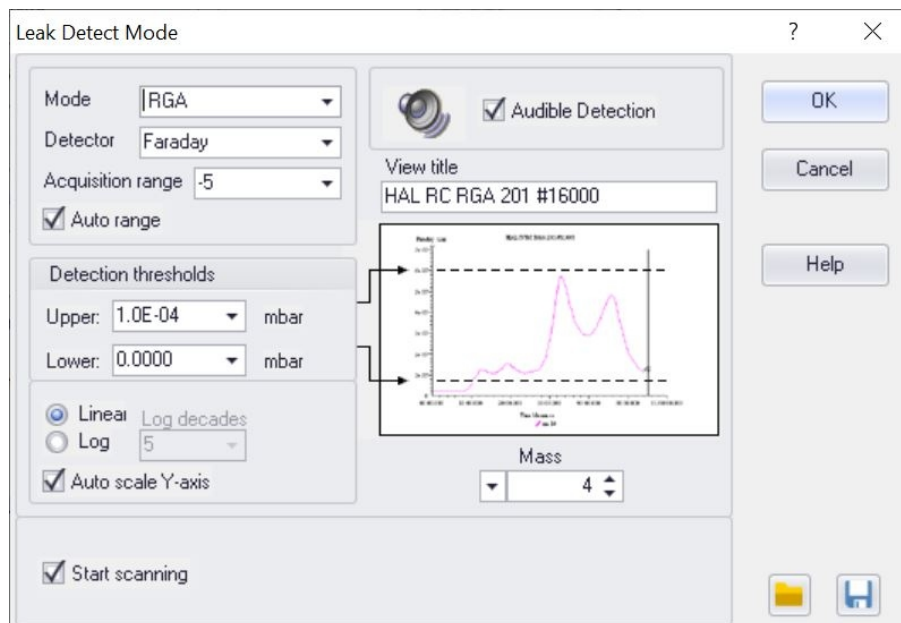


The Scan Sequence can be configured independently of the Easy Scans tab and a new Scan Sequence can be created by selecting File - New

Select a scan box and then click the **Insert Sequential Scan** toolbar Icon  to monitor additional mass to charge ratios. Double left click the new Scan box and select the MID tab, enter the new mass to charge ratio in the Start Value box.

1.7 Easy Scans - Leak Detect Scan

The Leak Detect Scan creates a Scan Sequence which will monitor a probe gas with an audible beep and graphical display, typically Helium (m/z 4).



To create a Leak Detect Scan:

1. Click the **Control Tabs** frame and select the **Easy Scans** Tab
Control Tabs frame is located in the upper left corner
2. Select **Leak Detect Scan**.
The **Leak Detect Mode dialog** will appear
3. Change **Mass** to 40 if argon is to be used as the probe gas
5. Select OK to start scan
If **Start Scanning** is selected the scan will start immediately.
6. Click the Stop Icon located on the toolbar to end the scan