OPERATORS MANUAL

Rev 1.3

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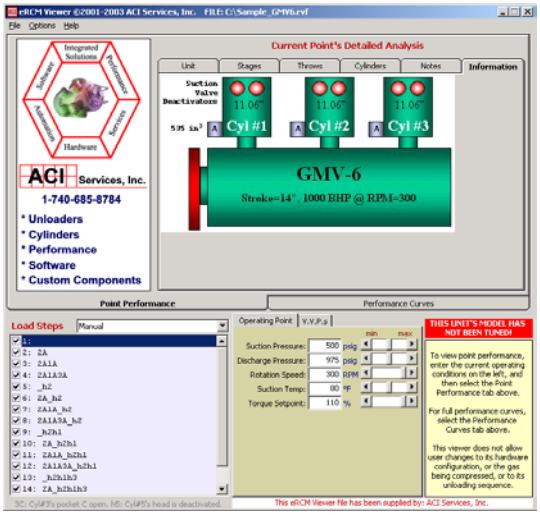
Introduction

Using either ACI's eRCM software package, or Ajax's eAjax software package, an engineer can create eRCM Viewer files. The eRCM Viewer software allows for dynamic review of individual point performance, and full map performance via multiple types of compressor curves using technology from ACI's eCurves®. Users can print detailed reports and/or entire complements of full-color performance curves.

Furthermore, other ACI software, such as eRCM Controller™, eStationFlow™, eRCM Evaluator™, eRCM ActiveX™, and eRCM MultiServices™ all make use of the same eRCM Viewer file format.

For additional order information about other ACI software for reciprocating compressors, please contact ACI at 1.740.435.0240, 9AM – 5PM EST.

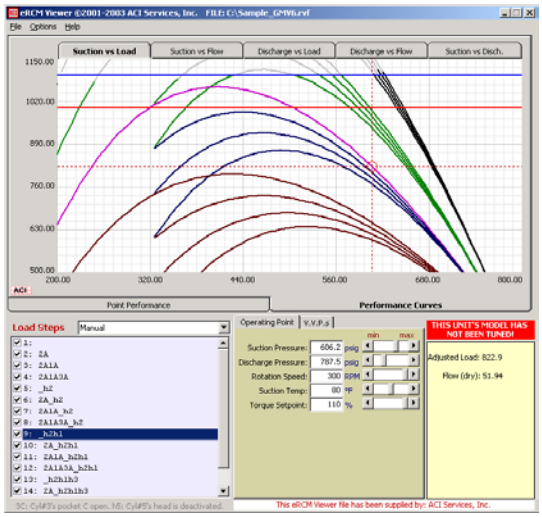
General Use



When you receive an eRCM Viewer file (*.rvf) you may load it into the eRCM Viewer by selecting File-Load eRCM Viewer File. Once this file is loaded, you may analyze the reciprocating compressor's performance either on a point basis, or on a range/graphical basis.

To analyze the data on a point basis, select the Point Performance tab. Located towards the lower middle of the screen is an area that details the allowed ranges for various operating parameters. You may either enter your exact operating point, or select it by using the adjacent sliders. If you enter a point less than the minimum allowed value, then the minimum value will be used. If you enter a point more than the maximum allowed value, then the maximum value will be used.

As you change the operating point, the data in the Current Point's Detailed Analysis region will be updated. This section will report: information about the unit; errors encountered such as Exceeding Cylinder's MAWP, High Discharge Temperatures, etc.; information about each stage of the unit; results of rod load calculations (gas and net), and results of crosshead pin reversal calculations; various items about the cylinders such as flows, horsepowers, isentropic efficiencies, volumetric efficiencies, etc. for both the Head End and the Crank End; and any special notes the author of the eRCM file included. ***Access to some features to a particular eRCM Viewer file may be limited.***

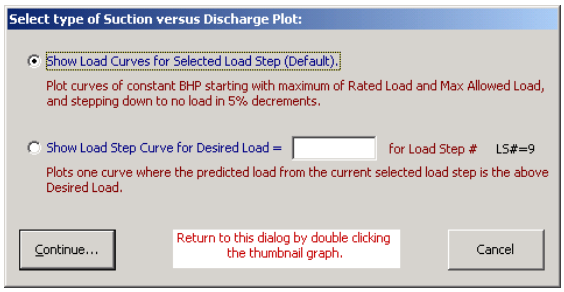


To view performance over an entire range, select the Performance Curves tab. Here you can elect what type of graph to view and then adjust the various operating parameters to generate the resulting performance curves.

If you want to avoid certain load step curves, simply toggle them off/on via the Load Step's list of checkboxes. Moreover, if you want the Viewer to automatically pick the best load step for the current operating point, then select one of the methods via the pull down menu adjacent to the Load Steps area.

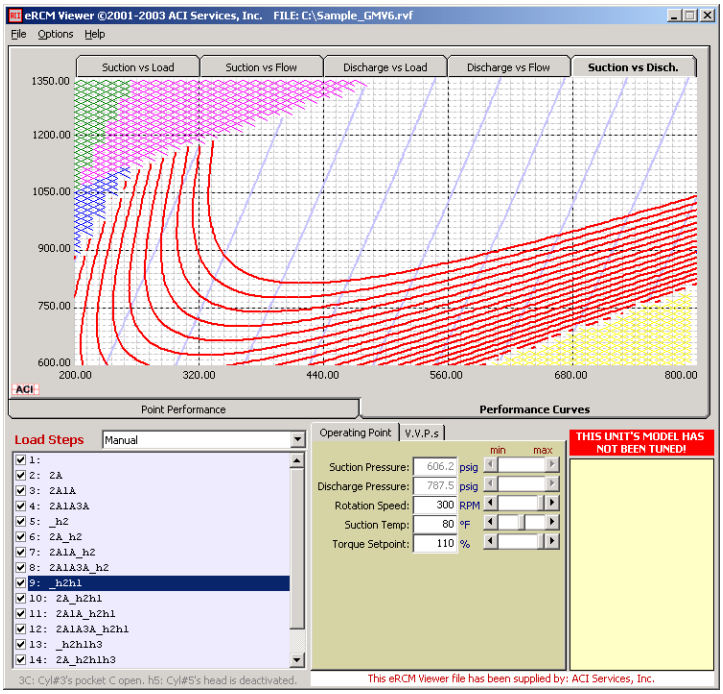
When in graph mode, you can drag the crosshair on the graph to move the current operating point. To jump between load steps, select a new load step in the Load Step box – your current load step will be highlighted (in **magenta** color).

To preview Suction Pressure versus Discharge Pressure graphs, also known as Thumbnail Plots, click on the **Suction vs Disch.** tab. You will be presented with a dialog box similar to:



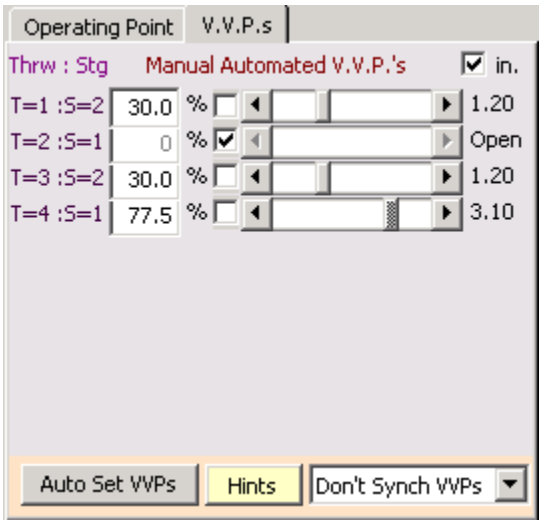
You can either view a series of load and flows curves for the current load step (first option) or you can view more detailed information about one load step for a desired load (second option).

These thumbnail curves can take awhile to plot on slower machines, so please be patient.



Miscellaneous Items

Variable Volume Pockets: For units that have manual and/or automated VVPs, you can model opening and closing them via the **V.V.P.s** tab. As you adjust the position of each of the VVPs, the point and/or graph performance will dynamically change.



Selection of the **in.** checkbox will result in displaying of inches of travel open per VVP as you change them.

The throw number and stage of each VVP device is shown via the **T=1:S=2** labels. If you need to know the cylinder number on which the VVP is located, place you mouse over any of the **T=2:S=2** labels.

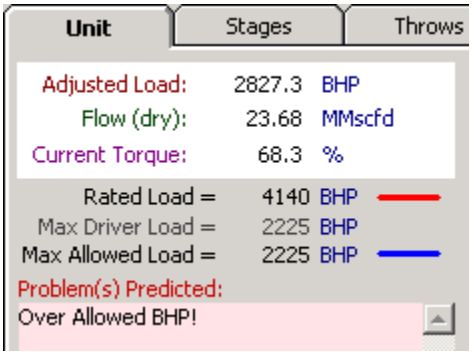
To lock a particular VVP from subsequent changes, check the box next to that device. Once check, the input box and slider will no longer be useable. Also, any locked devices will not be considered when Auto Setting VVPs and/or synchronizing VVPs. To unlock the VVP, uncheck the box.

To synchronize the opening/closing of all VVPs, or just those within the same stage, change the **Don't Synch VVPs** to either **Synch Stage VVPs** or to **Synch All VVPs**. To return to the normal mode of being able to adjust each VVP individually, set the dropdown list back to **Don't Synch VVPs**.

Clicking the **Auto Set VVPs** button will result in eRCM Viewer auto-determining the VVP settings for all unlocked VVPs so that maximum load is achieved for the currently load step while still maintaining safety.

For more VVPs usage notes, please read the items displayed via the Hints button.

Unit Tab: This tab displays the current load, flow and torque based on the current operating point and the current load step. If there are any issues with using the selected load step at the current operating point, then errors and/or warnings will be displayed in the **Problem(s) Predicted** box.



Max Allowed Load value may change with speed, ambient temperature and user-specified torque setting. Rated Load (at rated speed) and Max Driver Load are displayed for reference purposes.

Stages Tab: Shows various information about each stage.

Unit | **Stages** | Throws | Cylinders

	Stage #1	Stage #2	Stage #3
Ps:	150.00	382.28	851.38
Pd:	382.28	851.38	1188.60
Ts:	50.0	110.0	110.0
Td:	170.5	222.0	157.5
Zs:	0.9734	0.9573	0.9119
Zd:	0.9701	0.9582	0.9168
Pressure Ratio:	2.5091	2.2456	1.4095
Ps @ Flange:	149.18	379.51	848.78
Pd @ Flange:	394.55	868.93	1201.82
Load per Stage:	2905.3	2606.9	1188.7
Flow per Stage:	52.00	51.98	51.86

Throws Tab: Shows various information about each throw.

Unit | Stages | **Throws** | Cylinders | Notes | Information

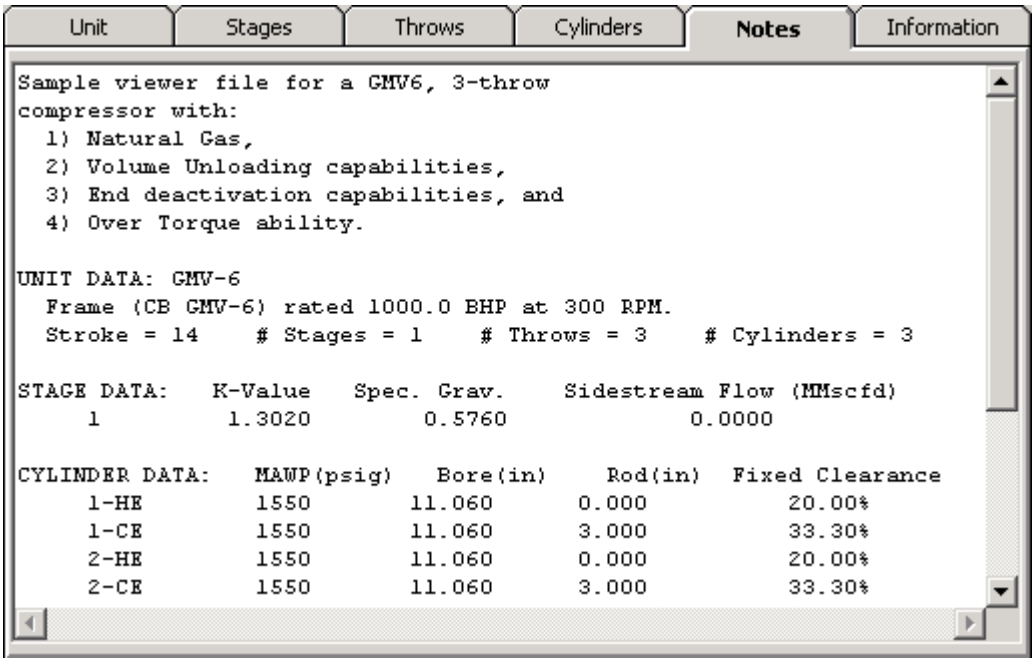
	C: Flange	T: Flange	C: Internal	T: Internal	C: Inertia	T: Inerita	Reverse	Pass?
#1:	66,383	54,897	70,929	59,248	69,609	55,671	30° +	Passed
#2:	66,383	54,897	70,929	59,248	69,609	55,671	30° +	Passed
#3:	66,383	54,897	70,929	59,248	69,609	55,671	30° +	Passed

Cylinders Tab: Shows various information about each end of each cylinder.

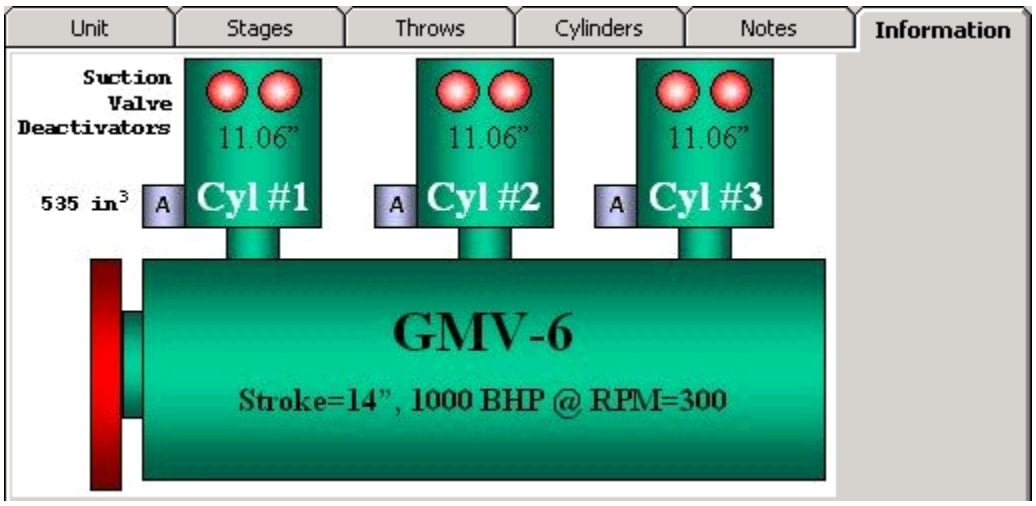
Unit | Stages | Throws | **Cylinders** | Notes | Information

	Ps	Pd	Ts	Td	Zs	Zd	VEs %	VEd %	FixClr%	EffClr%	IsenEff
#1-HE	484.86	1140.15	80.0	193.6	0.937	0.939	79.30	41.31	20.00	20.00	87.8
#1-CE	484.86	1140.15	80.0	193.6	0.937	0.939	67.07	34.94	33.30	33.30	90.9
#2-HE	484.86	1140.15	80.0	193.6	0.937	0.939	79.30	41.31	20.00	20.00	87.8
#2-CE	484.86	1140.15	80.0	193.6	0.937	0.939	67.07	34.94	33.30	33.30	90.9
#3-HE	484.86	1140.15	80.0	193.6	0.937	0.939	79.30	41.31	20.00	20.00	87.8
#3-CE	484.86	1140.15	80.0	193.6	0.937	0.939	67.07	34.94	33.30	33.30	90.9

Notes Tab: Noteworthy information about the unit.



Information Tab: This tab can show additional hardware and unloading specifications about the unit, or if provided, may show a unit diagram.



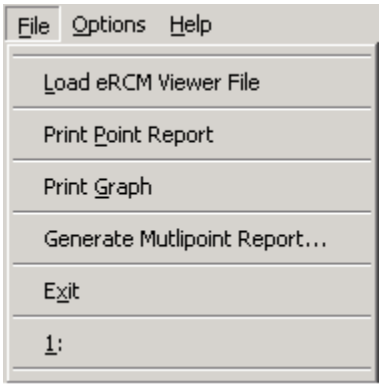
Special Notes:

- **Limited Availability**: Certain eRCM Viewer files (usually preliminary ones, or ones not yet purchased) are limited to thirty (30) of use. After that period, they will no longer load into the eRCM Viewer.
- **Moving Files**: If you want to copy/move an eRCM Viewer model, then make sure you move/copy **all** files in the selected folder with the same name as the base "**rvf**" file.

Shortcuts:

- When in Manual Load Step selection mode, double-click a load step in the graph box to auto-select it.
- Double-click y-axis labels to change the y-axis scaling.

File Menu

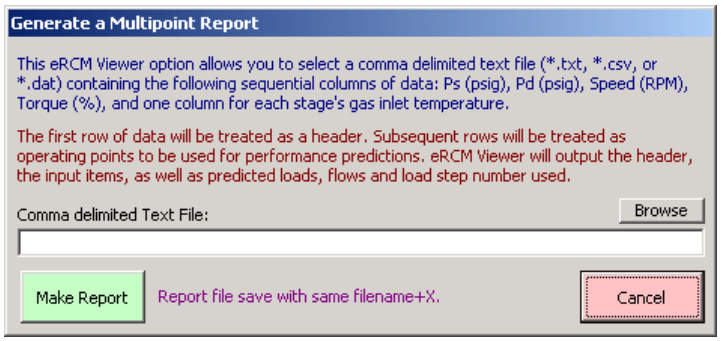


Load eRCM Viewer File: Clears all existing data and loads in an eRCM Viewer file. To load all versions of eRCM Viewer files, make sure you have the latest version of the viewer.

Print Point Report: Prints to the select printer, a report detailing the performance results based on the current operating point. Results include: Load, Flow, Validity of current Load Step at these conditions, Stage Performance, Throw Performance, and Individual Cylinder End Performance. This feature is not always available, depending on the settings of the viewer file.

Print Graph: Prints to the select printer the current compressor performance curves. This feature is not always available, depending on the settings of the viewer file.

Generate Multipoint Report:



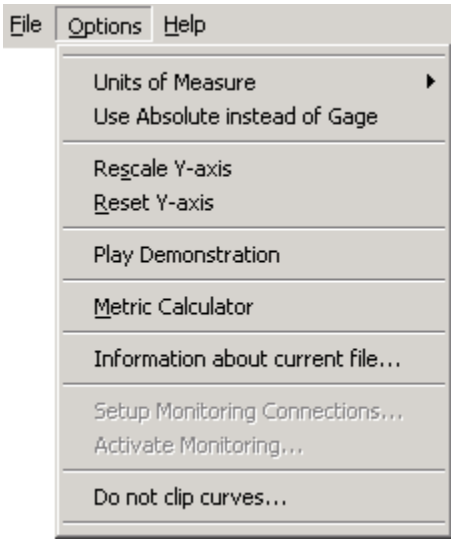
If you need to check a lot of measured operating points against eRCM's predictions, create a table of the required operating point data (see above dialog box) and save that file as an ASCII, comma-delimited text file. Next, load the file into eRCM Viewer via the Generate Multipoint Report option and run it. Finally, open the newly created file into a spreadsheet program and review any discrepancies between measured and predicted values.

Note: If the original file is named "C:\TestFile.TXT", then the file with the eRCM Viewer predictions will be entitled "C:\TestFileX.TXT".

Exit: Exits the eRCM Viewer software.

1: Filename and Pathway: Lists your last loaded file – used to quickly reload the last accessed file.

Options Menu



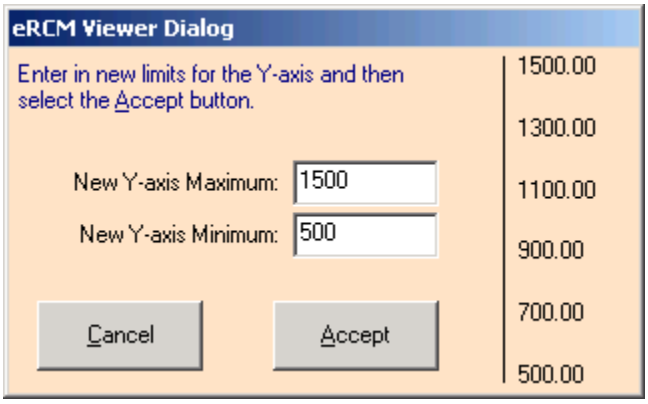
Units of Measure: User may select from Imperial (English), Canadian Metric, and SI Metric. Once selected, eRCM remembers this setting until changed later.

Item	Imperial	Metric-Canada	Metric-SI
Pressure	psig & psia	kPa and kPaA	bar & barg
Temperature	°F & °R	°C and K	°C and K
Load	HP and BHP	KW	KW
Flow	MMscfd	Mscmd (decs)	MMscmd
Force	lbf	Kgf	Kgf

Use Absolute instead of Gage: Normal mode is that suction and discharge pressures are shown as gage pressures. However, you may toggle between gage and absolute pressures via this menu item.

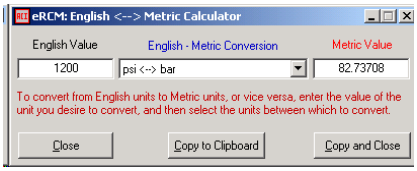
Rescale Y-axis: Allows you to rescale the Y-Axis so that the minimum and maximum values used to plot the curves are chosen by you, instead of the those chosen by the software. An onscreen axis will show you the subsequent divisions based on your new upper and lower limits.

Reset Y-axis: Resets the Y-Axis back to minimum and maximum values chosen by the software.

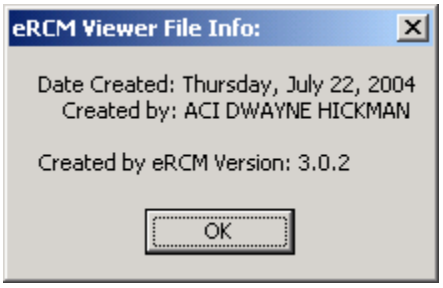


Play Demonstration: When activated, eRCM Viewer simulates monitoring real-time changes in operating conditions. A crosshair with fading trails indicates recent trends.

Metric Calculator: Simple calculator to convert between Imperial and Metric units.

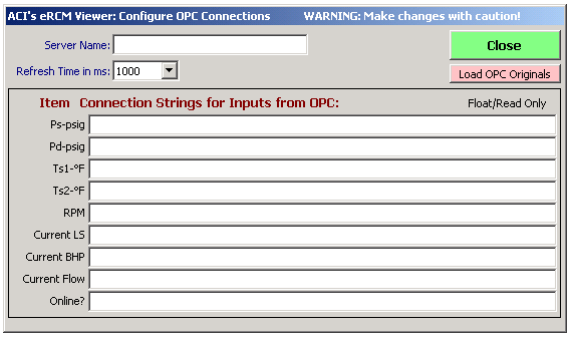


Information about current file...: Details information about the current eRCM Viewer file.

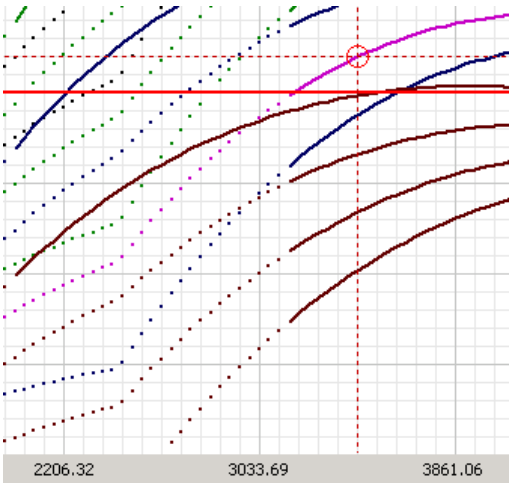


Setup Monitoring Connections...: Displays a dialog box to indicated the PLC/HMI tagnames for OPC and/or DDE connections to live sensor data.

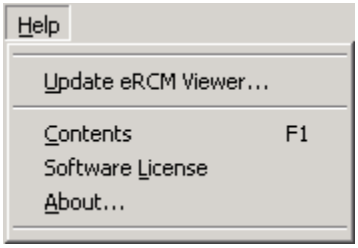
Activate Monitoring...: Turns on/off the connection to the OPC Server and/or to DDE server.



Do no cliip curves...: Instead of clipping curves, a dotted extension is shown to indicate the unsafe/undesirable areas of operations.



Help Menu



Update eRCM Viewer...: If you are online, when this item is selected, the eRCM Viewer download area will be checked to see if a newer version is available. If so, the latest version will be downloaded and you will be given the option to install it. If you have problems, you can always direct your browser to ACIServicesInc.com/ercmviewer where updates to the software may be downloaded to your PC, extracted and installed.

Contents: Shows this Help File.

Software License: Redisplays the software agreement license the user accepted before the product could be initially used, or after any upgrades and/or updates were installed.

About...: Shows the eRCM Viewer Splash Screen, and the current version of the software.

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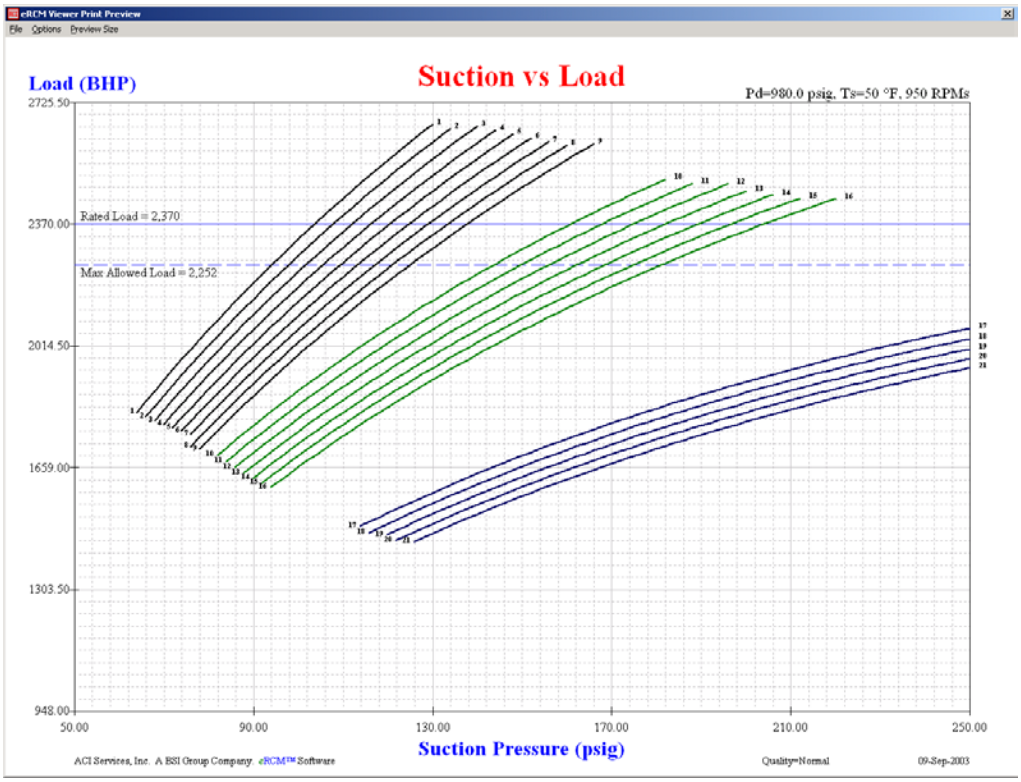
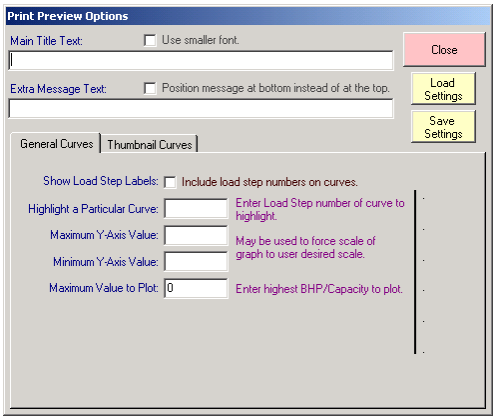
Printing Graphs

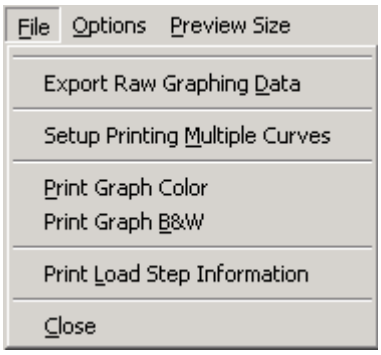


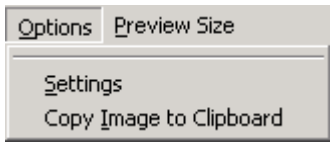
To print any of the curves, simple select Print Graph from the main menu bar. Upon doing this, a preview of the page will be shown on the screen. To print this to a printer, select Print Graph Color (or Print Graph B&W) from the menu bar.

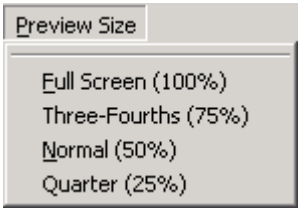
Graph Options: If you need to add/change certain items about the current graph, select Options-Settings from the menu. You can change the default titles, font sizes, y-axis scaling, and more.



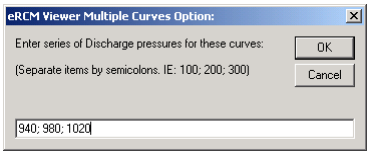
Print Preview Menus:







- **File**
  - **Export Raw Graphing Data:** Used to export data to a file readable by other graphing software and spreadsheet applications. This allow you the ability to import the graph data into a different program for even more graph manipulation.
  - **Setup Printing Multiple Curves:** Use when you want to print multiple curves without have to generate each one individually prior to printing. Here, you can specify a range of pressures or speeds and eRCM Viewer will print a series of graphs.



  - **Print Graph Color:** Prints the graph to the select print as a color document.
  - **Print Graph B&W:** Prints the graph to the select print as a black and white document.
  - **Print Load Step Information:** Prints a document detailing the definitions for each load step.
  - **Close:** Close Print Preview and return to the main eRCM Viewer software.

- **Options**
  - **Settings:** Displays options that allow you to customize the graph.
  - **Copy Image to Clipboard:** Places an image of the graph into the Windows clipboard. You may then paste it into your other document applications.

- **Preview Size**
  - **Full Screen (100%):** Enlarges the Print Preview window.
  - Others: Adjusts the Print Preview window accordingly.

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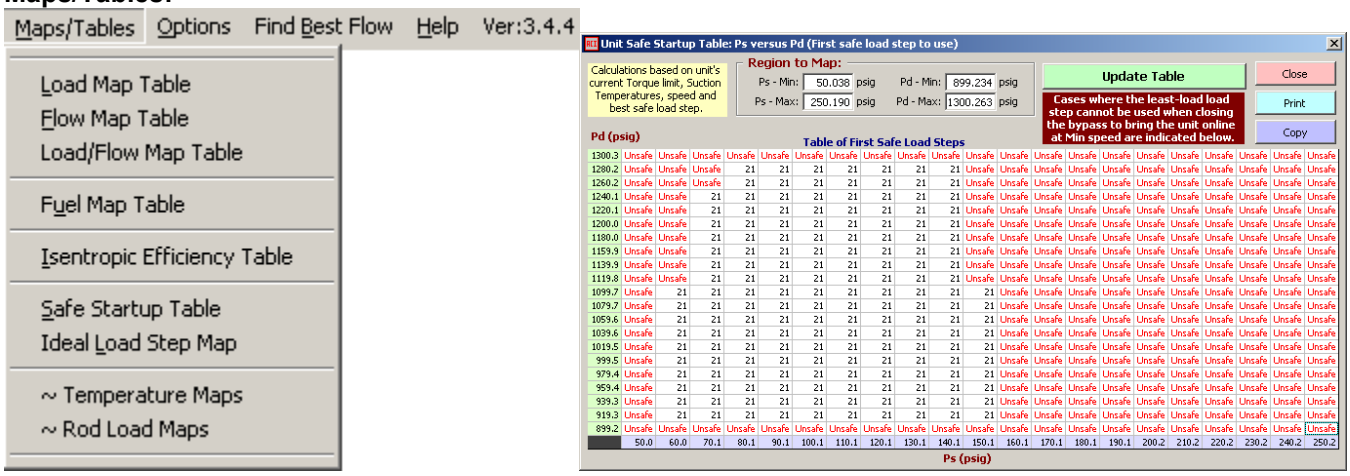
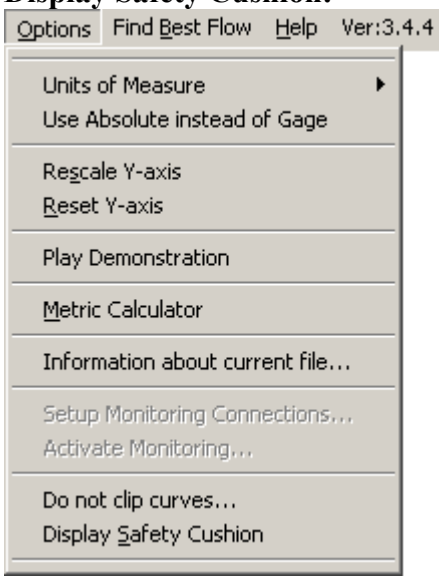
New Items:

Maps/Tables:



To generate tables of loads, flows, isentropic efficiencies, etc., click the Maps/Table menu item and select the desired submenu item. Next, set the ranges of interest and then elect to Update Table. Table data may be copied to spreadsheet programs and/or 3-D plotting programs to visualize the data as a 3-D surface.

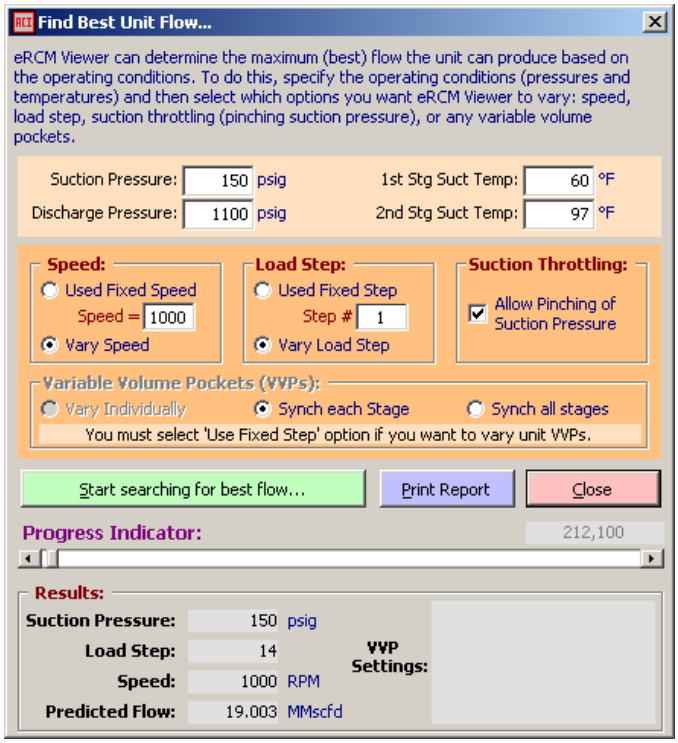
Display Safety Cushion:



This feature is ideal for operation of manual units. When engaged, it gives the operator a risks rating (Low, Medium, High) of how well the current load step will handle ±2% changes in suction or discharge pressures, ±2% changes in speed and/or ±2% changes in suction temperature, and still keep safely running.

When operators need to leave units unmanned (overnight, weekends, extended period) then they can use this feature to select a load step with low risks.

Find Best Unit Flow:



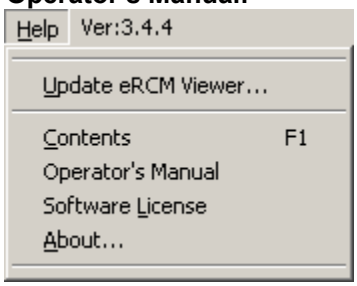
This option determines the best flow rate the unit can deliver based on changing load steps, adjusting speed, throttling suction pressure back, and adjusting any variable volume pockets.

To prevent billions of possible scenarios from being calculated, eRCM Viewer imposes the following restrictions:

- VVPs are only varied if a single load step is specified.
- Increments in speed are from a minimum of 2 RPM to a maximum of 5 RPM.
- Decrements to suction pressure as it is throttled are from a minimum of 2 psig to a maximum of 5 psig.

When determined, the best flow rate, and its corresponding settings of suction pressure, load step, speed, and VVPs are displayed.

Operator's Manual:



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