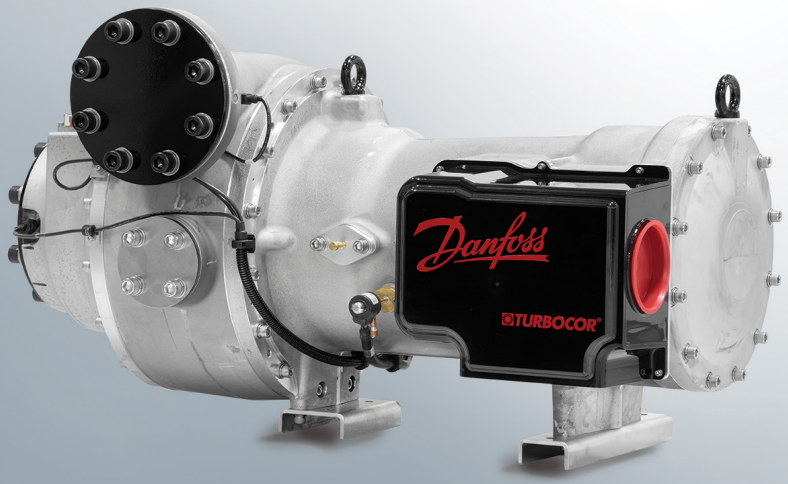
ENGINEERING
TOMORROW

SMT User Manual - Revision H

Danfoss Turbocor® **Twin-Turbine** Centrifugal Series Compressors

TTS, TGS, TTH, TTG, VTT, and VTX Series Compressors



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TURBOCOR®

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List of Changes

Revision	Date	Page	Description of Change
H	07-21-2020		Added new screenshots throughout manual. Reworked content to include VTX information.

Chapter 1.0 Service Monitoring Tools Overview

1.1 Service Monitoring Tools Suite

Figure 1-1 TTS/TGS SMT Suite Launcher Strip - Not Connected

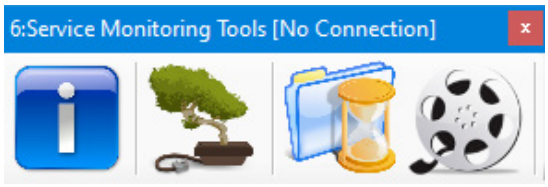
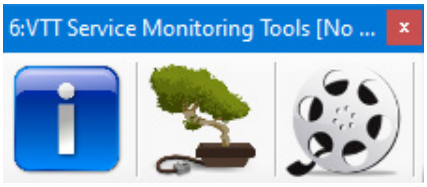


Figure 1-2 VTT/VTX SMT Suite Launcher Strip - Not Connected



Once connected, more tool icons may appear in the *SMT Suite Launcher Strip* depending on the compressor's established access level.

Figure 1-3 TTS/TGS SMT Suite Launcher Strip - Connected

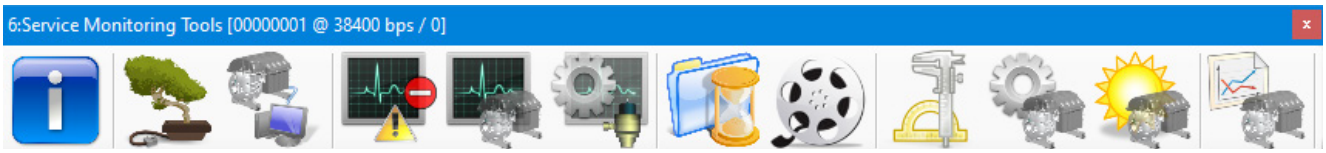
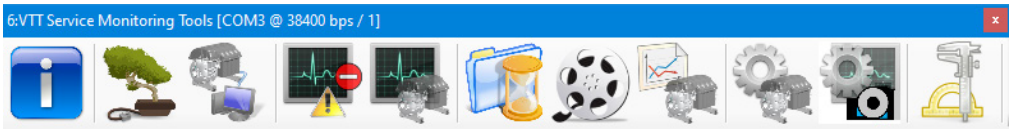
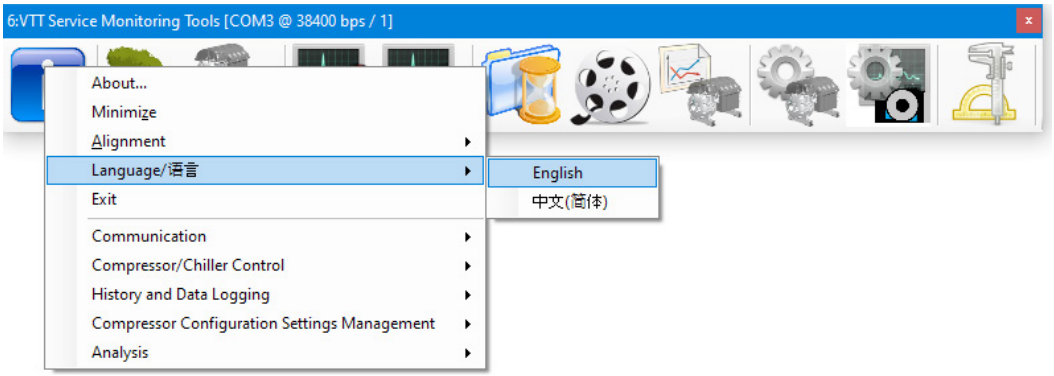


Figure 1-4 VTT/VTX SMT Suite Launcher Strip - Connected



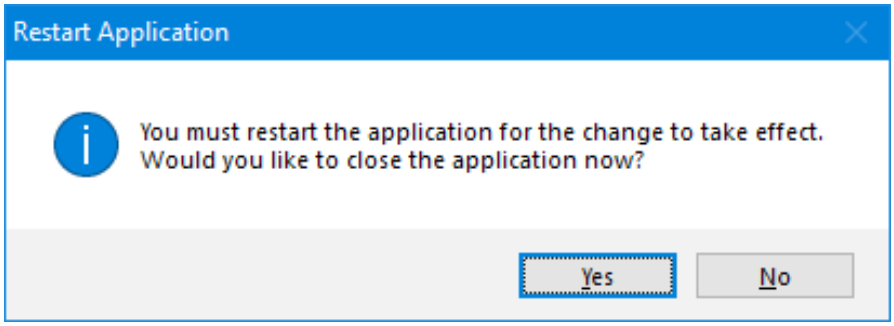
To change the language in the SMT, Right-Click the main toolbar and select Language then English or Chinese.

Figure 1-5 Select Language



To save language preference, restart the application. The chosen language will be stored in settings. The default language found in local machine settings will be used during installation.

Figure 1-6 Restart Application



1.2 Compatibility Requirements

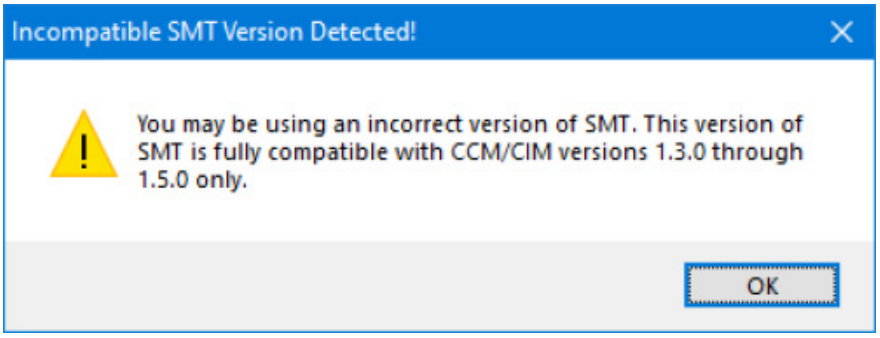
Refer to "Table 1-1 SMT Software Requirements" provides the system requirements for the SMT.

Table 1-1 SMT Software Requirements

Computer Requirements
Framework: .NET Framework Version 4.0 or later.
Operating System: Microsoft Windows XP (32-bit or 64-bit) SP2 or later, Microsoft Windows Vista (32-bit or 64-bit) Basic or better, Microsoft Windows 7 (32-bit or 64-bit) Home Basic, or Windows 10 (32-bit or 64-bit).
Hardware: 1.0 GHz or higher CPU, minimum OS-required RAM. Hard-disc needs to have 20 MB or more free space available.
For VTT/VTX CIM USB driver compatibility, the operating system must provide native support for USB serial driver (Usbser.sys).
For optimal viewing, the minimum display resolution should be set at 1024x768 with 100% DPI, high-color display (or better).

A Compatibility Warning message will be displayed once the Service Monitoring Tool (SMT) is connected to the compressor. The Compatibility Warning message applies to the entire program, not just an event/snapshot. The SMT may still work, but some functionality may be limited or not work as expected. Refer to "Figure 1-7 Compatibility Warning" for the message example.

Figure 1-7 VTT/VTX Compatibility Warning



Depending on compressor access level, the following tools may be available from the SMT Suite Launcher Strip:

Table 1-2 SMT Software Icons

Icon	Tool	Description
	About	The *About* tool displays a form showing OS and framework version information, SMT software system release product version info, and a listing of software assemblies loaded for the SMT software product. • To view a detailed description of any given assembly, select an item in the loaded assemblies listing and a text description and graphic icon (if exists) displays in the area below • To copy all of the version information to the clipboard, click the *Copy Info* button. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Compressor Connection Manager	Discover and establish a means of communication with the compressor. (TTS/TGS, TTH/TGH, and VTT/VTX)
	ModComm Tool	Assists in troubleshooting a Bearing, Motor and Compressor Controller (BMCC) or monitoring registers by providing access to ModBus registers on a raw level. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Active Alarm/Fault Viewer	Instantaneously monitor the alarm and fault status of a connected compressor device and configure the alarm and fault limits. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Compressor Monitor	Monitor the most commonly desired parameters of the BMCC related to motor, bearing, and compressor operation. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Chiller and Analog Configuration	Allows you to view or modify the chiller control and analog output control configuration parameters and settings. (TTS/TGS 3.1.X or older Firmware Only)
	EXV Configuration Tool	This allows you to view and configure the electronic expansion valve configuration parameters and settings. (TTS/TGS AND TTH/TGS Only)
	Logged Event and Fault Viewer	Retrieve logged fault and event data regarding the operation of a connected compressor for the purpose of troubleshooting and diagnostics. (TT/TG 3.1.X or older Firmware Only)
	Compressor Data Recording and Playback	Start and stop recording of any variables on the BMCC, as well as launch a server partially simulating an actual compressor using previously recorded data. The intended usage of this tool is not only for training, but for testing, evaluation and compressor troubleshooting purposes. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Bearing Calibration	Execute a bearing calibration procedure and analyze the outcome. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Compressor Configuration	View and configure the compressor operation, IGV startup, surge/choke, and other operational configuration parameters. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Compressor Commissioning	View, modify and commit site-specific compressor parameter values of a connected compressor, as well as import and export configurations between portable files. Minor guidance is provided to the user by presenting any number of configuration pages which are necessary for consideration during the deployment of a compressor system and the displaying of basic coverage/flow indication. (TTS/TGS and TTH/TGH ONLY)
	Compressor Data Trending	Graphically monitor selected compressor parameter values and load or save user-configurable watch configurations. (TTS/TGS, TTH/TGH, and VTT/VTX)
	Valve Control	View and configure the valve operation: Motor Cooling, VFD Cooling, IFV, and Staging valves. (VTT/VTX only)

1.2.1 Right-Click Context Menu

From the SMT Launcher Strip, you can right-click with your mouse to view a context menu providing easy access to tasks, including:

- Launching a tool - select the desired tool by name.
- Display the About form - click About.
- Minimize the tool suite - click Minimize and the tool will be minimized to your task bar under one window button.
- Change the SMT Launcher Strip orientation - click Alignment -> Horizontal to display the SMT Launcher Strip in a landscape format or Alignment -> Vertical for a portrait layout.

1.3 General Usage

There are several helpful features common across all tools in the SMT software system geared toward simplifying day-to-day as well as extensive usage. These features include: internal logging system, informative tooltips, highlight-on-click, collapsible group boxes, interactive graphs, persistent user settings, normalized tool framework, and product update checking.

1.3.1 Internal Logging System

To enhance maintenance and troubleshooting the SMT software system, all tools utilize a common logging system functionality for outputting to file internal trace information, as well as any error occurrences which may occur.

The log file is located at: [My Documents]\Danfoss Turbocor\SMT\smt.log

1.3.2 Informative Tooltips

To aid in general use and interpretation of compressor data, all compressor parameter edit/display fields will display a tooltip which pops up if the mouse cursor hovers over the field and will describe the modbus register associated with that parameter.

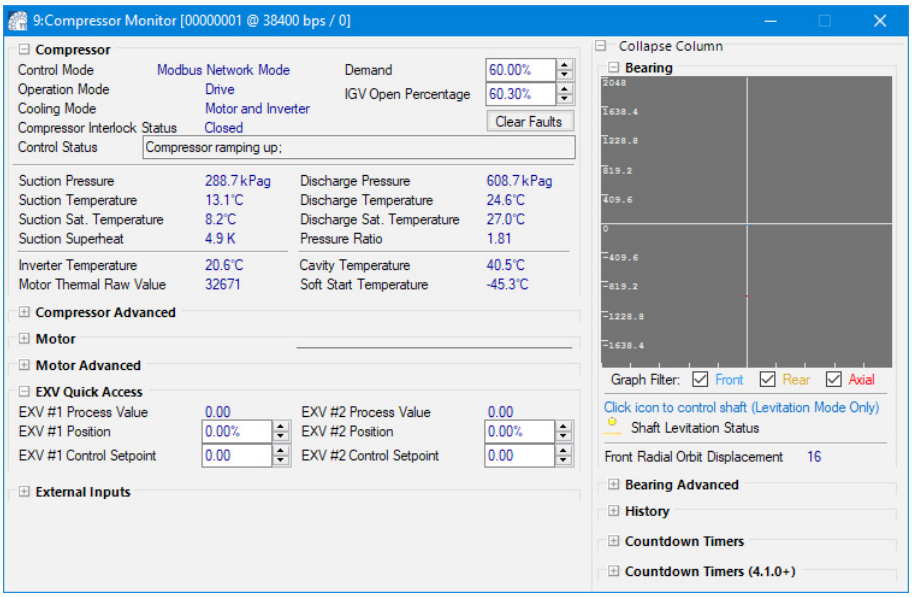
1.3.3 Highlight-on-click

To assist you in viewing data "at a glance", certain readout fields can be highlighted to make them stand out from the rest. The highlighting of fields with this functionality enabled can be toggled by left-clicking on the desired field.

1.3.4 Expand/Collapse-on-click

Any group boxes which display a box bearing a +/- box in the upper left-hand corner may be collapsed in order to reduce the size of a form when some information is not desired to be viewed. To collapse or expand these regions, left-click on the +/- graphic.

Figure 1-8 Collapsible Group Boxes Example (TTS/TGS SMT Shown)



1.3.5 Interactive Graphs

Graphs display data and provide a different perspective. The graphing feature provides the ability to pan, zoom, etc.

- To pan: if panning is enabled, click and drag in either the X or Y direction.
- To fast pan: hold the control key while clicking and dragging within a graph to pan across larger areas.
- To zoom: if zooming is enabled, use the scroll wheel on the mouse to zoom in and out - holding shift while scrolling will only stretch the Y axis; holding ctrl while scrolling will only stretch the X axis.
- To reset to initial view: double-click anywhere on the graph.

1.3.6 Persistent User Settings

Many of the interface settings are saved in a local settings file in order to persist common settings on a user-by-user basis.

Typical persistent settings include: tool form screen location, tool form normal/maximized state, collapsible form collapse/expand states, user-entered application fields (e.g., hostnames, DTC ports, technician name fields, etc.).

The settings file is located at:

[My Documents]\Danfoss Turbocor\SMT\Settings.xml

1.3.7 Normalized Tool Framework

All components considered to be tools contain a commonly-structured data identifying a tool and its interface components.

Data included in the tool metadata (assembly information) include: Tool Id #, Tool Name Id, Tool Description Id, Tool Classification, Minimum (execution) Access Level, Enumeration Count, Persistence, Connection Requirement, Dedication Requirement, and an Application Graphic.

In addition to the framework metadata, there are several components geared toward the utilization of these tool components, including standalone execution support, common interfacing components, etc.

1.3.8 Tool Identification

Each tool's title frame contains information identifying it. This information includes:

- Tool/Form ID - The first number, indicating the ID number of the current tool.
- Tool Title - The localized text title of the current tool.
- Device Connection Info - This includes the serial port and baud rate or IP address and port number and the slave address of the device with which the current tool is connected.

NOTE

To differentiate between instances of the SMT, look at the device communication information displayed in the tool's frame.

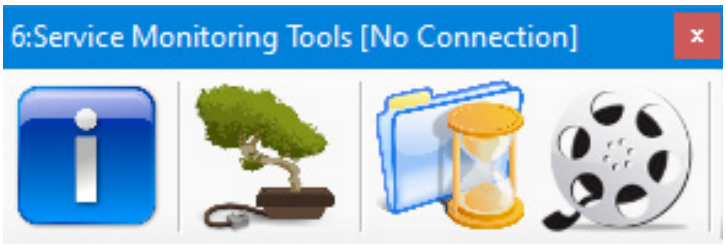
Chapter 2.0 Recordings

2.1 Running a Recording

While the SMT Suite Tools are intended to be used with live Danfoss Turbocor (DTC) compressors, it is possible to partially simulate communication with a compressor using recorded data. The playback simulation can be used for displaying values, but cannot accept write requests (parameter updates) and certain features may not be available (such as fault or event log retrieval).

When you first open the Service Monitoring Tools software, a limited version of the SMT Suite Launcher Strip is displayed.

Figure 2-1 SMT Suite Launcher Strip - Not Connected (TTS/TGS and TTH/TGH SMT Shown)

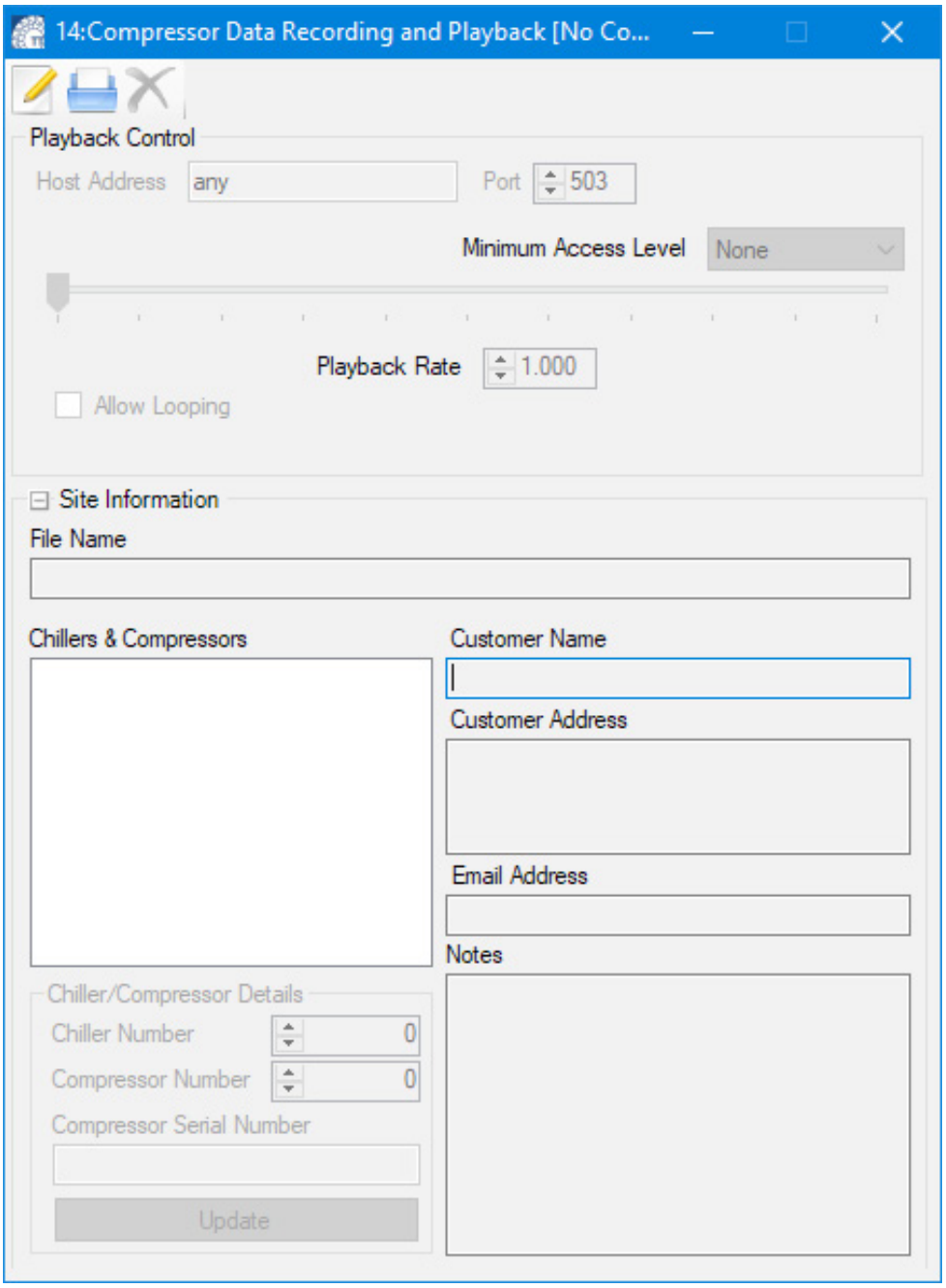


1. Click the Compressor Data Recording & Playback Tool icon.

Figure 2-2 Compressor Data Recording & Playback Tool Icon

2. The Compressor Data Recording & Playback Tool window displays.

Figure 2-3 Compressor Data Recording and Playback Tool

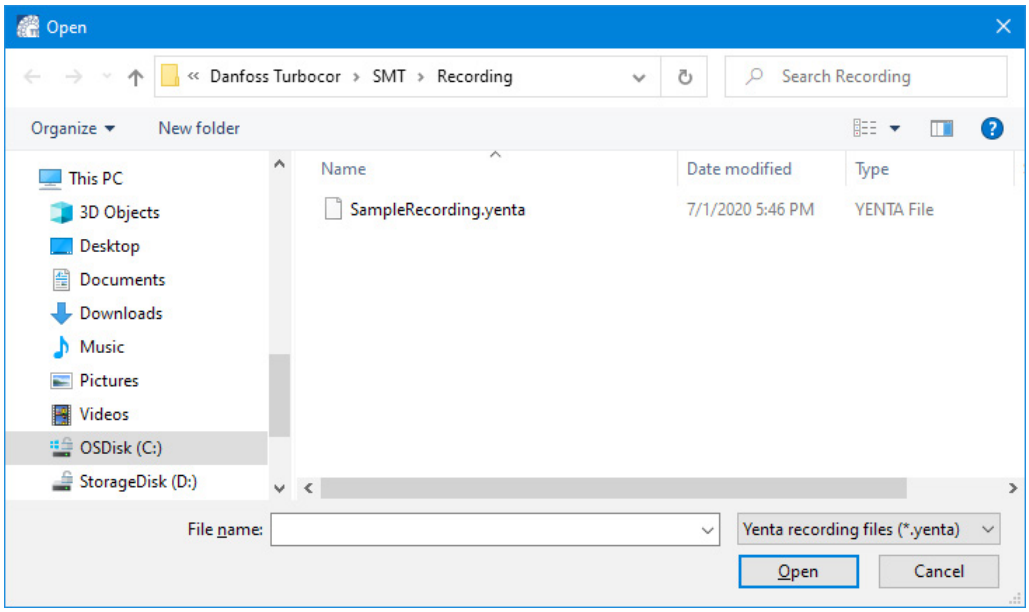


3. Click the Open Recording icon.

Figure 2-4 Open Recording Icon

The Choose a recording file to open window displays:

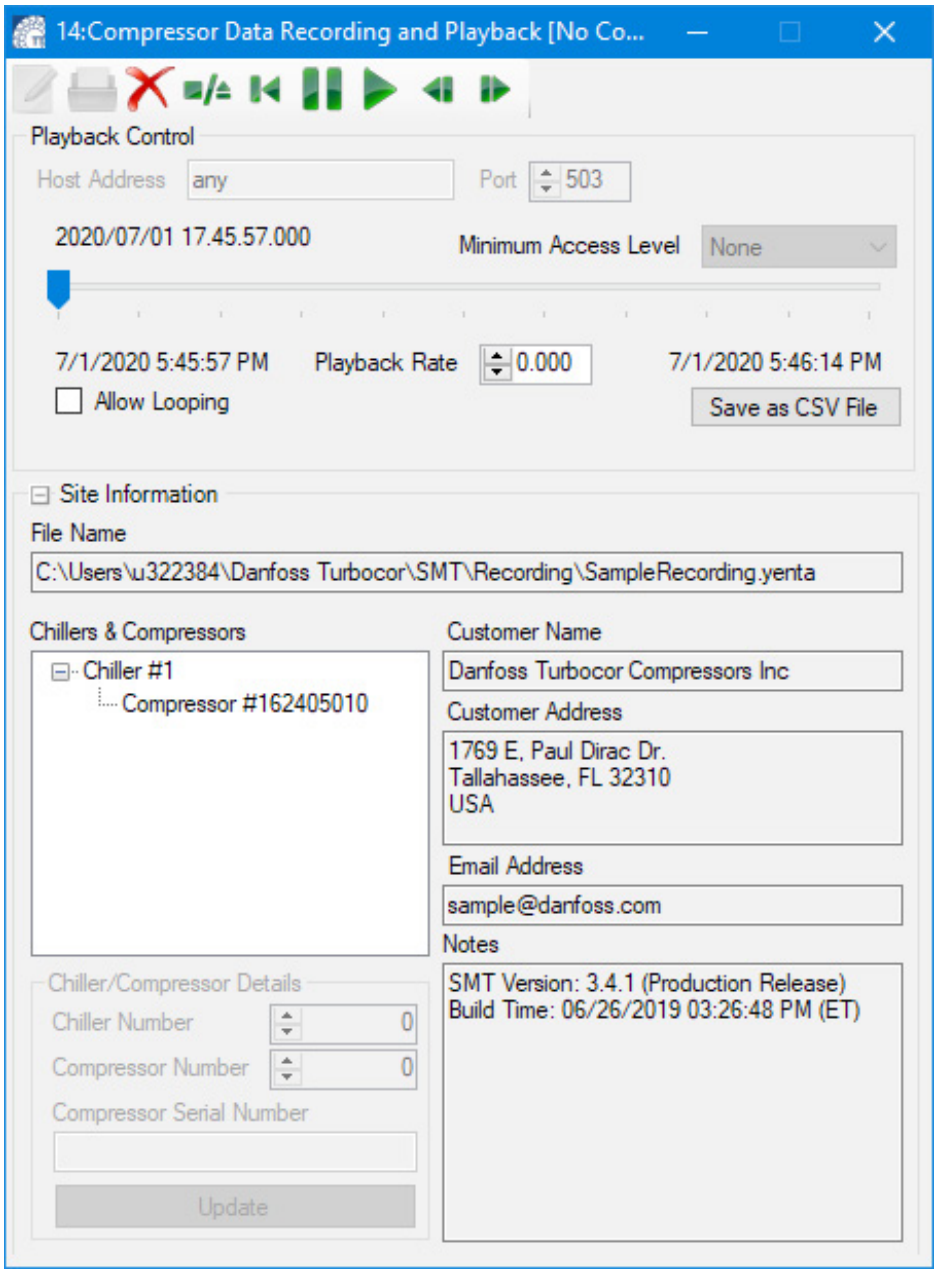
Figure 2-5 Choose a Recording File to Open Window



4. Select a **recording file,** and then click **Open**.

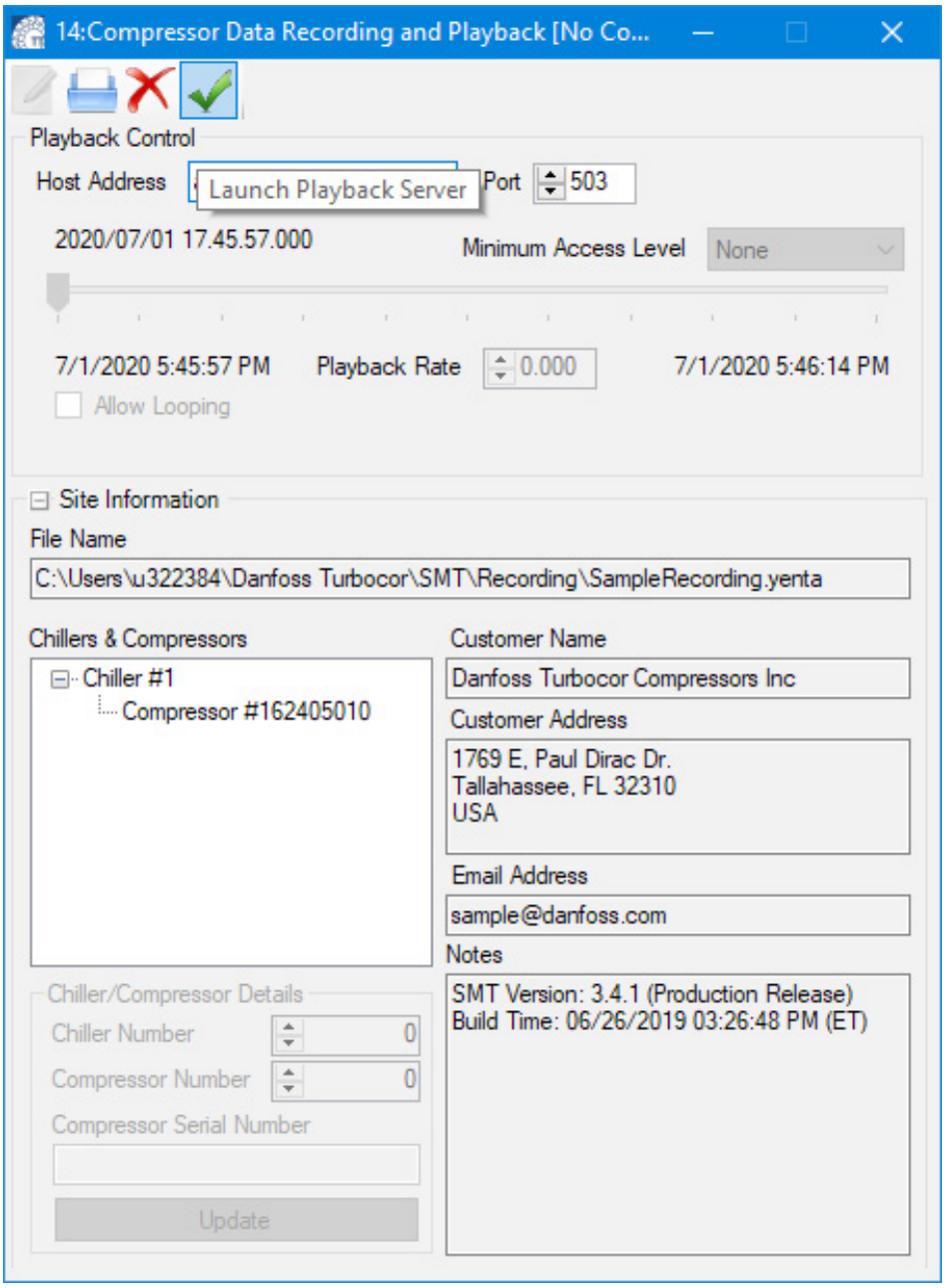
NOTE
The playback host will automatically start when you connect to it.

Figure 2-6 Compressor Data Recording & Playback Tool



5. If the playback control icons do not appear at the top of the Compressor Data Recording & Playback Tool, a window similar to "Figure 2-7 Compressor Data Recording and Playback Tool showing Launch Playback Server" on page 19 will display. Complete steps a and b; otherwise jump to step 6.

Figure 2-7 Compressor Data Recording and Playback Tool showing Launch Playback Server



a. Check the settings of the Host Address and Port fields (default values are "any" and "503").

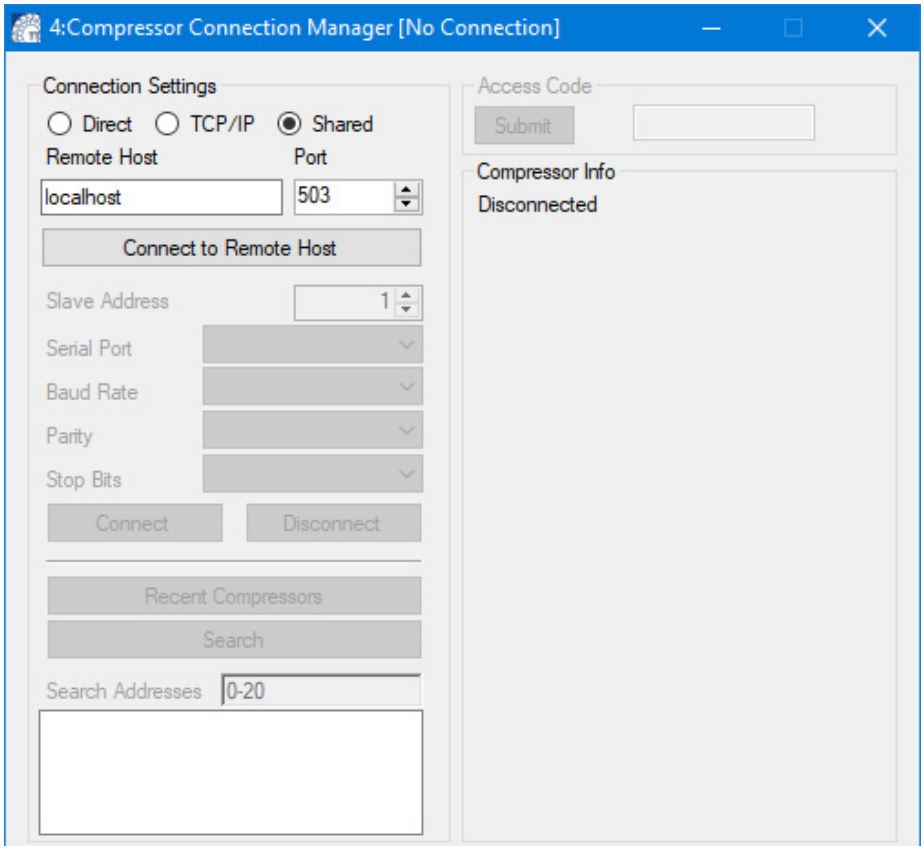
b. Click the Launch Playback Server icon. For more information, refer to Section "8.1 Launching the Compressor Data Recording and Playback Tool" on page 47.

Figure 2-8 Launch Playback Server Icon

6. Click the Compressor Connection Manager icon.

Figure 2-9 Compressor Connection Manager Icon

Figure 2-10 Compressor Connection Manager



7. In the Compressor Connection Manager, ensure that Shared is selected under the Connection Settings.
8. Ensure that the field labeled Port matches the Port filed displayed on the Compressor Data Recording & Playback Tool and that the field labeled "Remote Host" says "localhost".
9. In the Compressor Connection Manager, click Connect to Remote Host.

NOTE

No other information (e.g., Serial Port, Baud Rate) will need to be selected/entered prior to clicking the **Connect** button.

10. Click Connect. You are now connected.

NOTE

Access level is determined by the recording and cannot be changed. For example, if the recording was made at an OEM level, the recording playback will display OEM level access.

Figure 2-11 TTS/TGS and TTH/TGH SMT Suite Launcher Strip - Connected

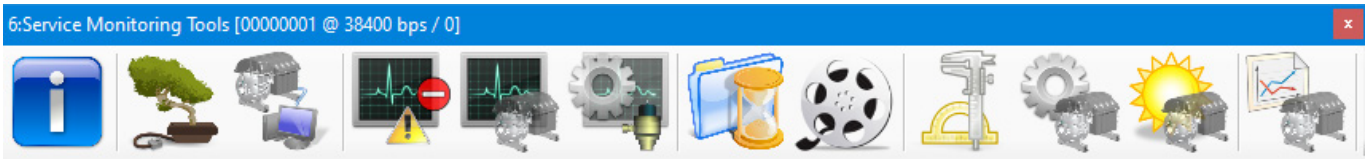
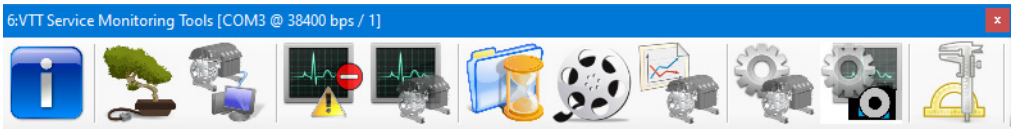


Figure 2-12 VTT/VTX SMT Suite Launcher Strip - Connected



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Chapter 3.0 Compressor Connection Manager

The Compressor Connection Manager is used to discover and establish a means of communication with a compressor. This tool can be used to establish a connection with a compressor, close an established connection, detect compressor settings, change compressor access level, synchronize the compressor real-time clock (RTC) with a personal computer (PC) clock, and view a list of recent compressor connection settings.

When a connection with a compressor is established, information detailing the compressor's current access level, Bearing and Motor Control (BMC) version, Compressor Controller (CC) version, part number, configuration number, refrigerant type, unit system, and current real-time clock readout are displayed as well as the current connection status.

3.1 Accessing the Compressor Connection Manager

NOTE

Please see Section 1.5 "Running a Simulation" if you wish to evaluate the software without connecting to a compressor.

1. Click the Compressor Connection Manager icon.

Figure 3-1 Compressor Connection Manager Icon

The Compressor Connection Manager window displays:

Figure 3-2 TTS/TGS and TTH/TGH Compressor Connection Manager

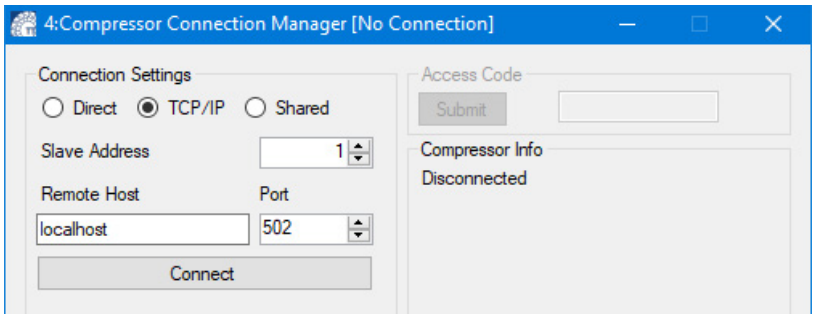
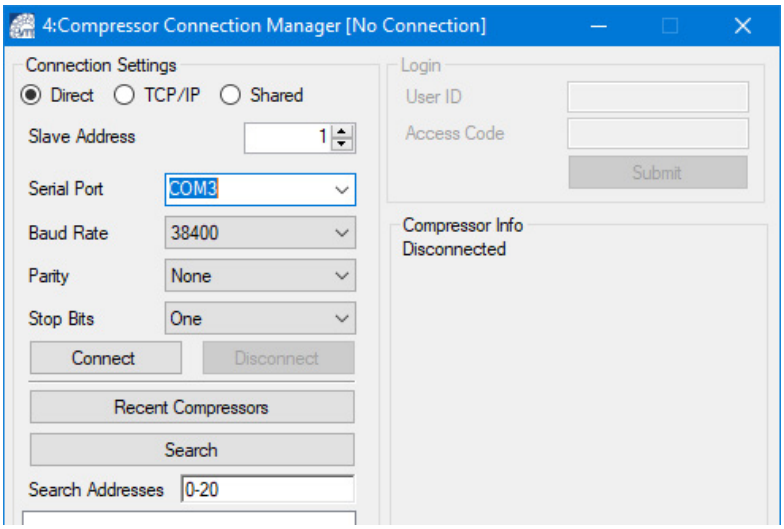


Figure 3-3 V TT/VTX Compressor Connection Manager



3.2 Compressor

To establish a connection with a compressor:

1. From the Connection Settings group, select a connection type:
   - Direct for direct use of the serial port. This is the default recommended setting.
   - Shared for indirect use of a serial port, allowing multiple applications access to the same compressor via the same serial port.
   - Transmission Control Protocol/Internet Protocol (TCP/IP) for communication with a Modbus TCP compressor interface.
2. If using Shared or TCP/IP, enter your shared host name and TCP port number - usually the default values (localhost and 502) will work.
   a. For a Direct Connection, refer to Section "3.2.1 Direct Connection" on page 24.
   b. For a Shared Connection, refer to Section "3.2.2 Shared Connection" on page 25.
   c. For TCP/IP, refer to Section "3.2.3 TCP/IP Connection" on page 25.

3.2.1 Direct Connection

1. From the Connection Settings group, select Direct as your connection type.
2. Select the serial port to which the compressor is connected from the Serial Port drop-down list.

NOTE

The Serial Port listing only shows serial port names which currently exist on the local/host machine.

3. Do one of the following:
   a. If the slave address and baud rate are known: enter the **known slave address** in the *Slave Address* field and select the **known baud rate** from the *Baud Rate* drop-down and click **Connect** - a connection should now be established.
   b. If the slave address or baud rate are unknown, enter a **slave address search range** or **list of values to test for detection** in the *Search Addresses* field and click **Search** (default is 0-20).

After a short period of time (the fewer addresses to check, the quicker the search will be), the search results containing a list of communication setting combinations display in the *Search Addresses* field.

Double-click any of the **communication setting combinations** to automatically connect using those settings. A connection should now be established.

If no compressors are detected, *No compressors found!* will display in the listing.

4. Type in your *Access Code* and click **Submit.**

3.2.2 Shared Connection

To enter a Shared connection:

1. From the to Connection Settings group, select **Shared** as your connection type.
2. Enter your **shared host name** and **TCP port number** - usually the default values will work.
3. Click the **Connect to Remote Host** button.
4. Select the **serial port** to which the compressor is connected from the Serial Port drop-down box.
5. Do one of the following:
   a. If the slave address and baud rate are known: enter the **known slave address** in the *Slave Address field* and select the **known baud rate** from the *Baud Rate* drop-down and click **Connect** - a connection should now be established.
   b. If the slave address or baud rate are unknown, enter a **slave address search range** or **list of values to test for detection** in the *Search Addresses* field and click **Search** (default is 0-20).

After a short period of time (the less addresses to check, the quicker the search will be), the search results containing a list of communication setting combinations display in the *Search Results* listing.

Double-click any of the **communication setting combinations** to automatically connect using those settings. A connection should now be established If no compressors are detected, *No compressors found!* will display in the listing.

6. Type in your Access Code and click **Submit.**

3.2.3 TCP/IP Connection

1. From the *Connection Settings* group, select **TCP/IP** as your connection type:
2. Enter the slave address in the *Slave Address* field.
3. Click **Connect.**

A connection should now be established.

4. Type in your Access Code and click **Submit.**

3.3 Closing an Established Connection

To close an established connection:

1. Click the **Disconnect** button.
2. To also disconnect from a remote host (such as the *Compressor Data Recording & Playback* tool's playback host), click the **Disconnect from Remote Host** button. The tool will close any connections established and data polling will stop.

3.4 Detecting Compressor Settings

To detect compressor settings:

- Enter a **slave address search range** or **list of values to test for detection** in the *Search Results* listing and click the **Search.**

After a short period of time (the less addresses to check, the quicker the search will be), the search results display in the *Search Addresses* field. If no compressors are detected, *No compressors found!* will display in the listing; otherwise, communication setting combinations will display.

3.5 Changing Compressor Access Levels

NOTE

On connection, the SMT requires a valid access code in order to allow access to the various tools available at the given access level.
A user must not change the access level of the BMCC to a value lower than 2 if the compressor is being controlled by Modbus.
If the access level is lower than access level 2, the compressor can not accept a demand write.
For firmware versions of 3.X.X or lower, for example, if the lowest level that a compressor can accept a demand write is at Access Level 2 (Low Level), then on submission of a "0" in the Access Code field, the SMT will revert to a read-only state and the compressor will not accept writes to demand from the Modbus controller. In this case, the compressor access level should be left at Access Level 2 (Low Level) or higher.

To change the compressor access level:

TTS/TGS and TTH/TGH SMT

1. Enter the desired **Access Code,** then click **Submit.**

VTT/VTX SMT

1. Enter the desired **User ID and Access Code**, then click **Submit.**

The tool will send the access code to the compressor and indicate the access level on the connected compressor.

If the access code is incorrect: the compressor will revert the access to the lowest level. After five failed access code change attempts, the compressor will no longer accept access codes and will require a power cycle before allowing an access level change.

NOTE

Since the access level on the compressor will remain after disconnecting from the compressor, be sure to either downgrade the access level or power cycle the compressor after completing service.

3.6 Synchronizing the Compressor Real-Time Clock with a PC Clock

To synchronize a compressor RTC with a PC clock:

- Click the **Sync Compressor/Computer Time** button.

The tool will attempt to update the compressor's RTC to match the local computer's date and time to within ±500 ms.

3.7 Viewing a List of Recent Compressor Connection Settings

To view a list of recent compressor connection settings:

- Click the **Recent Compressors** button.

A list of recent compressor communication settings will display. If there is no connection history, *No compressors found!* displays in the listing; otherwise, communication setting combinations are displayed. Double-clicking any of the settings combination entries will automatically attempt to connect using the those settings.

3.8 Selecting the Unit System

To select the appropriate unit system for the compressor:

- Click the Units Drop-Down Box and select the desired unit system.

3.9 Connection Status Indications

The Connection Status is indicated in the Compressor Info section of the Compressor Connection Manager Window.

- **Disconnected:** no connection exists with a compressor or remote compressor host.
- **Ready to Connect:** a connection with a remote host (if applicable) has been established, but no compressor connection has yet been established.
- **Compressor is starting up:** The currently connected compressor is in startup mode.
- **Connected:** There has been established a connection with a remote host (if applicable) and a connection with a compressor has been established and verified.
- **No compressor found:** Any serial ports or connections have been established, but a valid compressor was not able to be detected.
- **Error opening port:** There was an error opening the specified serial port (either the port is already in use, the port name doesn't exist, or there was some other error attempting to open the serial port).
- **Server not found:** Could not connect to remote host.
- **There was a time out during communication' (Error Time out):** There was a timeout during communication.
- **Invalid response:** The response received was invalid.
- **Received an error response:** The host responded with an error.
- **Error:** CRC mismatch: The received message has a cyclic redundancy check (CRC) mismatch.

3.10 RAM Only and RAM & EEPROM Check boxes (TTS/TGS and TTH/TGH Only)

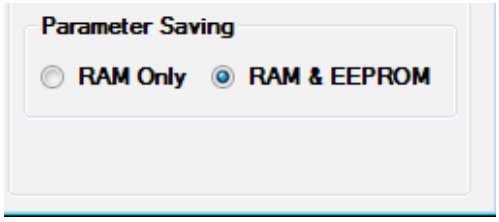
By default, changes made in the SMT are set to RAM & EEPROM.

If the RAM & EEPROM check box is clicked, all parameter changes are saved to persistent memory, if said register is capable of doing so.

⚠ • • • CAUTION • • •

Saving to RAM & EEPROM will commit all the current values to permanent memory and all previous values will be lost.

Figure 3-4 Parameter Saving Frame



The Parameter Saving frame is located in the lower right corner of the Compressor Connection Tool. See "Figure 3-4 Parameter Saving Frame".

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Chapter 4.0 ModComm Tool

The *ModComm* Tool assists users in troubleshooting a Bearing, Motor and Compressor Controller (BMCC) or monitoring extra registers by providing access to Modbus registers on a raw level. This tool can be used to change the current register watch range, toggle between watching the specified watch range and all currently polled register watches, make a single write request, and change the current data interpretation view.

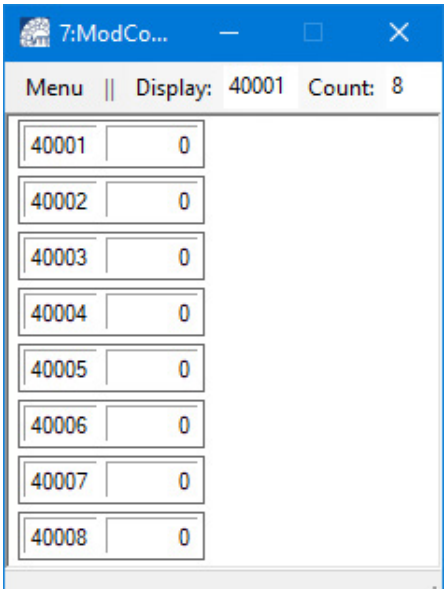
4.1 Accessing the ModComm Tool

- Once connected, select the **ModComm tool icon** from the *SMT Suite Launcher Strip.*

Figure 4-1 ModComm Tool Icon

The *ModComm* window displays.

Figure 4-2 VTT ModComm Window (VTT/VTX Displayed)

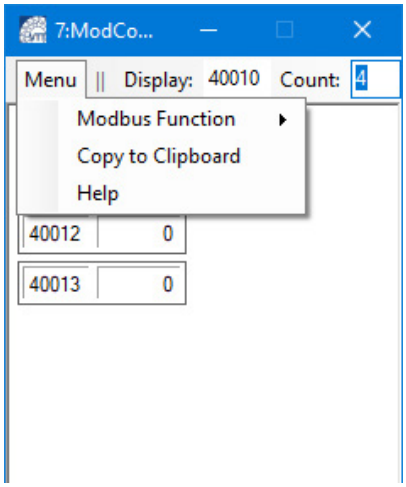


4.2 Changing the Current Register Watch Range

To change the current register watch range:

1. Double-click the Display register number in the header and change the register number to update the range.
2. If desired, the Count can be changed to display a desired number of registers.

Figure 4-3 ModComm Window Displaying Menu



4.3 Making a Single Write Request

To make a single write request:

1. Click on Modbus Function and select **Single Register Write** from the context menu.

Figure 4-4 ModComm Tool Window Showing Menu

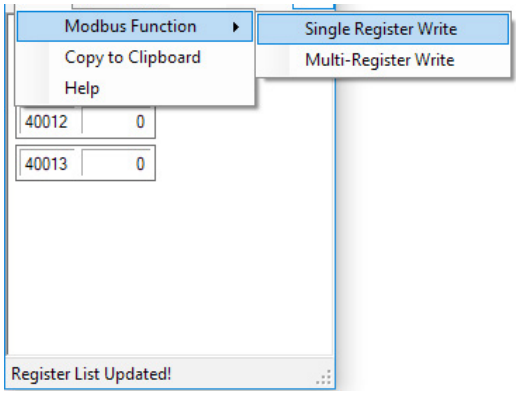
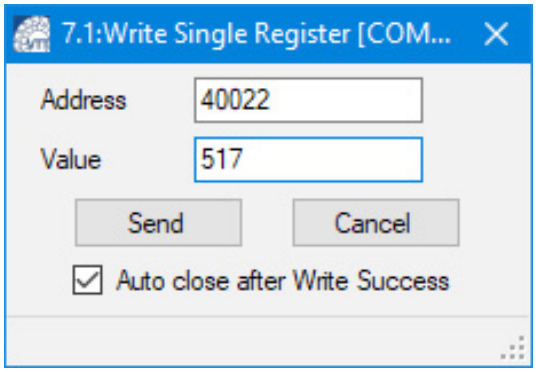
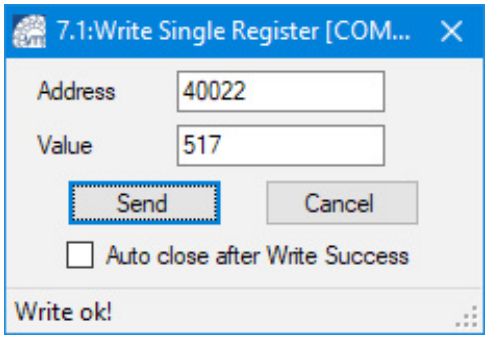


Figure 4-5 Write Single Register



2. Enter a **valid register address** (if necessary) and the **appropriate value.**
3. Click **Send** to perform the write. A window displays indicating the result of the operation.

Figure 4-6 Write Single Register Result Window

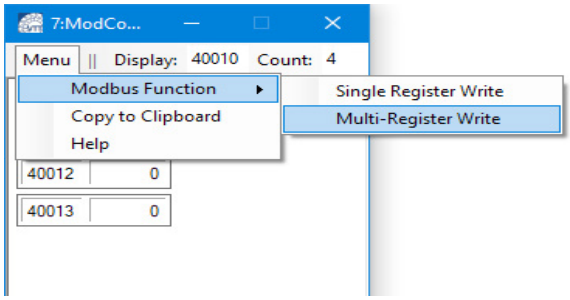


4. Look for the **Write ok!** message.

4.4 Making a Multiple Writes Request

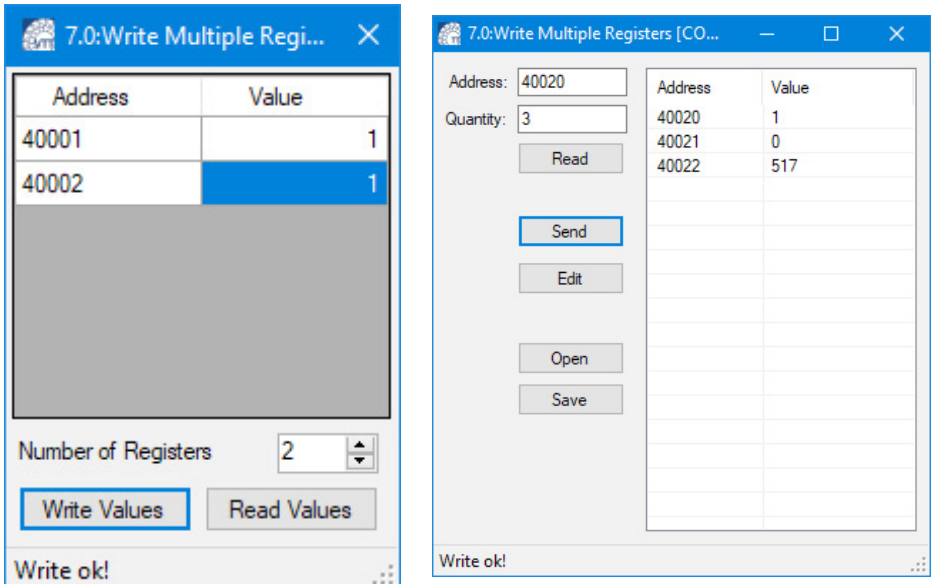
1. Click on Modbus Function and select **Multi-Register Write** from the context menu.

Figure 4-7 ModComm Tool Window Showing Menu



2. Enter the base register number and select the **Number of Registers** to be updated.
3. Update the desired registers then click **Write Values**.
4. Look for the **Write ok!** message.

Figure 4-8 Write Multiple Registers Result Window



4.5 Changing the Current Data Interpretation View

To change the current data interpretation view:

1. Right-click **anywhere on the main form** and the context menu will display.

Figure 4-9 TTS/TGS and TTH/TGH ModComm Tool Window Showing Menu

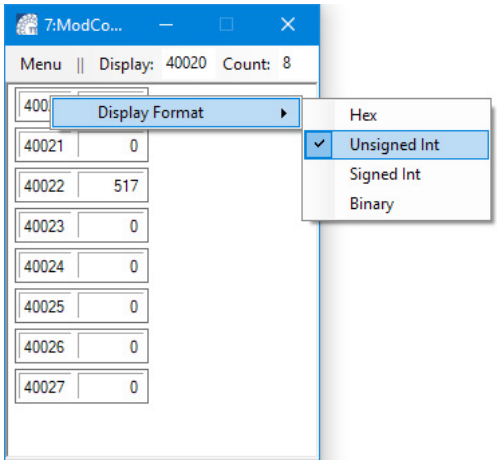
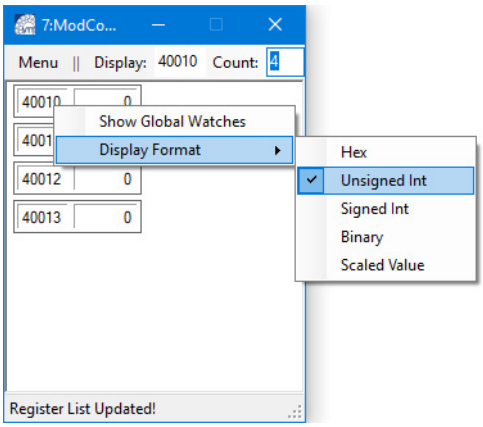
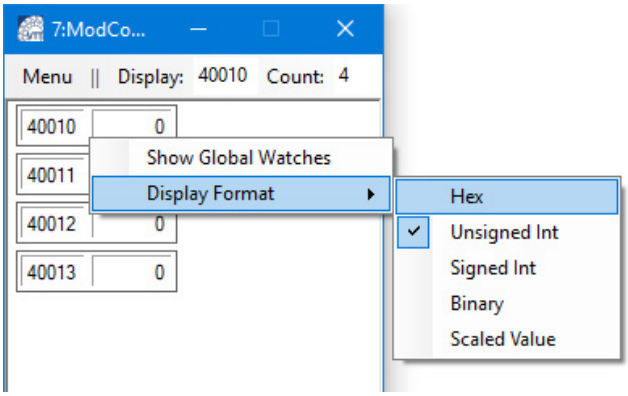


Figure 4-10 VTT/VTX ModComm Tool Window Showing Menu



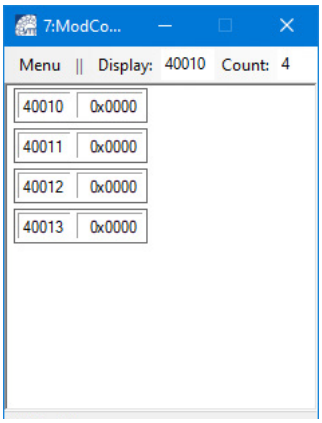
2. Highlight Display Format.

Figure 4-11 VTT/VTX ModComm Tool Window Showing Display Format Options



3. Select the **desired value display format.** The values displayed in the main form will be formatted as specified.

Figure 4-12 ModComm Tool Window Showing Chosen New Display Format (VTT/VTX Displayed)



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Chapter 5.0 Active Alarm/Fault Viewer

The *Active Alarm/Fault Viewer* allows you to instantaneously monitor the alarm and fault status of a connected compressor device and configure the alarm and fault limits. This tool can be used to view compressor alarms and faults, view motor alarms and faults, view bearing alarms and faults, and view/configure alarm and fault limits and lockout settings.

NOTE

This tool may not function properly if the connected compressor's access level is below Low.

NOTE

For alarm/fault indicators, alarm and fault status are indicated by the colored LED graphic to the left of the alarm/fault name (alarms are yellow, faults are red, and alarm + fault are orange)

5.1 Accessing the Active Alarm/Fault Viewer Tool

- Once connected, select the **Active Alarm/Fault Viewer tool icon** from the *SMT Suite Launcher Strip*.

Figure 5-1 Active Alarm/Fault Viewer Tool Icon

The *Active Alarm/Fault Viewer* window displays.

Figure 5-2 TTS/TGS and TTH/TGH Active Alarm/Fault Viewer Window

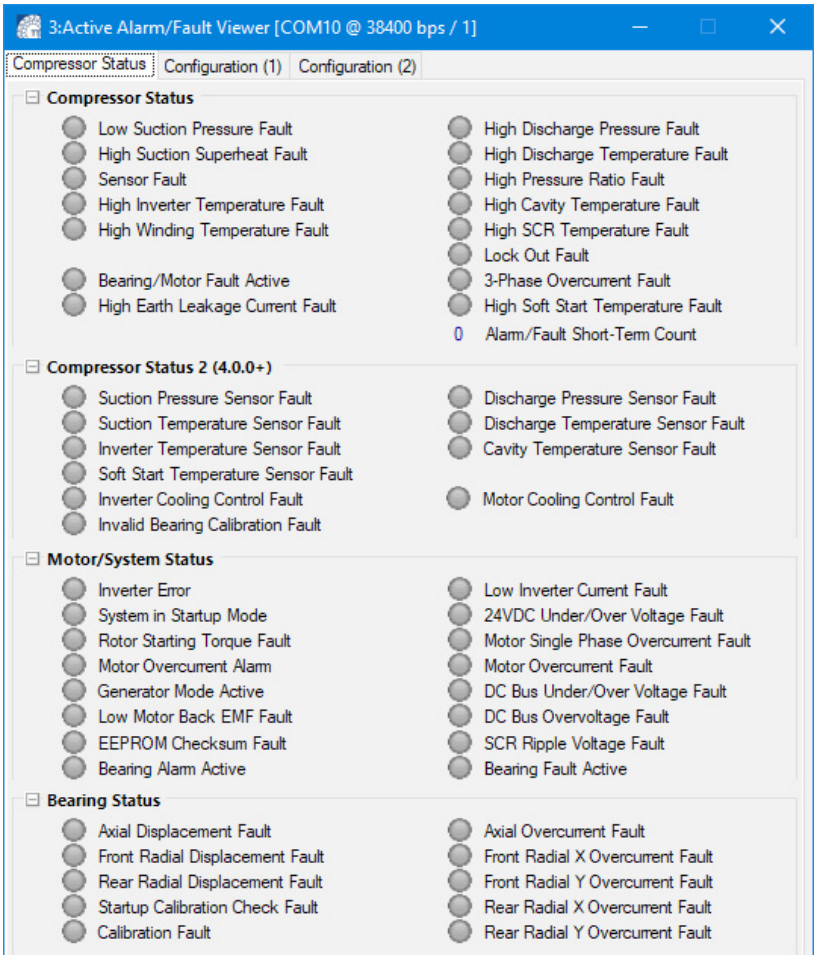
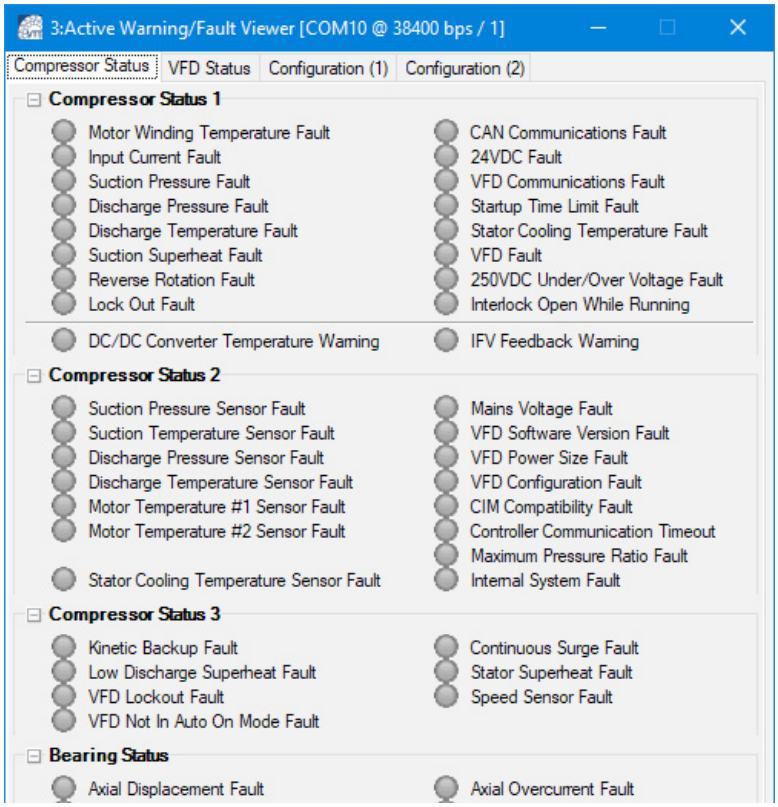


Figure 5-3 VTT/VTX Active Alarm/Fault Viewer Window



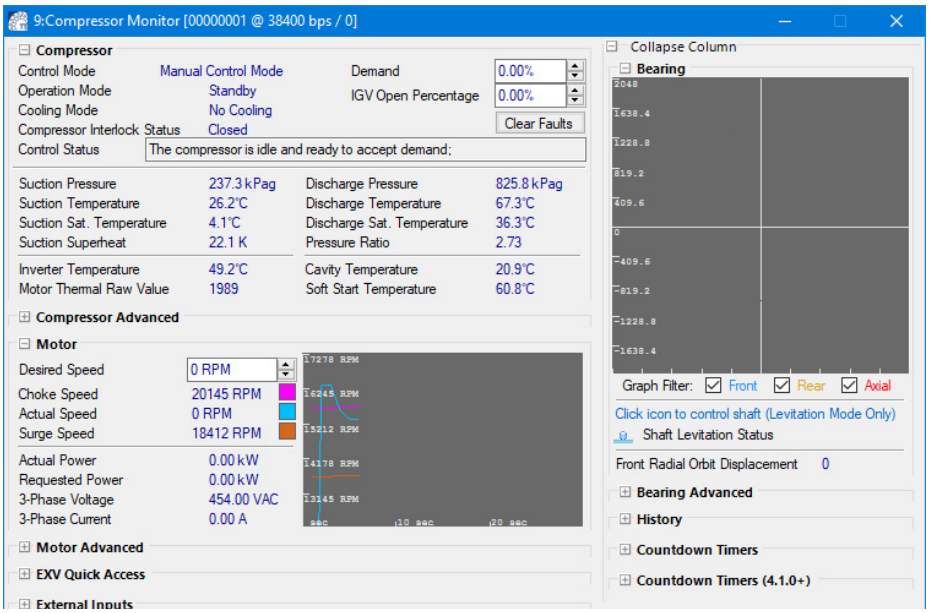
5.1.1 Clearing Faults

To attempt to clear or reset the fault status, click the Clear Faults button in the Compressor Monitor Window refer to Section "Chapter 6.0 Compressor Monitor" on page 39.

NOTE

If the cause of the fault has not be resolved, then clicking the Clear Faults button will not clear or reset the faults, since the cause of the fault still remains.

Figure 5-4 Clearing Faults (TTS/TGS and TTH/TGH)



5.2 Viewing and Configuring Alarm/Fault Limits and Lockout Settings

To view/configure alarm and fault limits and lockout settings:

- Click the **Configure Alarms/Faults** menu option.

NOTE

If the cause of the fault has not be resolved, then clicking the Clear Faults button will not clear or reset the faults, since the cause of the fault still remains. The method to access the Configure Alarms/Faults window differs between the two different SMTs. Refer to "Figure 5-5 TTS/TGS and TTH/TGH Compressor Status Tab" and "Figure 5-6 VTT/VTX Compressor Status Tab" illustrate the differences.

Figure 5-5 TTS/TGS and TTH/TGH Compressor Status Tab

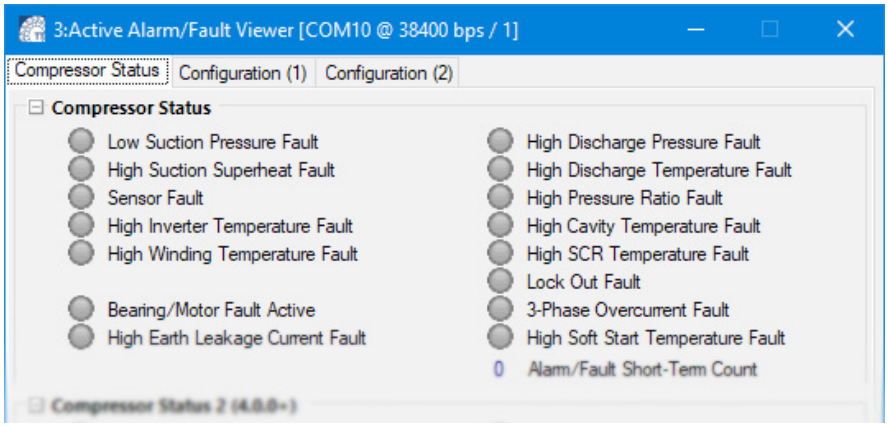


Figure 5-6 VTT/VTX Compressor Status Tab

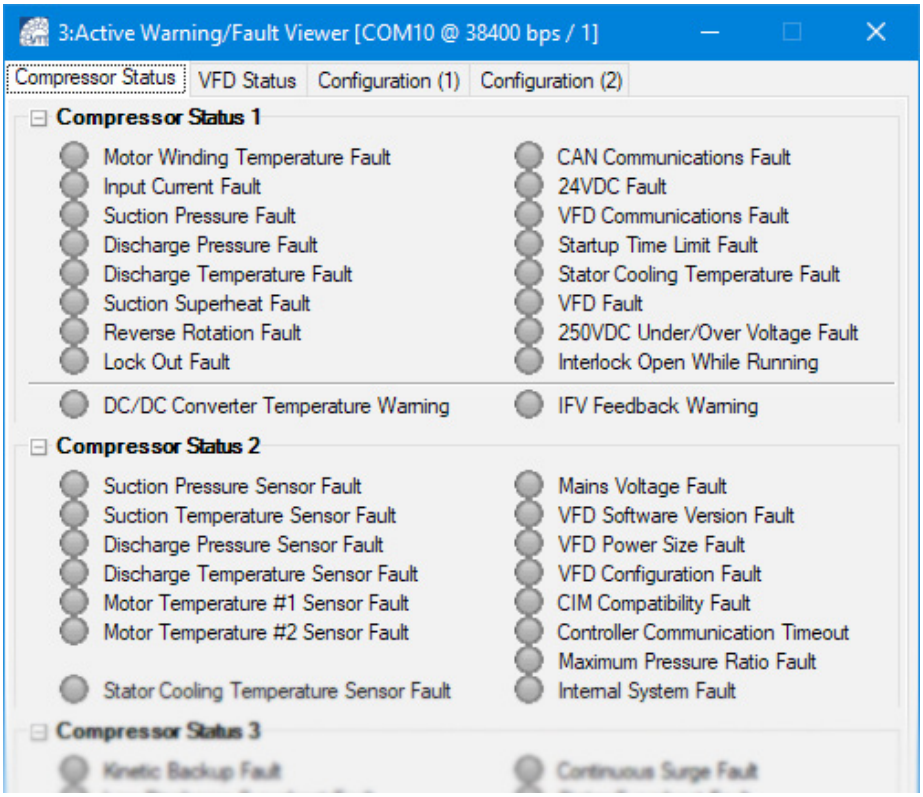


Figure 5-7 Alarm and Fault Configuration (1) (TTS/TGS and TTH/TGH Shown)

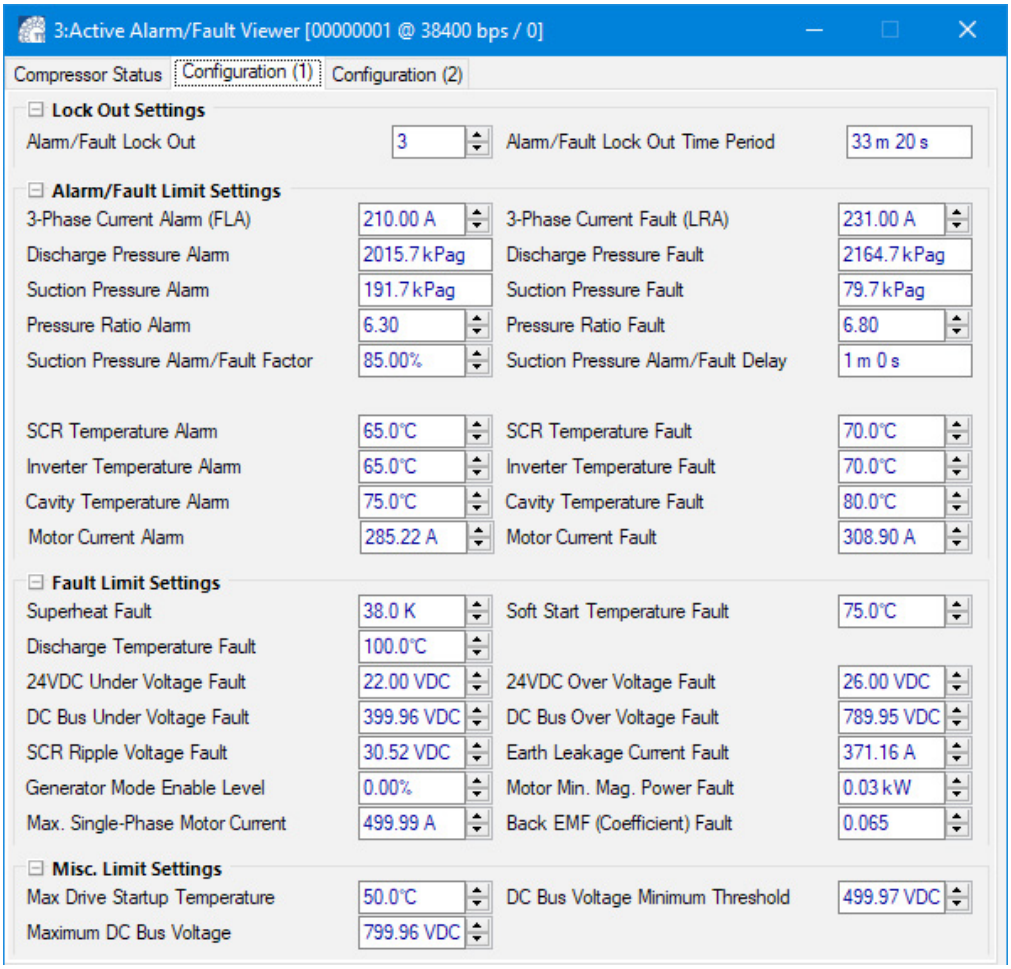
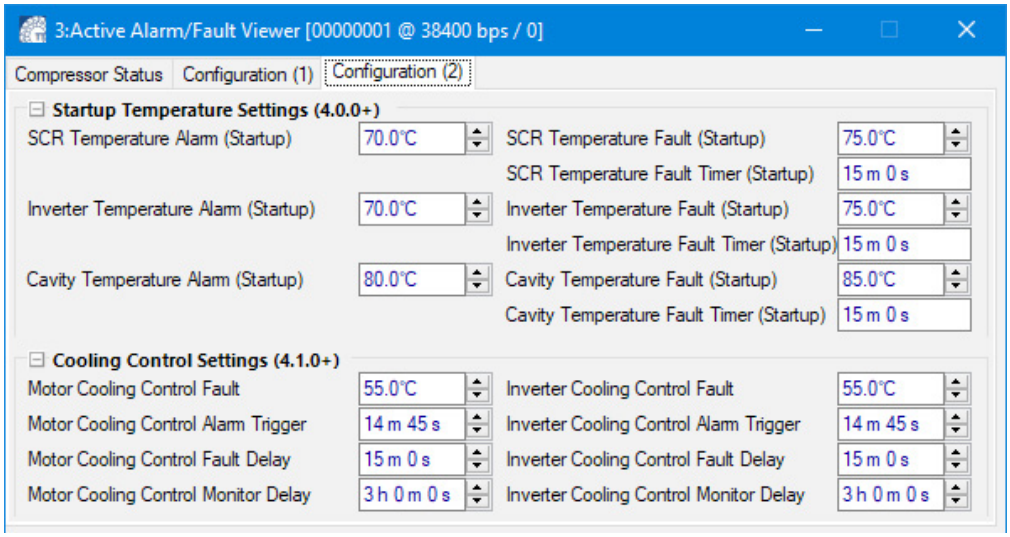


Figure 5-8 Alarm and Fault Configuration (2) Page 2 (TTS/TGH and TTH/TGH Only)



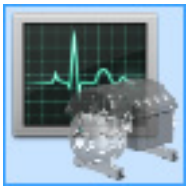
Chapter 6.0 Compressor Monitor

The *Compressor Monitor* tool allows you to monitor the most commonly desired parameters of the BMCC related to motor, bearing, and compressor operation. This tool can be used to view compressor, bearing, and motor operational readouts, change the demand, change the IGV opening, change the desired motor speed, and levitate/de-levitate the shaft.

6.1 Accessing the Compressor Monitor

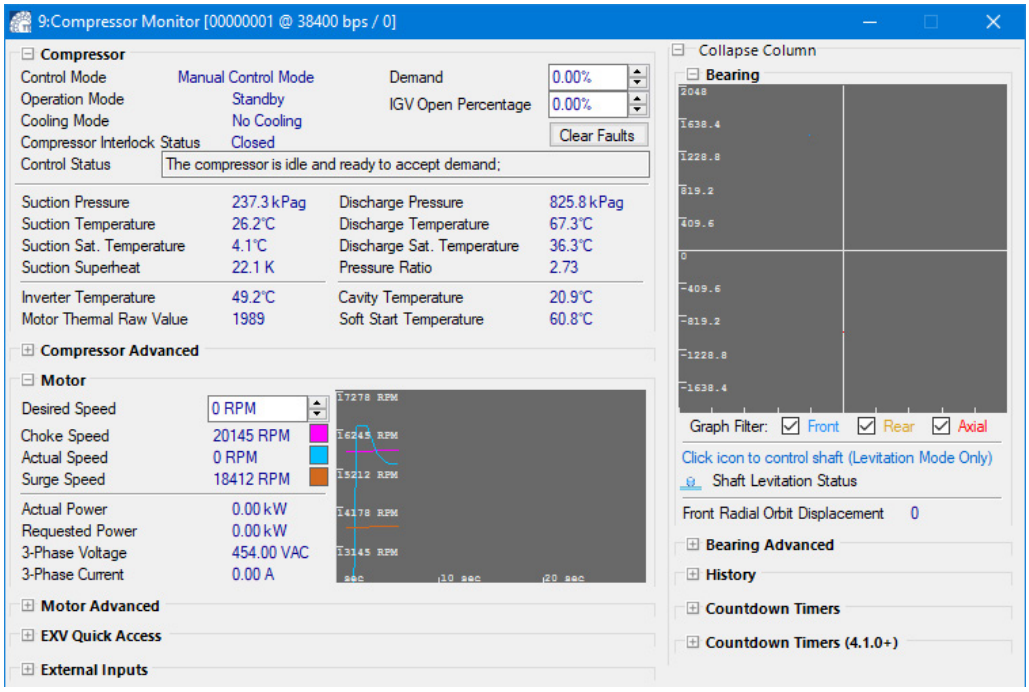
- Once connected, select the **Compressor Monitor Tool icon** from the *SMT Suite Launcher Strip*.

Figure 6-1 Compressor Monitor Tool Icon



The *Compressor Monitor* window displays.

Figure 6-2 Compressor Monitor Tool Window (TTS/TGH and TTH/TGH Shown)



6.2 View Options

The following view options are available on the *Compressor Monitor Tool* window:

- To view bearing-related readouts, expand the *Bearing* section.
- For compressor-related readouts, expand the *Compressor* section.

NOTE

The Pressure Ratio value displayed CANNOT be guaranteed to accurately reflect the pressure ratio as calculated by the BMCC for BMCC software versions earlier than 1210 - in such a case, it is at best an approximation of what the compressor is assumed to
be calculating.

- For motor-related readouts, expand the *Motor* section.

6.3 Changing the Demand

To change the demand:

1. Expand the **Compressor** section.
2. In the *Demand* field, either **use the up/down arrows or manually enter a value** and press **Enter** to submit a new value.

6.4 Changing the IGV Opening (TTS/TGH and TTH/TGH Only)

To change the IGV opening:

1. Make sure you are in Manual mode. (To change the Compressor Control Mode, refer to Section "12.2.1 Modifying Control Mode" on page 69.
2. Expand the **Compressor** section.
3. In the *IGV Open Percentage* field, either **use the up/down arrows or manually enter a value** and press **Enter** to submit a new value.

NOTE

Only values between 25%-110% are valid.

6.5 Changing the Desired Motor Speed

To change the desired motor speed:

1. Make sure you are in Manual mode. (To change the Compressor Control Mode, refer to Section "12.2.1 Modifying Control Mode" on page 69.
2. Expand the **Motor** section.
3. In the *Desired Speed* field, either **use the up/down arrows (TTS/TGH and TTH/TGH Only) or manually enter a value** and press **Enter** to submit a new value.

6.6 Levitating or De-levitating the Shaft

To levitate or de-levitate the shaft:

1. Make sure you are in Levitate Only mode. (To change the Compressor Control Mode, refer to Section "12.2.1 Modifying Control Mode" on page 69.
2. Click the **Shaft Levitation Status** graphic located just above the *Bearing* graph.

Figure 6-3 Shaft Levitation Status Graphic

The graphic will appear as a floating yellow ball when the shaft is levitating and a blue ball on the ground if the shaft is de-levitated.

Chapter 7.0 Logged Event and Fault Viewer

The *Logged Event and Fault Viewer* allows you to retrieve logged fault and event data regarding the operation of a connected compressor for the purpose of troubleshooting and diagnostics.

This tool can be used to retrieve logged event/fault data, watch for new logged event/fault data, view details pertaining to logged events/faults, export logged event/fault data to file, import logged event/fault data from file, and view application help information.

NOTE

This tool may not function properly if the connected compressor's access level is below Low.

7.1 Accessing the Logged Event and Fault Viewer

NOTE

Launch this tool after connecting to a compressor.
Any instance of this tool launched before connecting to a compressor will remain "offline".
Launch another instance of this tool after connecting if you later want to view logs of a connected device.

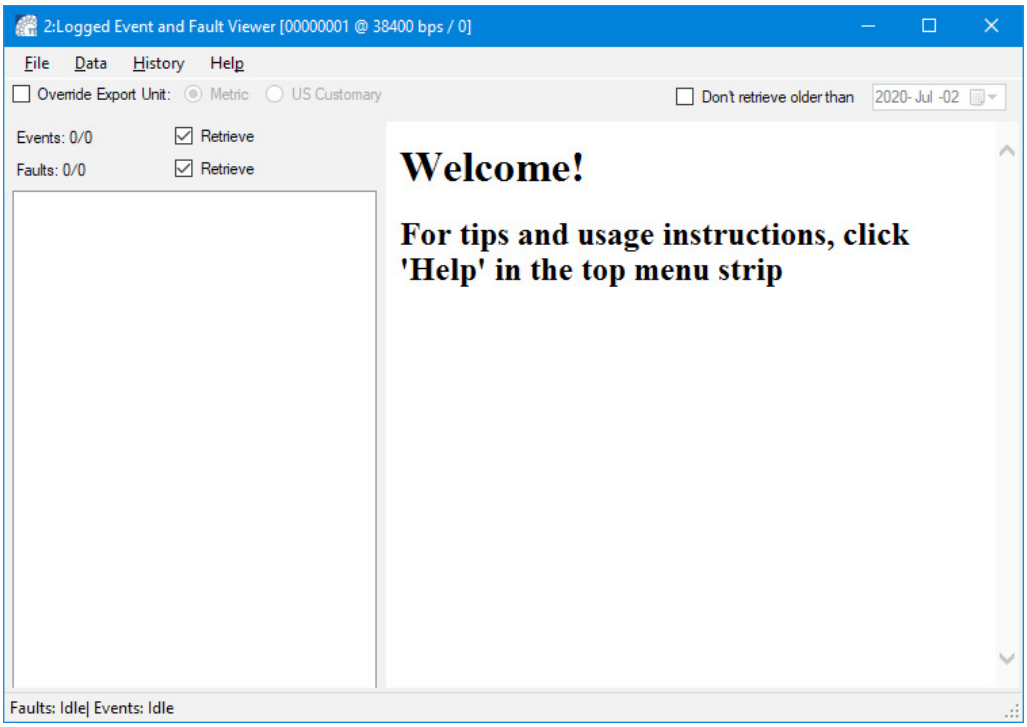
7.1.1 TTS/TGS and TTH/TGH Logged Event and Fault Viewer

1. Click the **Logged Event and Fault Viewer** icon.

Figure 7-1 Logged Event and Fault Viewer Icon

The *Logged Event and Fault Viewer* window displays:

Figure 7-2 Logged Event and Fault Viewer Window (TTS/TGS and TTH/TGH)



7.1.1.1 Applying Filters for Data Retrieval and Watching

To apply filters for data retrieval and watching:

- To retrieve logged event data from the connected compressor, check the **Retrieve** check box to the side of the *Events* count indicator.
- To retrieve logged fault data from the connected compressor, check the **Retrieve** check box to the side of the *Faults* count indicator.
- To apply a cut-off date/time for items retrieved, select the **Don't retrieve older than** check box, and then choose a date from the calendar drop-down. Items older than the selected date will not be retrieved.

7.1.1.2 Retrieving Logged Event and Fault Data

NOTE

Closing the Logged Event & Fault Viewer will terminate the retrieve functions.

To retrieve logged event and fault data:

1. Click the **Data->Start Retrieving** menu item.

The tool will automatically start retrieving events and faults as specified until either there are no more entries to retrieve or there are no more entries within the specified date/time range filter. Entries will appear in the event/fault listing panel.

2. To stop retrieving logged event and fault data before retrieval is completed, click **Data->Stop Retrieving Data.**

7.1.1.3 Watching for New Logged Event and Fault Data

NOTE

Closing the Logged Event & Fault Viewer will terminate the retrieve functions.

To watch for new logged event/fault data:

1. Click **Data->Watch for New…** menu item.

The tool will continuously check for changes in the event and fault logs as specified. Entries will display in the *Event/Fault Listing* pane.

2. To stop watching for new logged event and fault data, click the **Data->Stop Watching** menu item.

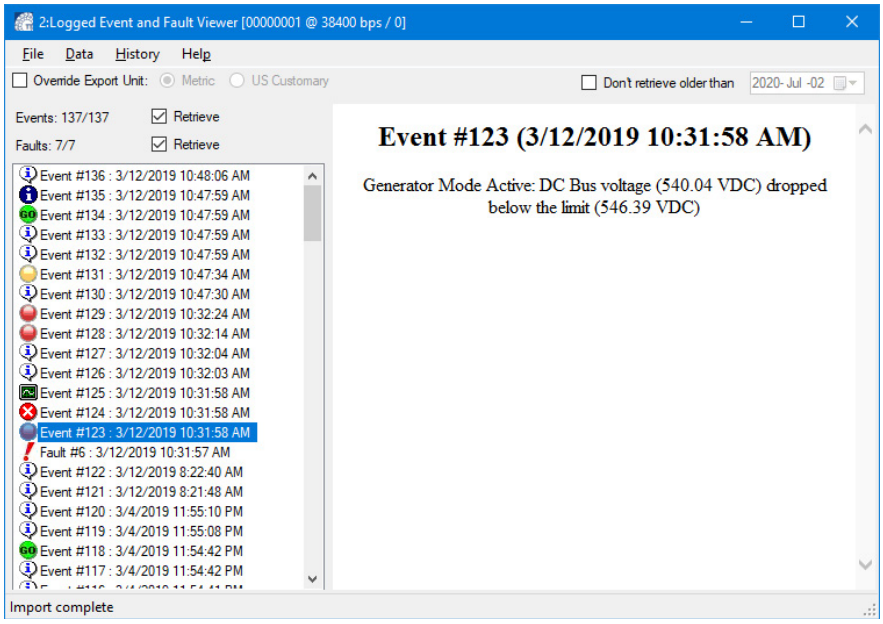
7.1.1.4 Viewing Logged Events and Faults Details

To view details pertaining to logged events and faults:

- Click on any entry in the *Event/Fault Listing* panel.

The tool will display details and analysis information describing the selected event or fault.

Figure 7-3 Logged Events Fault Viewer



7.1.1.5 Exporting Logged Event and Fault Data to a File

To export logged event/fault data to file:

1. Do one of the following:
   a. To export only selected entries, select the desired entries in the event/fault listing panel, and then select **File->Export Selected...**
   b. To export all entries, select **File->Export all.**
2. In the *Save as* window, select an **output file name.** The logged faults and events will be saved as .CSV and .TLF files.

7.1.1.6 Importing Logged Event and Fault Data

NOTE

You do not have to be connected to a compressor to import a saved TLF file for viewing.

To import logged event/fault data from a file:

- Click **File>Import Data.**
- In the *Open file* window, select a **previously exported TLF logged event/fault data file.**

If the file is valid, event and fault entries will display in the *Event/Fault Listing* panel.

7.1.1.7 Viewing Application Help Information

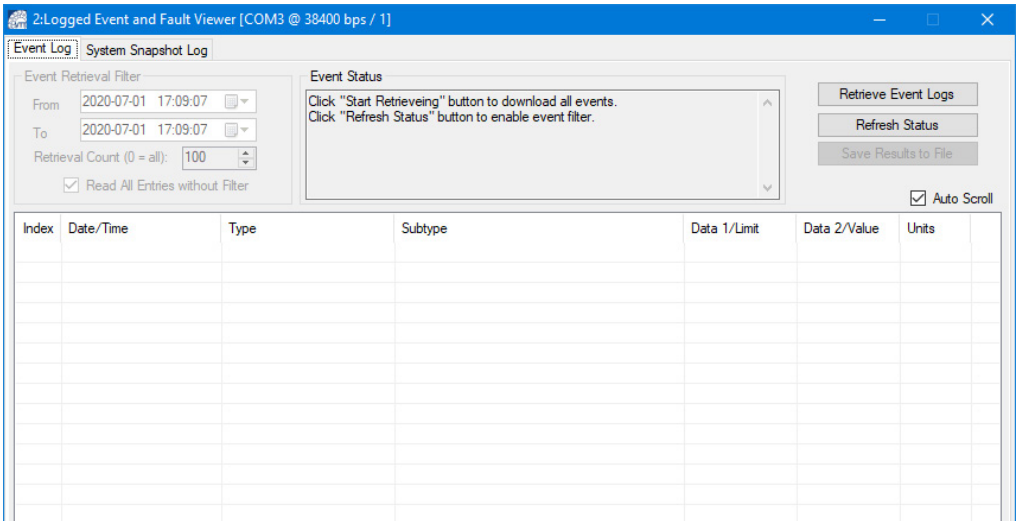
To view application help information:

- Click the Help menu option, and then select any help area item from the list which appears.

The tool will display relevant help information in the details view.

7.1.2 VTT/VTX Logged Event and Fault Viewer

Figure 7-4 Logged Event and Fault Viewer Window (VTT/VTX)



7.1.2.1 Event Log Tab

Event Log Tab

1. Click **Refresh Status**.
2. Choose a Date Range in the Event Retrieval Filter section.
3. Change Retrieval Count to **"0"** to get all events in the date range.
4. Click the **Retrieve Event Logs** button.
5. Once the event log is done with the retrieval process, click **Save Results to File**.

System Snapshot Log Tab

This first step will create the Collection Log.

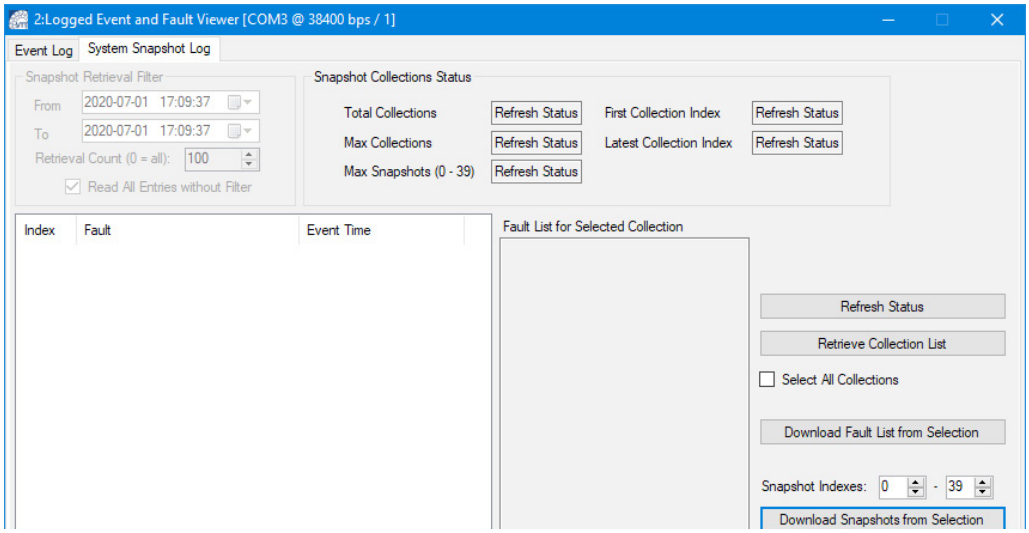
1. Click **Refresh Status**.
2. Choose a Date Range in the Snapshot Retrieval Filter section.
3. Change Retrieval Count to **"0"** to get all events in the date range.
4. Click **Retrieve Collection List**.
5. Once the Collection List is done with the retrieval process, click **Save Results to File**.

This second step will create the Snapshot.

1. Click **Refresh Status**.
2. Choose a Date Range in the Snapshot Retrieval Filter section.
3. Change Retrieval Count to **"0"** to get all events in the date range.
4. Click **Retrieve Collection List**.
5. Click on a specific fault you want to view in the list displayed.
6. Click download snapshot from selection.
7. Once the Snapshot is downloaded from the compressor, click **Save Results to File**.

7.1.2.2 System Snapshot Log Tab

Figure 7-5 VTT/VTX System Snapshot Log Window



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Chapter 8.0 Compressor Data Recording and Playback Tool

The *Compressor Data Recording & Playback* tool is used to start and stop recordings of variables in the BMCC, as well as to launch a server partially simulating an actual compressor using previously recorded data. The intended usage of this tool is for training, evaluation, and compressor troubleshooting purposes. This tool can be used to either record data communicated between the desktop SMT system and a compressor or to host "playback" recorded data for use with the SMT system.

When recording, the tool can be used to create a new recording, start recording, end recording, cancel recording, and pause/resume recording. A recording can be created and started either before or after establishing a connection with a compressor.

When playing back, the tool can be used to open a recording, close a recording, manually launch a playback server, stop a playback server, manipulate the playback rate, seek playback time, and specify the minimum access level.

8.1 Launching the Compressor Data Recording and Playback Tool

To launch the *Compressor Data Recording and Playback Tool:*

- Click the **Compressor Data Recording and Playback Tool** icon.

Figure 8-1 Compressor Data Recording and Playback Tool Icon

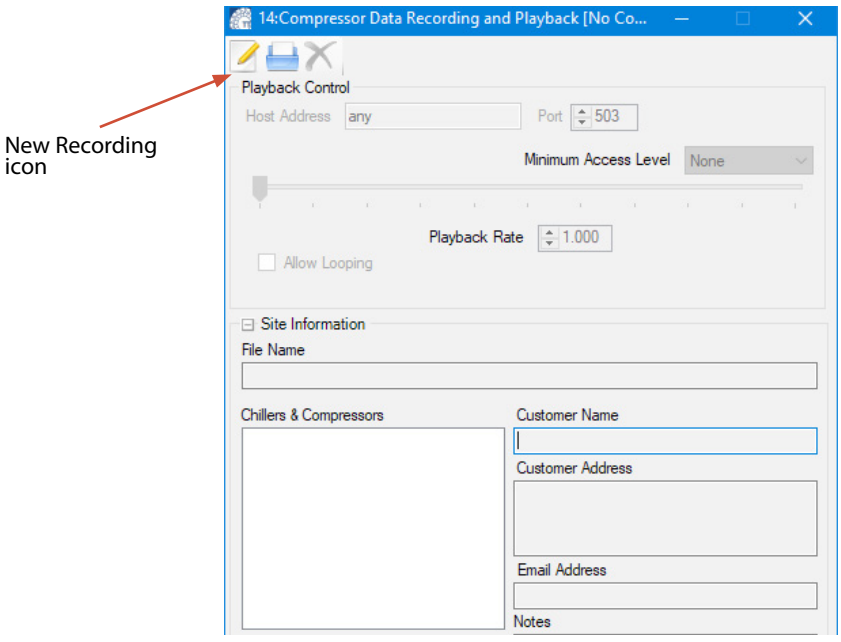
8.2 Recording

8.2.1 Creating a Recording

To create a new recording:

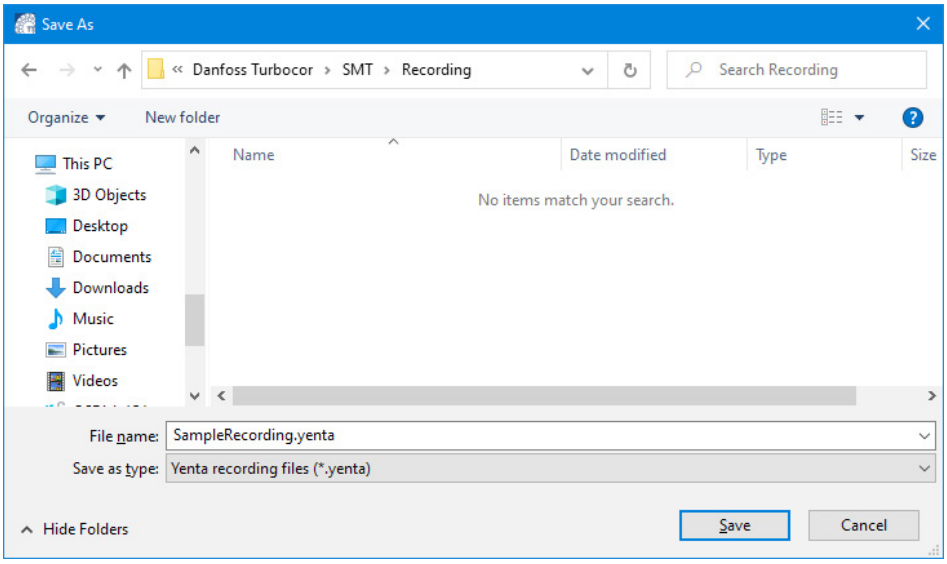
1. Click the New Recording icon.

Figure 8-2 Compressor Data Recording and Playback



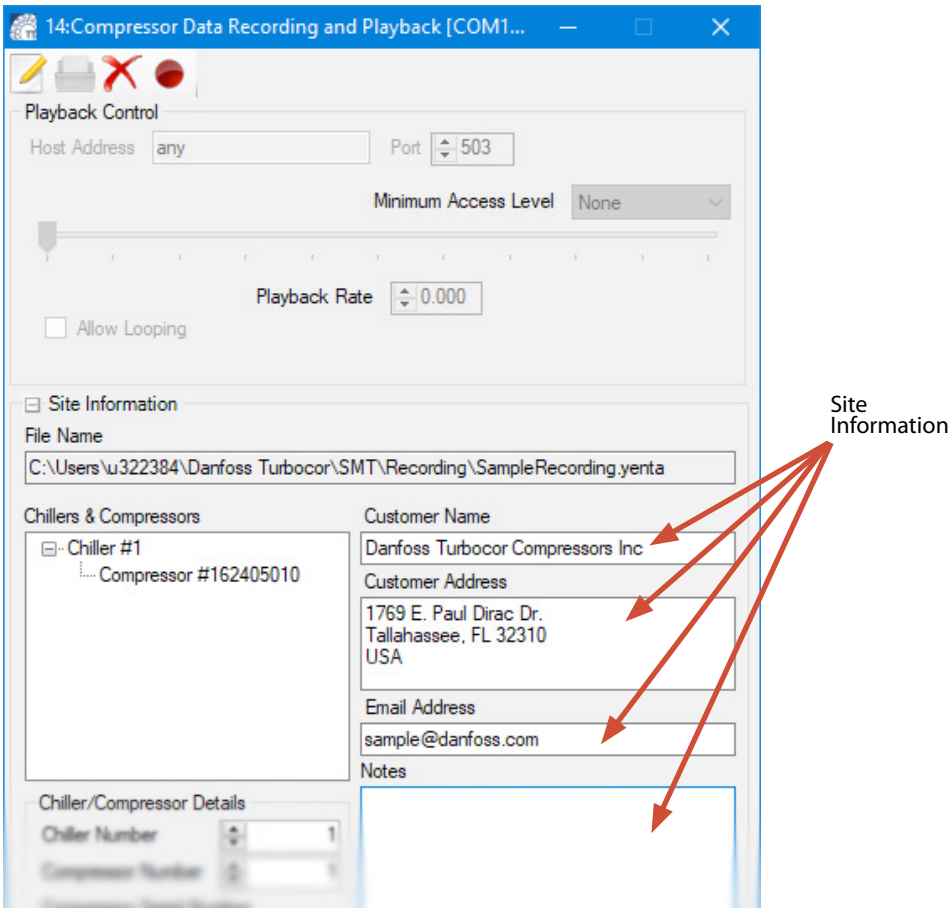
2. A *Save as* window displays. Select an **output filename** and click **OK.**

Figure 8-3 Choose Destination Filename TTS/TGS and TTH/TGH Shown)



3. In the *Site Information* section, optionally enter the **Customer Name, Customer Address, Email Address,** and any **Notes** regarding the recording. Any of this information can be edited at any time until the recording is stopped and saved. Once the recording is saved, this information can not be edited.

Figure 8-4 Site Information



5. To change the chiller and compressor identification, in the *Chillers & Compressors'* tree, select the **compressor node** and change the **chiller number, compressor number, and compressor serial number,** and then click **Update.**
6. To start recording, click the **Start Recording** (record circle) menu item.

Figure 8-5 Start Recording Icon

The tool will automatically make an initial read of all standard compressor parameters and begin polling all "volatile" compressor parameters until recording is finished.

NOTE

Recording can be started **before** or after establishing a connection with a compressor.

The tool will automatically save and close the recording when an active compressor connection is closed.

NOTE

The *current time* indicator may appear to only advance in short bursts - this is normal and is not indicative of performance degradation.

8.2.2 Stopping a Recording

To end a recording:

1. Click the **Stop Recording** menu item.

Figure 8-6 Stop Recording Icon

The tool will prompt you to verify ending of recording.

2. Click **Yes** to stop recording.

The tool will stop recording, finish writing any buffered data reads, compress, and close the recording. Long recordings may take a moment to save. File saving progress is displayed at the bottom of the *Playback Control* section.

NOTE

If no data has been recorded, a file will not be created.

NOTE

If compressor connection is lost during recording, the recording file will automatically save and close.

8.2.3 Cancelling a Recording

To cancel a recording:

1. Click the **Cancel Recording** (red X) menu item.

Figure 8-7 Cancel Recording Icon

You are prompted to verify canceling of the recording.

2. Click **Yes** to cancel.

The tool will cancel recording, wait for any pending writes to complete, close the file, and delete the temporary recording data.

8.2.4 Pausing a Recording

To pause a recording:

- If recording is active, click the **Pause Recording** (red pause marks) menu item. The tool will suspend recording data until recording is stopped or resumed.

Figure 8-8 Pause Recording Icon

8.2.5 Resuming a Recording

To resume a recording:

- If recording is paused, click the **Start Recording** menu item. The tool will resume recording data.

Figure 8-9 Start Recording Icon

8.3 Playback

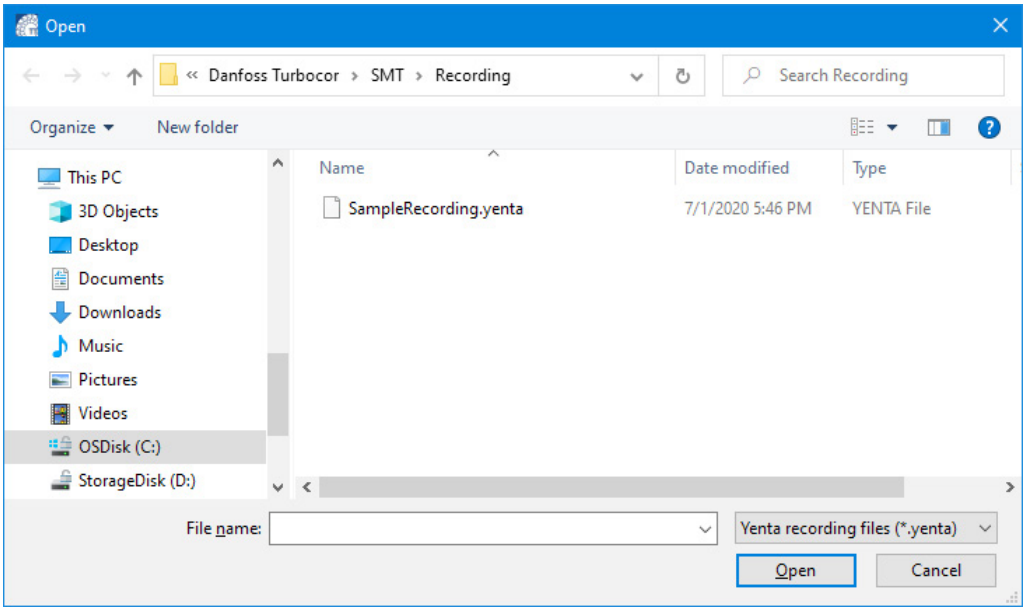
8.3.1 Playing Back a Recording

1. To open a recording, click the **Open Recording** (folder) menu item.

Figure 8-10 Open Recording Icon

An *Open file* window displays.

Figure 8-11 Choose a Recording to Open Window



2. Select a **recording file.**

- If the file is properly loaded, the recording's site information displays in the "Site Information" section.
- This data may not be altered.

3. The playback server will automatically attempt to launch. If there are any problems starting the playback host, a popup dialog displays.
4. Click the Play button to begin playing the recording.

Figure 8-12 Play Icon

NOTE

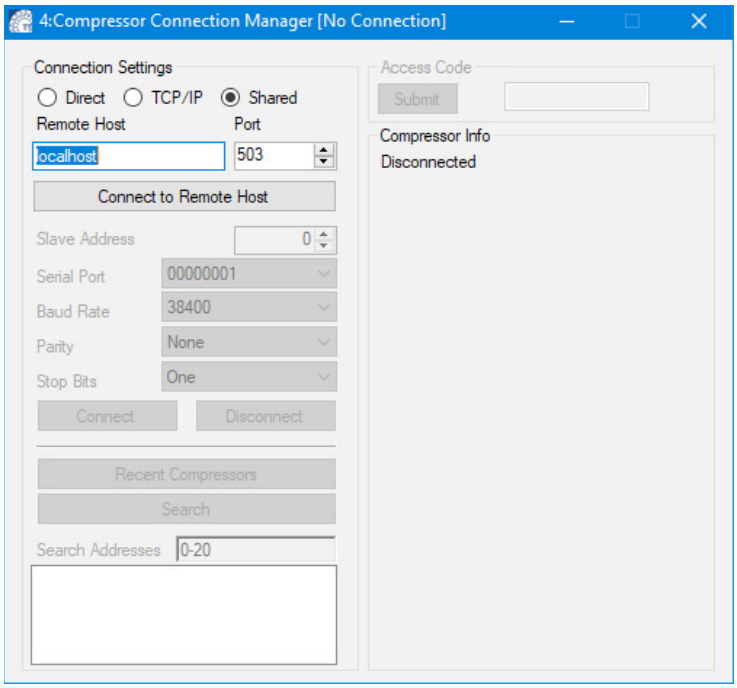
A connection with the playback server may be made in the same manner as with a remote compressor. Match the client host name and TCP port settings with those displayed in this application.

8.3.2 Connecting to the Playback of a Recording

To connect to the playback:

1. In the Compressor Connection Manager Window, select Shared for the Connection Settings.

Figure 8-13 Compressor Connection



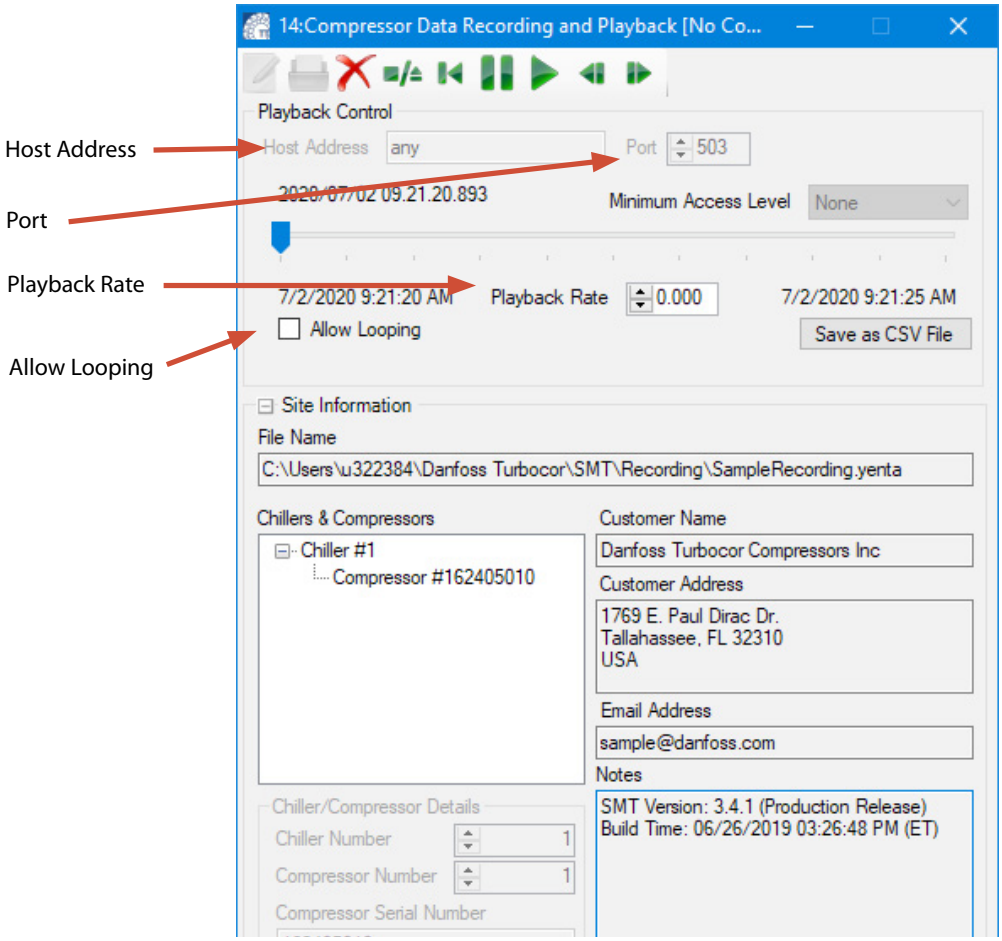
2. Verify Port setting matches recording information.

NOTE

Typically, the default settings - host address = any and port = 503 - are acceptable; however, ensure that this port is unused. For example, another application may be using port 503. The "launch" button will not display if the host name text box is empty.

3. Click Connect to Remote Host.
4. Click Connect.
5. To view all of the available tools, enter a valid access code.

Figure 8-14 Compressor Data Recording and Playback Window



8.3.3 Enabling or Disabling Automatic Playback Looping

The tool contains an *Allow Looping* feature which will enable the playback server to loop the playback timer when a boundary time is reached; otherwise the playback will pause.

- To enable looping, click the **Allow Looping** checkbox.
- To disable looping un-check the checkbox.

8.3.4 Closing an Open Recording

Figure 8-15 Close Recording Icon

To close an open recording:

1. Be sure to disconnect from the recording prior to closing the recording.
2. Click the **Close Recording** button.

- The tool will prompt to confirm the closure of the recording file.

3. Select **Yes** to close the file and terminate any active playback sessions.

NOTE
The playback server will launch in the paused mode - click the play button (play triangle) to begin playback at a normal rate.

8.3.5 Stopping the Playback Server

To stop the playback server:

1. Click the **Stop Playback Server** button.

Figure 8-16 Stop Playback Server

You are prompted for confirmation of termination of the playback server:

2. Select **Yes** to terminate the playback server.

8.3.6 Changing the Playback Rate

To change the playback rate:

In the *Playback Control* section, the playback rate may be manually specified by either using the up/down arrows or by entering a number in the *Playback Rate* field.

- To play at the normal rate (1.0), click the **Play** button.

Figure 8-17 Play Button

- To pause the playback, click the **Pause** button.

Figure 8-18 Pause Button

Figure 8-19 Rewind Button

- If the absolute value of the playback rate < 1.0, click the **Slow Forward** button to increase playback rate up to 1x in 1/8 increments.

Figure 8-20 Slow Forward Button

- If the absolute value of the playback rate < 1.0, click the **Slow Reverse** button to decrease playback rate down to -1x, in 1/8 increments.

Figure 8-21 Slow Reverse Button

8.3.7 Specifying the Minimum Access level

In case the recorded access level is too low to use certain tools for viewing, you can specify the minimum access level:

To specify the minimum access level:

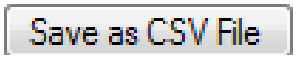
- From the *Minimum Access Level* drop-down, select the desired minimum access level. This forces the playback server to disallow the access level to drop below the level specified.

NOTE

You have to enter your Access level on the *Compressor Connection Manager* window to see the appropriate level. See "Changing Compressor Access Levels".

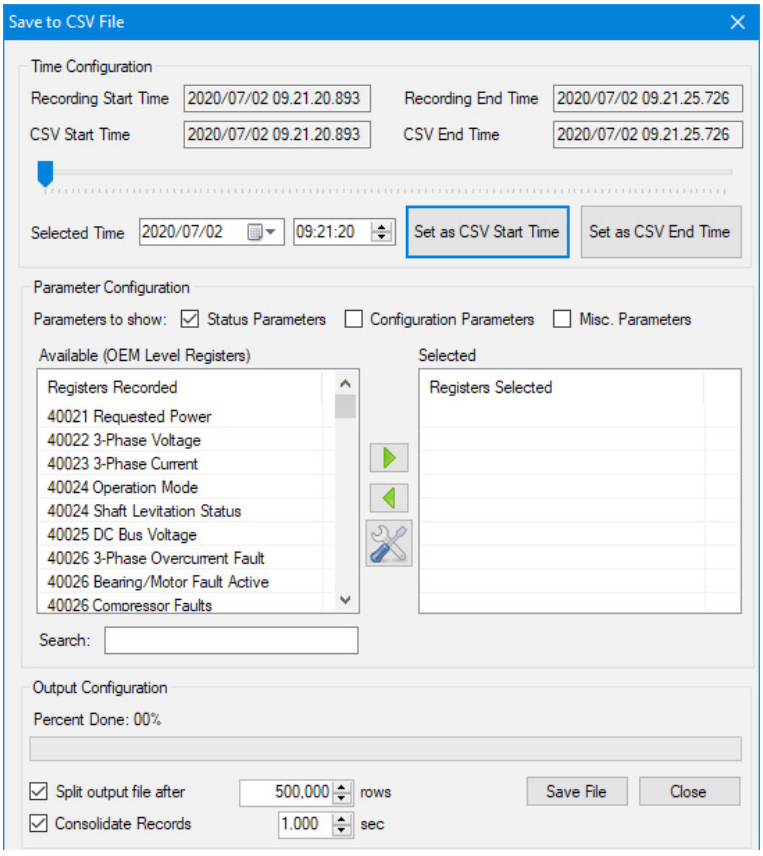
8.3.8 Save as Comma-Separated Values (CSV) File

Figure 8-22 Save as CSV File Button



Clicking the Save as CSV file button will launch a new window which will provide the ability to save all of the data stored in the Yenta into a CSV file, viewable in Excel.

Figure 8-23 Save to CSV



The Save to CSV File window provides the ability to set the start time and end time to reduce the actual data saved to the file, as well as, the ability to specify after how many rows to split the file. Use the right and left arrow buttons are add or remove selected registers. The Parameters to show checkboxes filters which registers are displayed in the Available Registers (left) list.

Figure 8-24 Tools Button

The Tools button displays the Manage Parameters window, which provides the ability to select specific parameters and to group specific parameters for future quick selection.

Figure 8-25 Manage Parameters Window

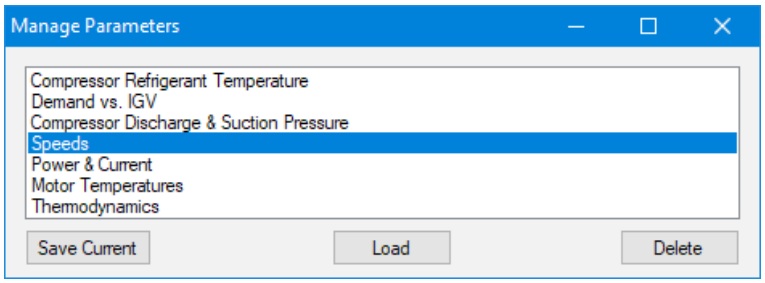
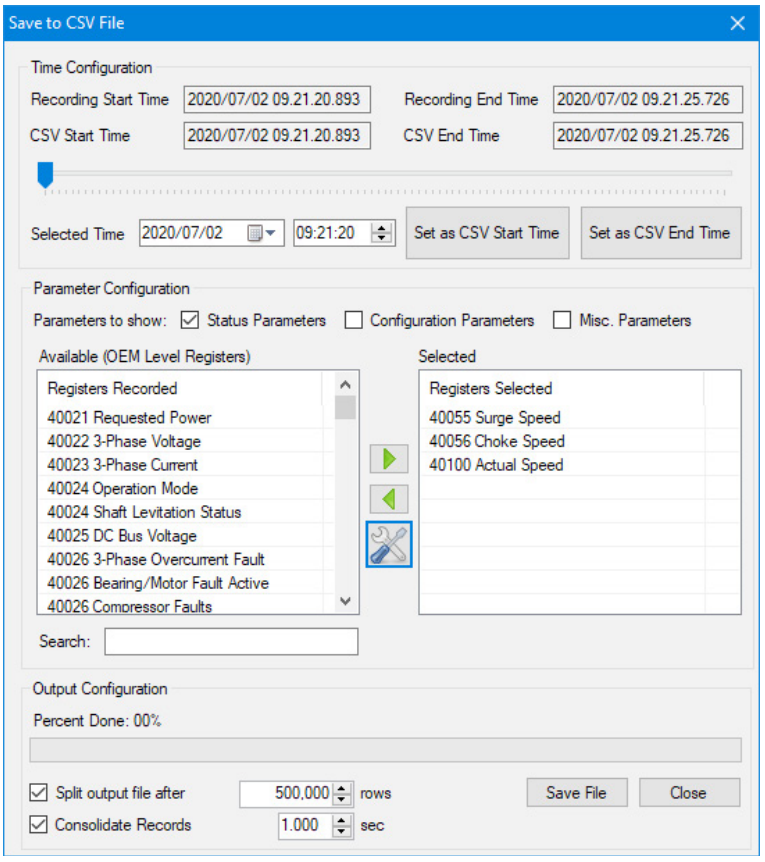


Figure 8-26 Speed Registers Selected



After the registers to record are selected and the start and end times are selected, click the "Save File" button to save the file as a CSV. Creating the CSV file may take a few minutes; the Percent Done in the Output Configuration section will display the status of the file save procedure.

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Chapter 9.0 Bearing Calibration Tool

The *Bearing Calibration Tool* allows you to execute a bearing calibration procedure and analyze the outcome. The tool can be used to calibrate the bearings, validate a calibration, view the current persistent and latest calibration values and create a calibration report.

NOTE

This tool may not function properly if the connected compressor's access level is below Technician. This tool requires exclusive application focus - all other tools will be closed or hidden when starting this tool.

9.1 Accessing the Bearing Calibration Tool

Once connected, select the **Bearing Calibration tool icon** from the *SMT Suite Launcher Strip*.

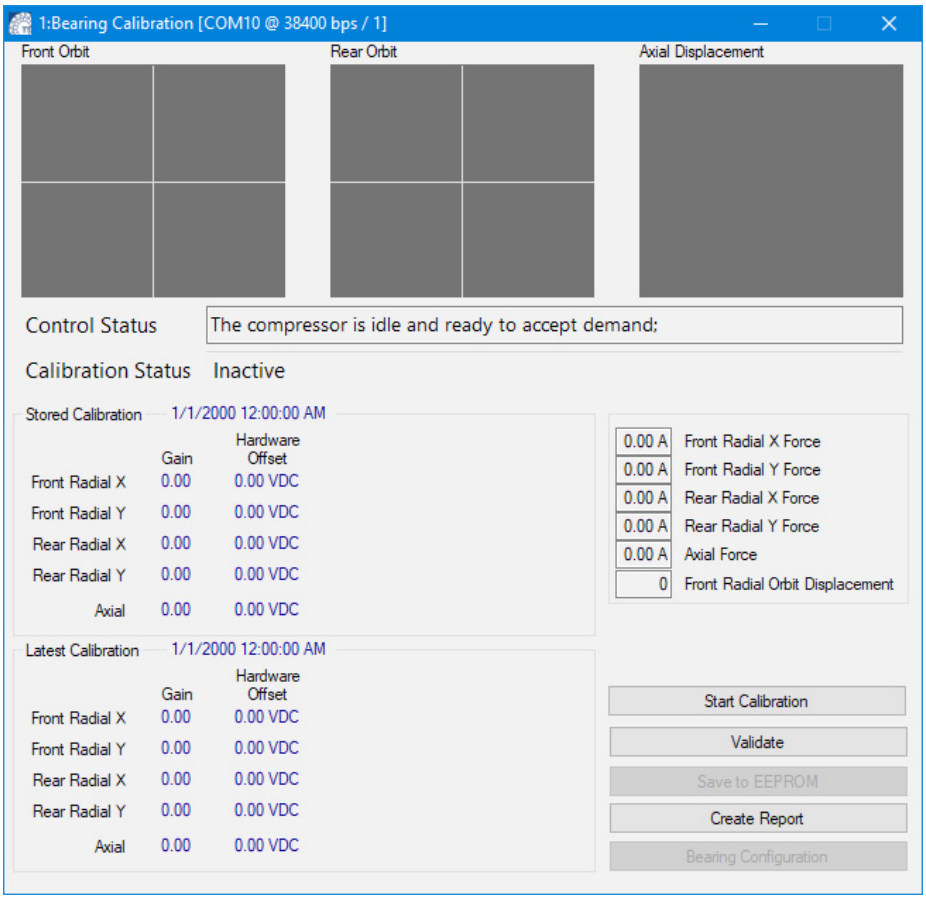
WARNING

Disconnect the PLC RS485 communication to compressor and manually open the Interlock, prior to performing the Bearing Calibration. Additionally, all faults must be cleared.

Figure 9-1 Bearing Calibration Tool Icon

The *Bearing Calibration* window displays:

Figure 9-2 Bearing Calibration Window



NOTE

If the *Save* to *EEPROM* setting is set to *RAM Only* on the *Compressor Connection* window, the *Save* to *EEPROM* button will be unavailable for use on the *Bearing Calibration* window.

9.2 Performing a Calibration

To perform a calibration:

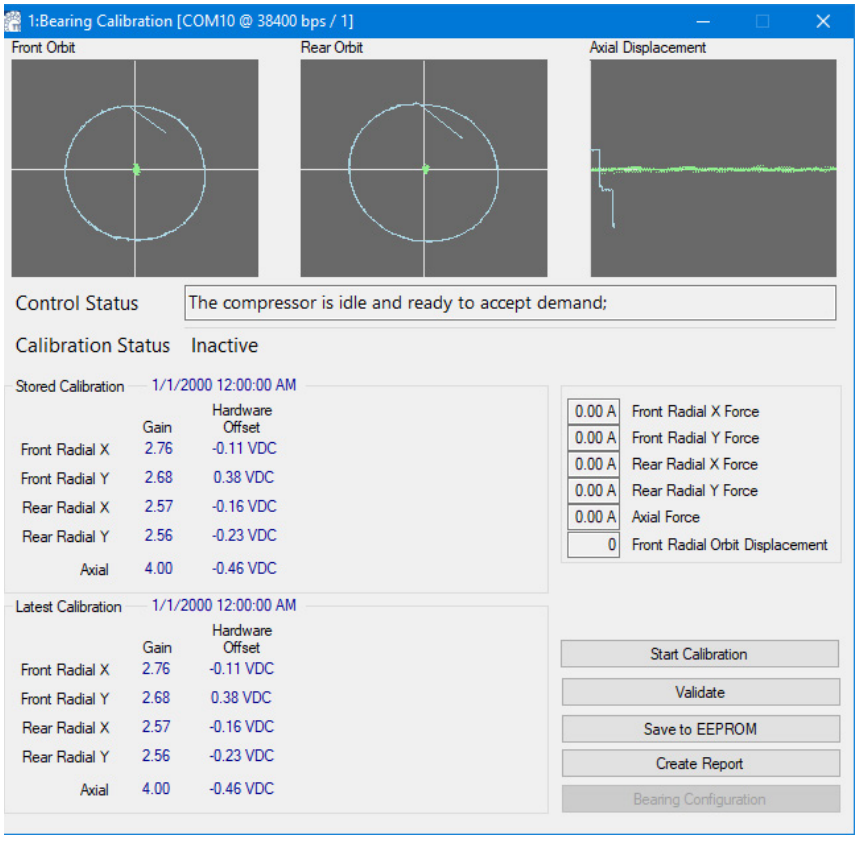
1. Ensure that the compressor's interlock is open and the Modbus connection to the compressor is disconnected.
2. Click the **Start Calibration** button.

The tool will invoke the calibration sequence on the compressor and display the bearing offset data in the three graphs visible at the top of the main form.

The left-most graph displays data pertinent to the front radial bearing; the middle graph displays data pertinent to the rear radial bearing; and the right-most graph displays data pertinent to the axial bearing. The radial graphs display the offsets of the shafts edges. The axial graph displays the axial displacement by time.

After the compressor successfully completes a bearing calibration sequence, the option to **Save to EEPROM** becomes available.

Figure 9-3 Bearing Calibration Tool Showing Graphs



9.3 Performing a Validation

To perform a validation:

- Click the **Validate** button.

The tool will validate the calibration by levitating the shaft, sampling orbit offset data, and validating the data using the calibration values currently stored in Electrically Erasable Programmable Read-Only Memory (EEPROM).

NOTE

If the tool indicates that it is unable to perform a validation, check for any faults present and take appropriate actions before attempting validation again.

9.4 Saving the Latest Bearing Calibration for Persistent Use

To save the latest bearing calibration for persistent use, click the **Save to EEPROM** button. The tool will notify the compressor to use the latest calibration for persistent operation.

This calibration will overwrite previous calibration data.

NOTE

If the last calibration values differ from the stored values outside of the tolerances set in the SMT, a warning message will appear when saving to the EEPROM. This measures changes from the stored calibration and may be an indicator of shaft alignment changes over time. Refer to the Service Manual for further information.

9.5 Viewing Bearing Calibration or Operation Settings

To view bearing calibration or operation settings:

1. Click the **Bearing Configuration** button.

The tool will display a form consisting of three sections: *Calibration Limits, Operational Limits, and Bias Settings.*

2. Close the form when done.

9.6 Creating a Calibration Report

To create a calibration report:

1. Click the **Create Report** button.

A *Save As* window displays.

2. Select a **path** to use for saving the generated report.

The tool will generate a report at the user-specified path.

NOTE

A bearing calibration need not be saved to EEPROM to create a report.

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Chapter 10.0 Chiller and Analog Configuration Tool

NOTE

- This section is only applicable to when using BMCC firmware 3.1.4 and earlier
- The Chiller and Analog Configuration Tool is only available if the firmware supports these features (i.e., TTS/TGS compressors with CC 3.1.4 and earlier)

Configuration tool allows you to view and configure the configuration and operational parameters of the BMCC's chiller controller and analog output controller. This can be used to view or modify the chiller control and analog output control configuration settings.

The tool can only modify parameters which the BMCC will allow for each given access level. If the current access level is below any individual write access level, the corresponding field will appear disabled.

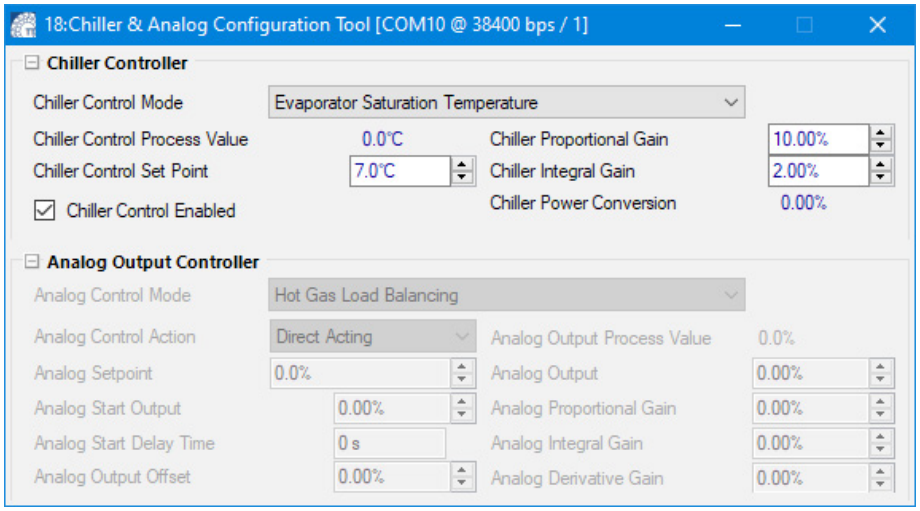
10.1 Accessing the Chiller and Analog Configuration Tool

Once connected, select the **Chiller and Analog Configuration Tool** icon from the *SMT Suite Launcher Strip.*

Figure 10-1 Chiller and Analog Configuration Tool Icon

The *Chiller and Analog Configuration* window displays:

Figure 10-2 Chiller and Analog Configuration Window



10.2 Viewing or Modifying Chiller Controller Settings

To view or modify the chiller controller settings:

1. Expand the **Chiller Controller** section

This section includes:

- Chiller Control Mode - The functional control mode of the compressor and how it is expected to interact with external chiller system components.
- Chiller Set Point - Represents the operational target for the chiller control loop.
- Chiller Control Enabled - Checkbox enables Chiller Control. Even if the Control Mode is set to Chiller Control Mode, the Chiller Control Enabled box must be checked.
- Chiller Proportional Gain - Represents the proportional gain for the chiller control loop. The higher the proportional gain, the more severe the reaction to a given instantaneous deviation from the setpoint will be.
- Chiller Integral Gain - Represents the integral gain for the chiller control loop. The higher the integral gain, the more severe the reaction to an accumulated deviation from the setpoint over time will be.

2. Modify as necessary.

10.3 Viewing or Modifying Analog Output Controller Settings

To view or modify the analog output settings:

1. Expand the **Analog Output Controller** section.

This section includes:

- Analog Control Mode - Represents the methodology used to control the Analog Output.
- Analog Control Action - Indicates the control action of the analog output.
- Analog Setpoint - The target value by which the analog output controller operates.
- Analog Start Output - This value represents the percentage of maximum voltage sent to the "ANALOG" (JP1) terminal on the compressor interface module. This position will be maintained until the Start Delay Timer has expired.
- Analog Start Delay Time - Represents the time in seconds that the analog Start Output is held. The Start Delay Timer starts to count down when drive is enabled.
- Analog Output Offset - Represents the minimum amount of the maximum output voltage to output at all times.
- Analog Output Process Value - The process value used by the BMCC for analog output control. *This readout is only available for BMCC software versions 1210 or later.*
- Analog Output - The value indicated by the analog output via the analog output controller.
- Analog Proportional Gain - Represents the analog output proportional gain.
- Analog Integral Gain - Represents the analog output integral gain.
- Analog Derivative Gain - Represents the analog output derivative gain.

2. Modify as necessary.

Chapter 11.0 EXV Configuration Tool

NOTE

The EXV Configuration Tool is only available when the firmware on the connected compressor has the Automatic EXV Control feature.

The *Electronic Expansion Valve (EXV) Configuration Tool* allows you to view and configure the electronic expansion valve configuration parameters and settings.

The tool can only modify parameters which the BMCC will allow for each given access level. If the current access level is below any individual write access level, the corresponding field will appear disabled.

11.1 Accessing the EXV Configuration Tool

Once connected, select the **EXV Configuration Tool icon** from the *SMT Suite Launcher Strip.*

Figure 11-1 EXV Configuration Tool Icon

The *EXV Configuration Tool* displays.

Figure 11-2 EXV Configuration Tool (Applies to firmware prior to 4.X)

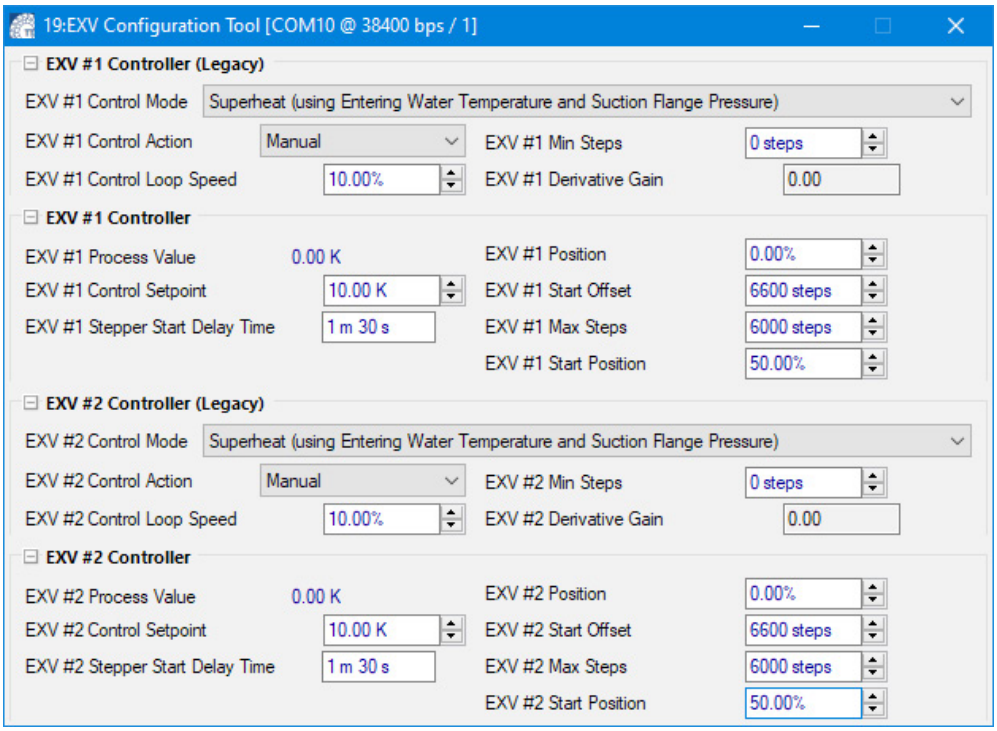
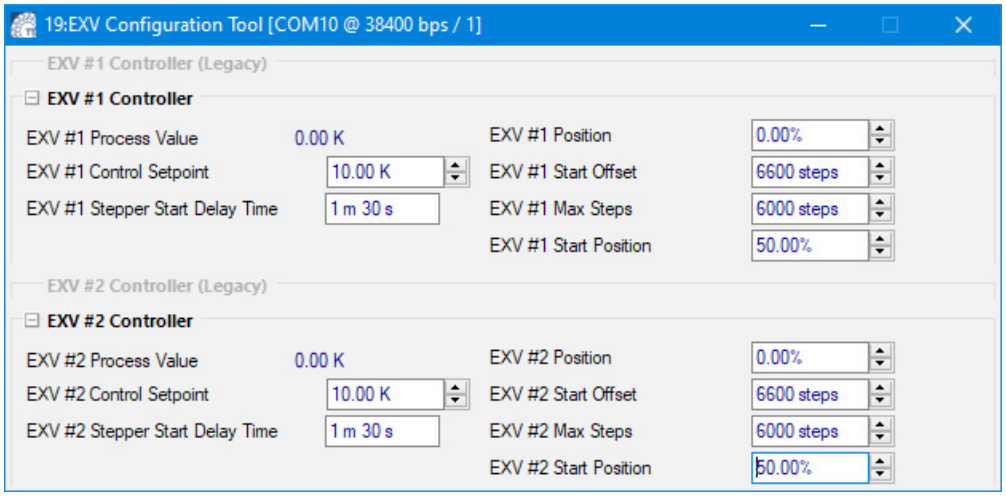


Figure 11-3 EXV Configuration Tool (Applies to 4.x firmware)



11.2 Viewing and Modifying EXV Controller Settings

To view or modify external expansion valve settings:

- Expand either the "EXV #1 Controller" or "EXV #2 Controller" sections.

These sections include:

- EXV #1 Control Mode - The methodology used to control the EXV #1 output.
- EXV #1 Control Action - Indicates the control action of the EXV output.
- EXV #1 Control Setpoint - Suction Superheat or Liquid Level percentage in accordance with the selected control mode. Not applicable to Load Balance control mode because the compressor will calculate the best position.
- EXV # 1 Stepper Start Delay Time - Represents the time in seconds that the valve's Start Position is held. The Stepper Start Delay Timer starts to count down when drive is enabled.
- EXV #1 Control Loop Speed - Represents the reaction time of the control loop to a process error and replaces the PID (proportional, integral, and derivative) controller gains.
- EXV #1 Derivative Gain - The gain of the EXV controller's derivative component.
- EXV #1 Process Value - The EXV's process value by which the EXV position is controlled.
- EXV #1 Position - The current valve position.
- EXV #1 Min Steps - The minimum number of steps EXV #1 can open.
- EXV #1 Start Offset - The number of steps required to close EXV #1 to ensure initialization to the closed position.
- EXV #1 Max Steps - The number of steps between the minimum and maximum positions for EXV #1.
- EXV #1 Start Position - The percentage that the valve is open in start position and
- EXV #2 Control Mode - The methodology used to control the EXV #2 output.
- EXV #2 Control Action - Indicates the control action of the EXV output.
- EXV #2 Control Setpoint - Suction Superheat or Liquid Level percentage in accordance with the selected control mode. Not applicable to Load Balance control mode because the compressor will calculate the best position.
- EXV # 2 Stepper Start Delay Time - Represents the time in seconds that the valve's Start Position is in held. The Stepper Start Delay Timer starts to count down when drive is enabled.
- EXV #2 Control Loop Speed - Represents the reaction time of the control loop to a process error and replaces the PID (proportional, integral, and derivative) controller gains.
- EXV #2 Derivative Gain - The gain of the EXV controller's derivative component.
- EXV #2 Process Value - The EXV's process value by which the EXV position is controlled.
- EXV #2 Position - The current valve position.
- EXV #2 Min Steps - The minimum number of steps EXV #2 can open.
- EXV #2 Start Offset - The number of steps required to close EXV #2 to ensure initialization to the closed position.
- EXV #2 Max Steps. - The number of steps between the minimum and maximum positions for EXV #2.
- EXV #2 Start Position - The percentage that the valve is open in start position.

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Chapter 12.0 Compressor Configuration Tool

The *Compressor Configuration Tool* allows you to view and configure the compressor operation, IGV, startup, surge/choke, and other operational configuration parameters and settings.

NOTE

The *Compressor Configuration Tool* can only modify parameters which the BMCC will allow for each given access level and the for firmware in the connected compressor. If the current access level is below any individual write access level or if the particular setting is not available on the firmware on the connected compressor, the corresponding field may not be available or may be disabled.

12.1 Accessing the Compressor Configuration Tool

Once connected, select the **Compressor Configuration Tool** icon from the *SMT Suite Launcher Strip*.

Figure 12-1 Compressor Configuration Tool Icon

The *Compressor Configuration* window displays:

Figure 12-2 Compressor Configuration Window (TTS/TGS and TTH/TGH)

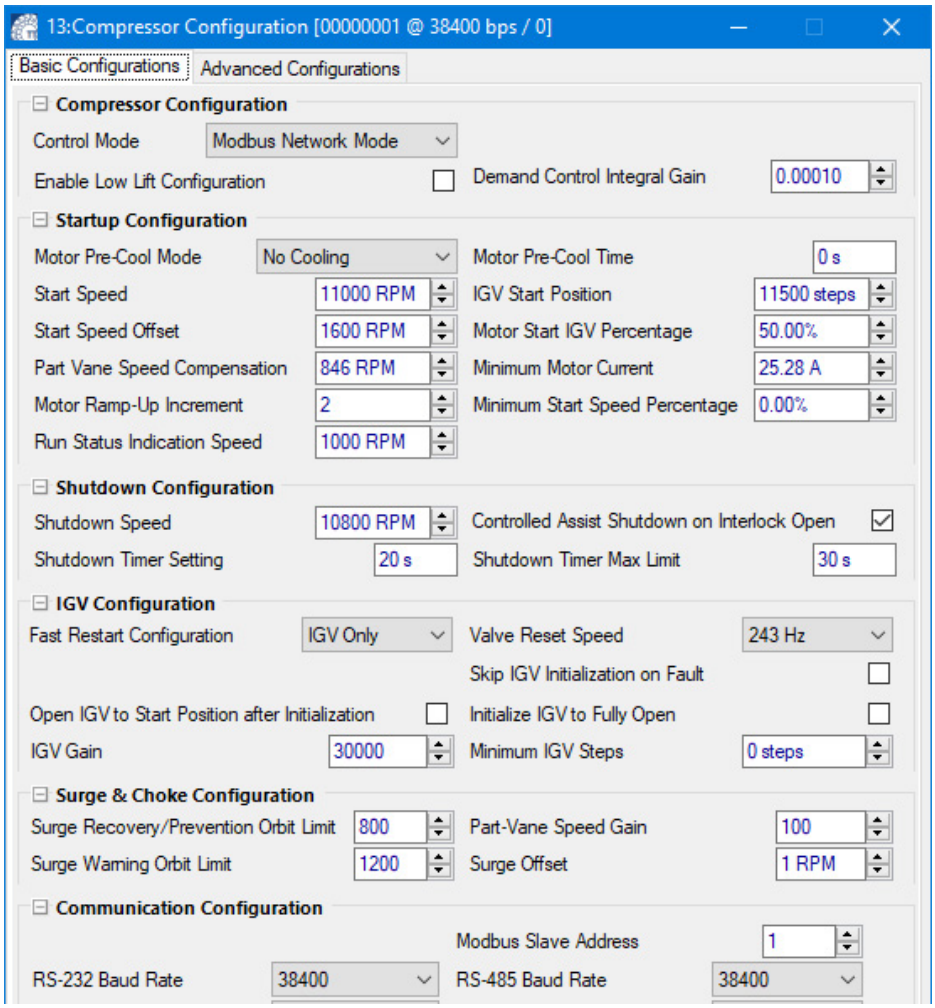


Figure 12-3 Compressor Configuration Window (VTT/VTX Basic Configuration)

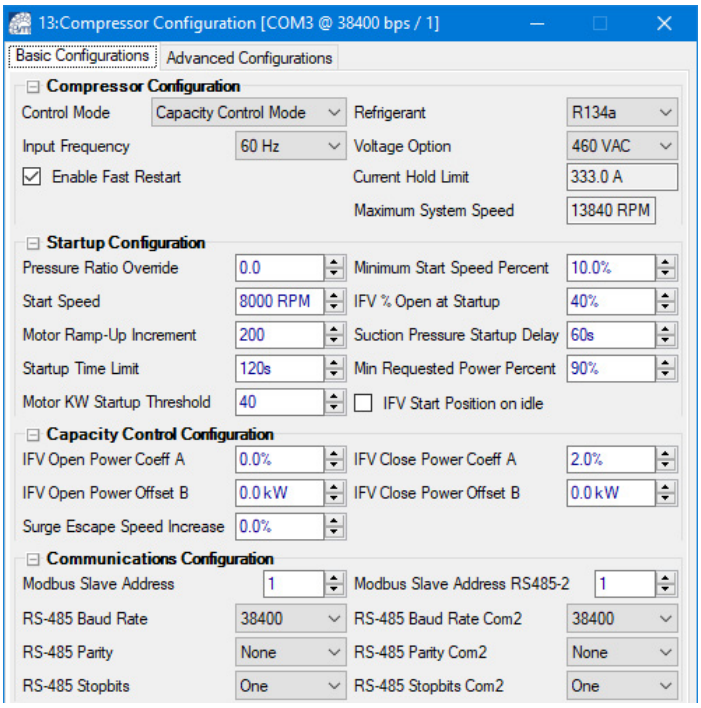
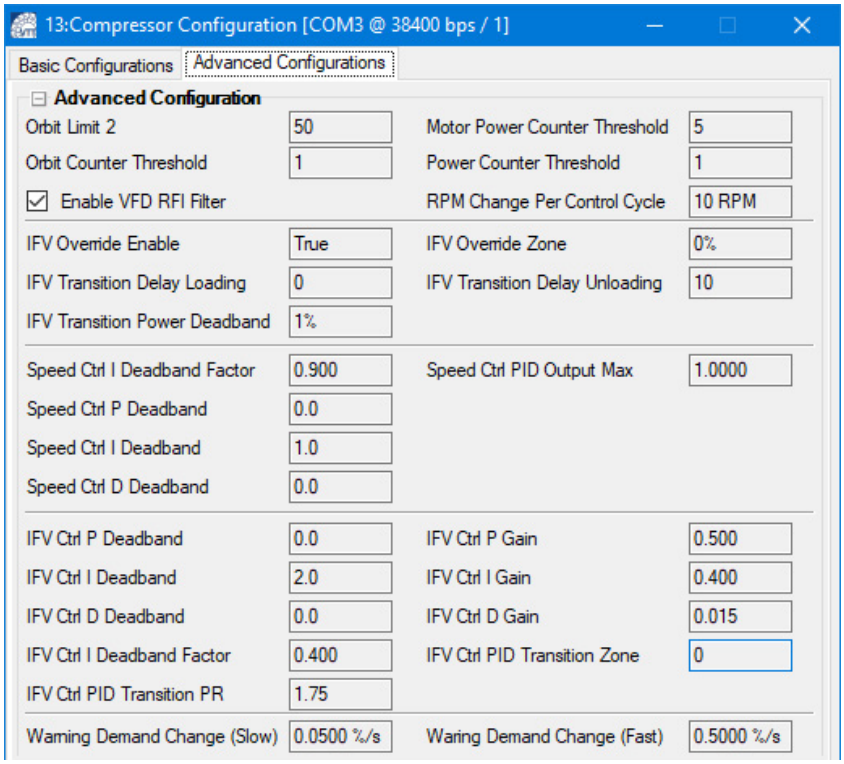


Figure 12-4 Compressor Configuration Window (VTT/VTX Advanced Configuration)



12.2 Viewing or Modifying Compressor Operation Settings

To view or modify the compressor operation settings:

TTS/TGS and TGH/TGH

1. Expand the **Compressor Configuration** section.

This section includes: Control Mode, Hot Gas Bypass Gain, and Power Control Loop Gain.

2. Modify as necessary.

VTT/VTX

1. Expand the **Compressor Configuration** section.

This section includes: Control Mode, Input Frequency, Refrigerant, Voltage Option, Current Hold Limit, and Maximum System Speed.

2. Modify as necessary.

12.2.1 Modifying Control Mode

To modify the Control Mode, click the Drop-Down Box and change to the desired control mode.

12.3 Viewing or Modifying Compressor Startup Settings

To view or modify the compressor startup settings:

TTS/TGS and TGH/TGH

1. Expand the **Startup Configuration** section.

This section includes: Motor Pre-Cool Mode, Start Speed, Start Speed Offset, Part Vane Speed Compensation, Motor Ramp-Up Increment, Run Status Indication Speed, Motor Pre-Cool Time, IGV Start Position, Motor Start IGV Percentage, Minimum Motor Current, and Minimum Start Speed Percentage.

2. Modify as necessary.

VTT/VTX

1. Expand the **Startup Configuration** section.

This section includes: Pressure Ration Override, Start Speed, Motor Ramp-Up Increment, Startup Time Limit, Motor KW Startup Threshold, Minimum Start Speed Percent, IFV% Open at Startup, Suction Pressure Startup Delay, Min Requested Power Percent, and IFV Start Position on idle.

2. Modify as necessary.

12.4 Viewing of Modifying Shutdown Configuration Settings (TTS/TGS and TTH/TGH Only)

To view or modify the Shutdown Configuration settings:

1. Expand the Shutdown Configuration section.

This section includes: Shutdown Speed, Shutdown Timer Setting, Controlled Assist Shutdown on Interlock Open, and Shutdown Timer Max Limit.

2. Modify as necessary.

12.5 Viewing or Modifying IGV Configuration Settings (TTS/TGS and TTH/TGH Only)

To view or modify the IGV configuration settings:

1. Expand the **IGV Configuration** section.

This section includes: Fast Restart IGV on Interrupt, Open IGV to Start Position after Initialization, IGV Gain, Skip IGV Initialization on Fault, Initialize IGV to Fully Closed and Minimum IGV Steps.

2. Modify as necessary.

NOTE

Refer to *M-PR-001-EN OEM Programming Guide* for detailed information on the Fast Restart feature.

12.6 Viewing or Modifying Surge/Choke Configuration Settings (TTS/TGS and TTH/TGH Only)

To view or modify the surge/choke configuration settings:

1. Expand the **Surge & Choke Configuration** section.

This section includes: Surge Recovery/Prevention Orbit Limit, Surge Warning Orbit Limit, Part-Vane Speed Gain, and Surge Offset.

2. Modify as necessary.

12.7 Viewing or Modifying Capacity Control Configuration Settings (VTT/VTX Only)

To view or modify the capacity control configuration settings:

1. Expand the **Capacity Control Configuration** section.

This section includes: IFV Open Power Coeff A, IFV Open Power Coeff B, Surge Escape Speed Increase, IFV Close Power Offset A, and IFV Close Power Offset B.

2. Modify as necessary.

12.8 Viewing or Modifying Communication Configuration

To view or modify the Communication Configuration settings:

TTS/TGS and TGH/TGH

1. Expand the Communication Configuration section.

This section includes: RS-232 & RS-485 Baud Rate, Parity and Stopbits, as well as the Modbus Slave Address.

2. Modify as necessary.

VTT/VTX

1. Expand the Communication Configuration section.

This section includes: Modbus Slave Address, RS-485 Baud Rate, RS-485 Parity, RS-485 Stopbits, Modbus Slave Address RS485-2, RS-485 Baud Rate Com2, RS-485 Parity Com2, and RS-485 Stopbits Com2.

2. Modify as necessary.

12.9 Viewing Advanced Configuration

TTS/TGS and TGH/TGH

To view the Advanced Configuration settings:

1. Expand the Advanced Configuration section.

This section includes: Positive Calculation Mode, Inverter & Cavity Cooling Max Temp., SCR Mains Input Frequency, Min. Operating Speed, Cooling Split Mode, Envelope Coefficient A & B, Low Speed Acceleration Threshold, Max System Speed, IGV Coefficient A & B, Max IGV Steps, IGV Initialization Steps, Surge and Choke Coefficients A thru D.

VTT/VTX

To view the Advanced Configuration settings:

1. Click the Advanced Configuration tab.

This section includes: Orb Limit 2, Orbit Counter Threshold, Motor Power Counter Threshold, Power Counter Threshold, RPM Change Per Control Cycle, IFV Override Enable, IFV Transistion Delay Loading, IFV Transition Power Deadband 1% IFV Override Zone, IFV Transition Delay Unloading, Speed Ctrl PID Max, Speed Ctrl P Deadband, Speed Ctrl I Deadband, Speed Ctrl D Deadband, Speed Ctrl I Deadband Factor, IFV Ctrl P Gain, IFV Ctrl I Gain, IFV Ctrl D Gain, IFV Ctrl PID Transition Zone, IFV Ctrl P Deadband, IFV Ctrl I Deadband, IFV Ctrl D Deadband, IFV Ctrl I Deadband Factor, and IFV Ctrl PID Transition PR.

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Chapter 13.0 Compressor Commissioning Tool

The *Compressor Commissioning Tool* is used to view, modify, and commit site-specific compressor parameter values of a connected compressor, as well as to import and export such configurations between portable files. Minor guidance is provided by presenting any number of configuration "pages", which are necessary for consideration during the deployment of a compressor system, and by displaying basic coverage/flow indications.

This tool can be used to import commissioning configuration from a file, adjust commissioning parameters requirement steps, export a commissioning value configuration to a file, sign an existing configuration file, export commissioning parameter values to a connected compressor, and create a commissioning report.

NOTE

- The *Compressor Commissioning Tool* requires exclusive application focus - all other tools may be closed or hidden when starting this tool
- The *Compressor Commissioning Tool* is only available if the firmware supports these features (i.e., TTS/TGS and TTH/TGH compressors with CC 3.1.4 and earlier)

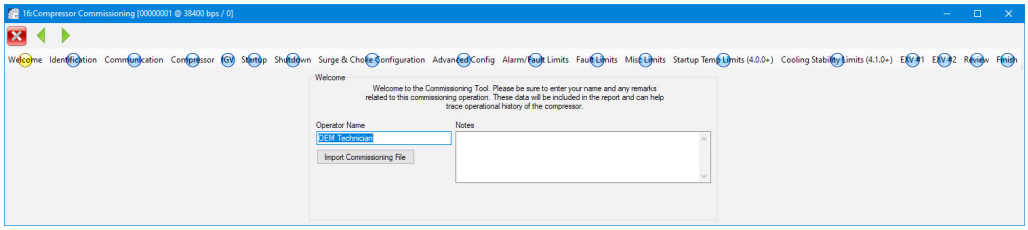
13.1 Accessing the Compressor Commissioning Tool (TTS/TGS and TTH/TGH Only)

Once connected, select the **Compressor Commissioning icon** from the *SMT Suite Launcher Strip.*

Figure 13-1 Compressor Commissioning Tool Icon

The *Compressor Commissioning* window displays:

Figure 13-2 Compressor Commissioning Window



NOTE

Available tools are dependent upon the firmware version of the connected compressor.

13.2 Importing a Commissioning Configuration from a File

To import a commissioning configuration from a file:

1. From the *Commissioning Configuration* window, click the **Import from File** button.
2. Select a **commissioning file** The commissioning parameters will be loaded and a notice is displayed indicating whether or not the file contains the signature of a DTC Trusted Official.

13.3 Adjusting Commissioning Parameters Requirement Step

To adjust the Commissioning parameters requirement step:

- Click any of the **graphical commissioning section flow item representation buttons** (colored circle with text name) in the flow items toolbar or click the **Next or Prev** buttons along the top toolbar.

NOTE

An orange button means the item has been visited, a blue is button is an unvisited item, and yellow is the current item.

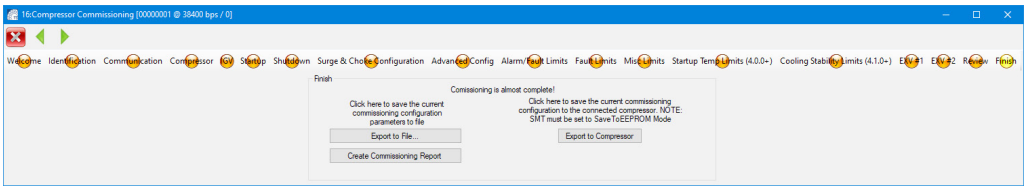
The selected section will appear below in the *Commissioning Section* display.

13.4 Exporting a Commissioning Values Configuration to a File

To export commissioning values configuration to a file:

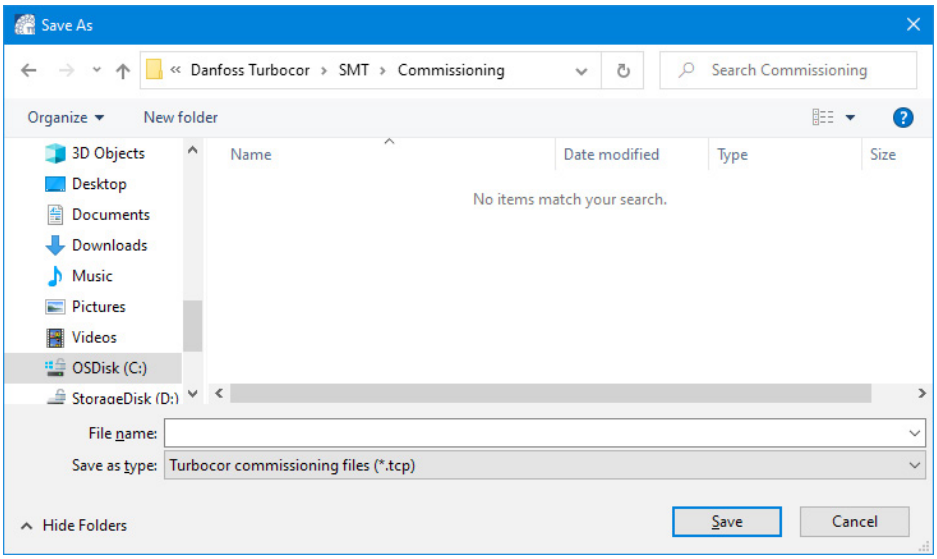
1. From the *Commissioning Configuration Finish* window, click the **Export to File** button.

Figure 13-3 Compressor Commissioning Finish Window



2. Select a **file destination.**

Figure 13-4 Choose Commissioning File Location



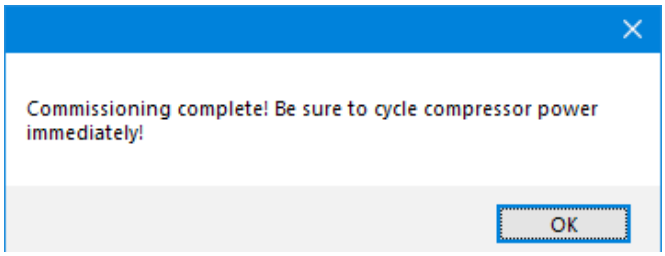
3. Click **Save.** The commissioning parameters and values are saved.

13.5 Exporting Commissioning Parameters to a Connected Compressor

Click the **Export to Compressor** button.

All parameters will be updated on the connected compressor. The progress of the export can be gauged by the progress bar directly below the button. A notification of completion will be displayed when finished.

Figure 13-5 Commissioning Complete



NOTE

The *Parameter Saving* selection in the *Connection Manager* must be set to **RAM & EEPROM** to enable the option to **Export to Compressor.**

13.6 Creating a Commissioning Report

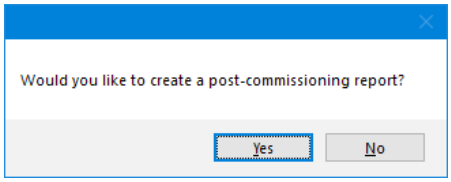
NOTE

A commissioning report can be saved at anytime, not just after commissioning has been performed.

To create a commissioning report:

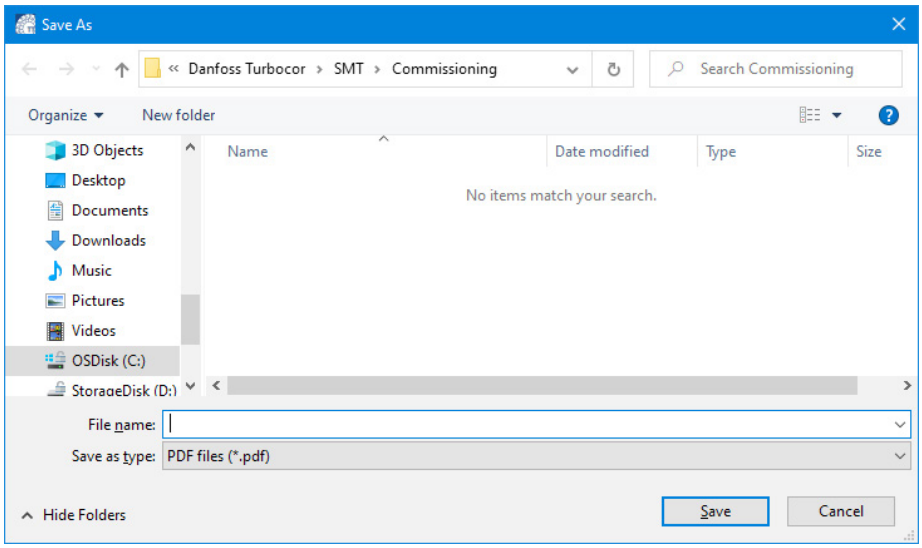
By clicking the Create Commissioning Report button or after commissioning is completed, a prompt will display asking if you would like to create a report.

Figure 13-6 Report Prompt



1. Click **Yes**. A *Save As* window displays.

Figure 13-7 Report Save As Window



2. Enter a **filename and path** to which the report will be saved.
3. Click **Save.**

A report is generated and saved to the user-specified path.

Chapter 14.0 Compressor Data Trending Tool

The *Compressor Data Trending Tool* is used to graphically monitor selected compressor parameter values and load or save user-configurable watch configurations. This tool can be used to add or remove parameters for graphical monitoring, select the plot color of a specific parameter, start or stop graphical monitoring, reset plot data, save plot data to CSV file, load saved or pre-configured watch groups, delete saved or pre-configured watch groups, or save the active watch configuration for later recall.

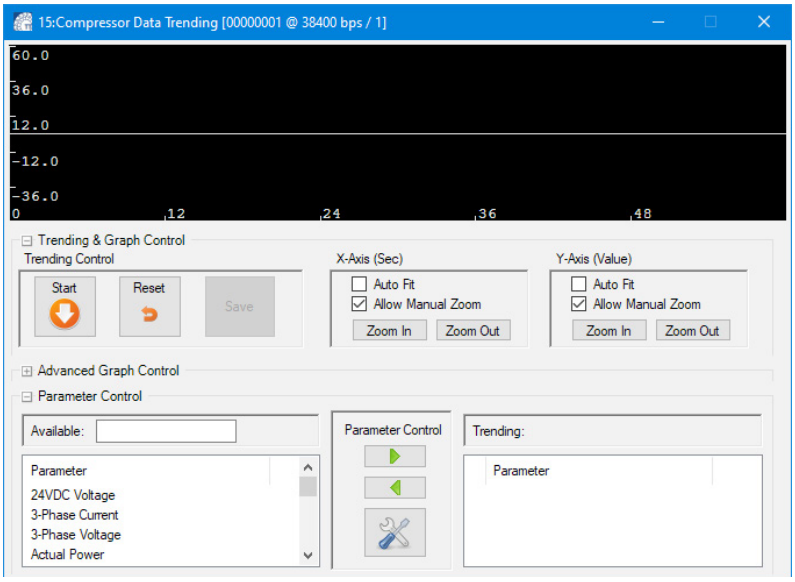
14.1 Accessing the Compressor Data Trending Tool (TTS/TGS and TTH/TGH Only)

Once connected, select the **Compressor Data Trending icon** from the *SMT Suite Launcher Strip.*

Figure 14-1 Compressor Data Trending Tool Icon

The *Compressor Data Trending* window displays:

Figure 14-2 Compressor Data Trending Window

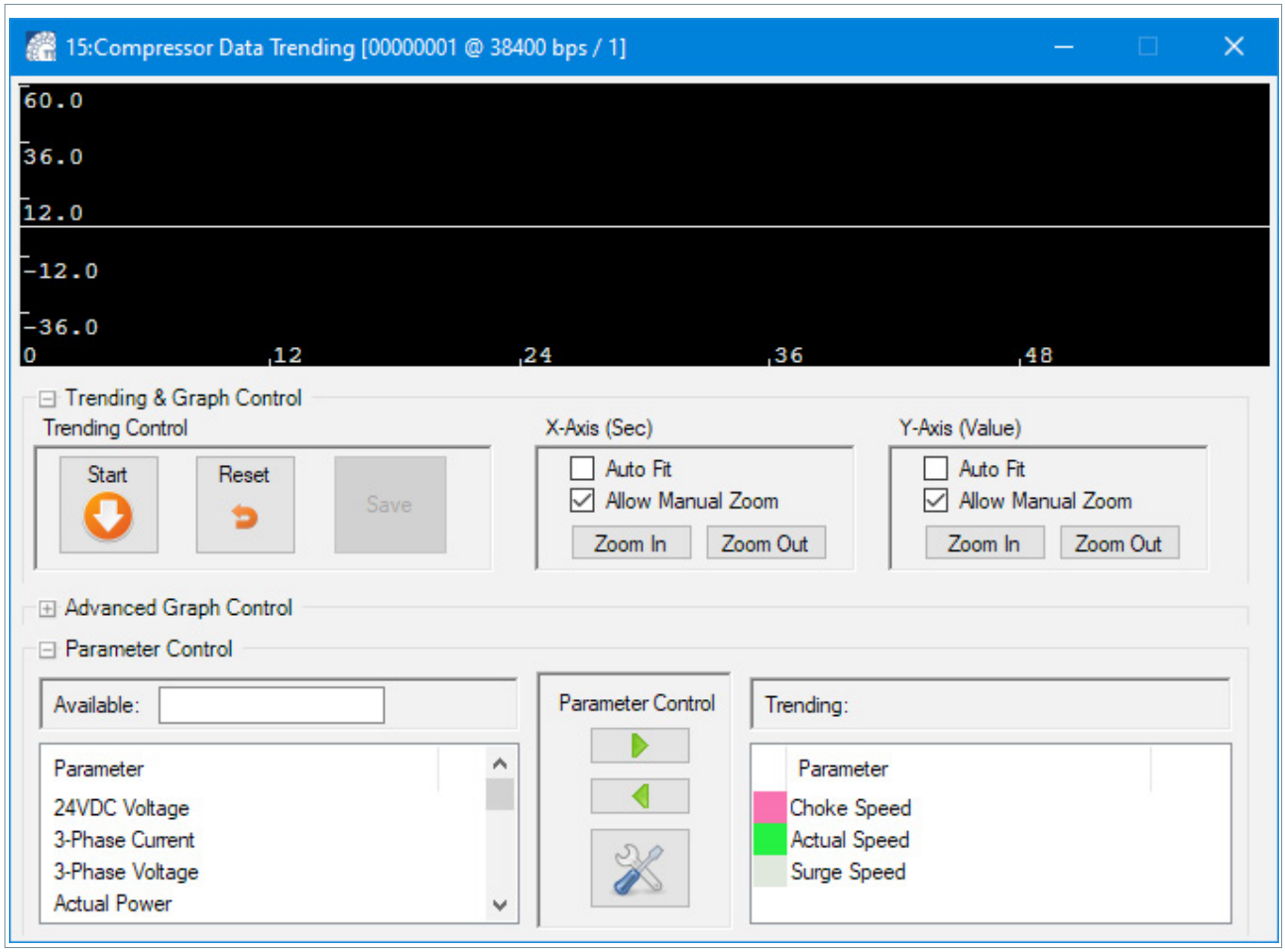


14.2 Adding Parameters for Graphical Monitoring

To add or remove parameters for graphical monitoring:

1. From the *Compressor Data Trending* window, in the *Available Parameters* listing, scroll to the **desired parameter.**

Figure 14-3 Compressor Trending Window - Parameter Pane



NOTE

You can enter a partial query in the *Available Parameters* text box above the listing to filter the visible parameters.

NOTE

Clicking inside the listing and typing the first few letters of the name can help speed up finding the parameter to select.

2. Double-click on the **desired entry** or click the **Add to Trend Configuration** button. Refer to "Figure 14-3 Compressor Trending Window - Parameter Pane".

The parameter is removed from the *Available Parameters* listing and added to the *Watched Parameters.* listing.

NOTE

To choose more parameters, first stop the plotting by clicking the Stop button in the Trending Control section.

14.3 Removing Parameters from Graphical Monitoring

To remove parameters from graphical monitoring:

1. From the *Compressor Data Trending* window, in the *Watched Parameters* listing, select the **desired parameter.**
2. Double-click on the **desired entry** or click the **Remove from Trend Configuration** button. Refer to "Figure 14-3 Compressor Trending Window - Parameter Pane".

The parameter is removed from the *Watched Parameters* listing and is added to the top of the *Available Parameters* listing.

NOTE

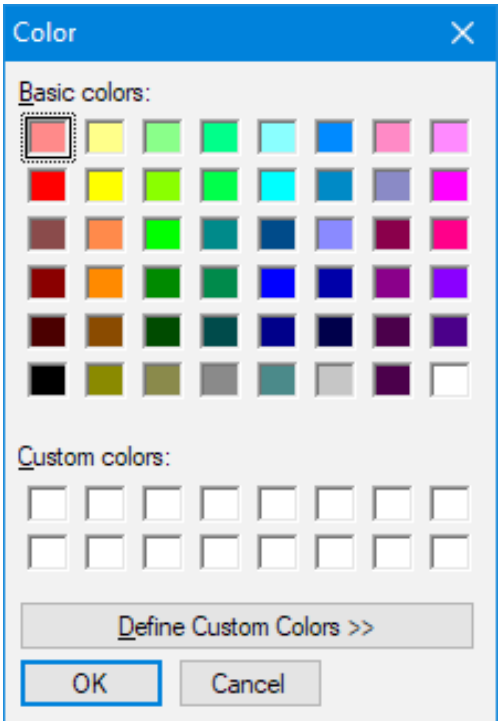
To remove parameters, first stop the plotting by clicking the Stop button in the Trending Control section.

14.4 Selecting the Plot Color a Specific Parameter

To select the plot color of a specific parameter:

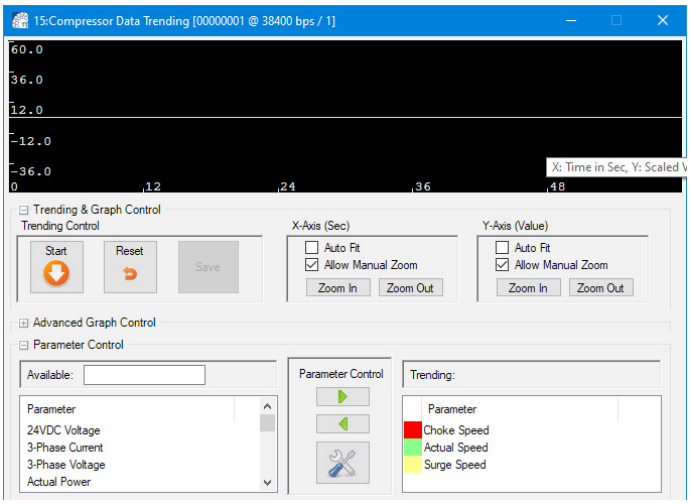
1. From the *Compressor Data Trending* window, in the *Watched Parameters* listing, click on the **colored square immediately to the left of the name of the parameter** whose plot color is to be changed. A color selection dialog displays.

Figure 14-4 Parameter Color Selection



2. Select a **new color** and click **OK**. The color square in the listing will update as will the color of the appropriate plot line (if plotting is active).

Figure 14-5 Watched Parameters After Color Change

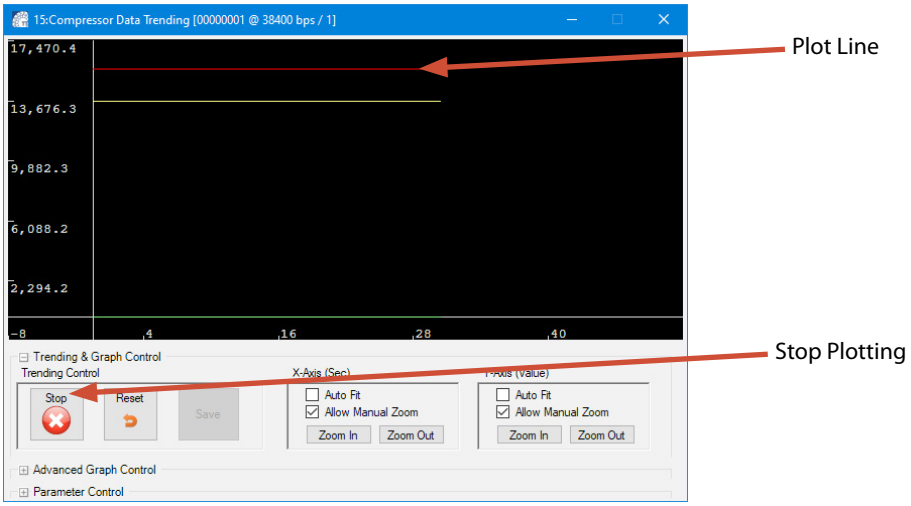


14.5 Starting Graphical Monitoring

To start graphical monitoring, from the *Compressor Data Trending* window, click the **Start Plotting** button (orange button with down arrow). Plotting begins.

The *Start Plotting* button will change to the *Stop Plotting* button.

Figure 14-6 Watched Parameters Being Plotted

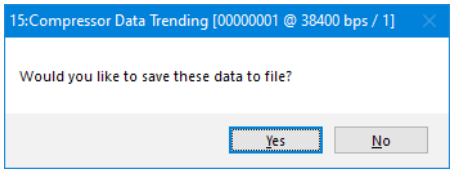


14.6 Stopping Graphical Monitoring

To stop graphical monitoring:

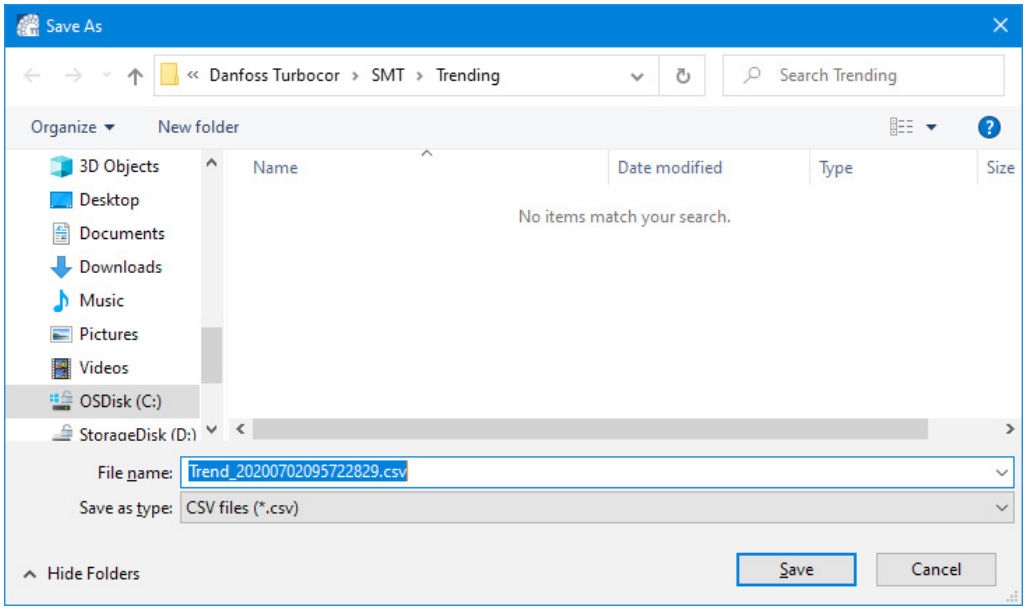
1. From the *Compressor Data Trending* window, click the **Stop Plotting** button. See Figure 101 (Watched Parameters Being Plotted).
2. You are prompted as to whether you would like to save the data to a file.

Save Data Prompt



3. Select **Yes** to save a CSV (Excel) file.

Figure 14-7 Save Data to a CSV File



4. Enter the **destination file name** and all trend data will be recorded to the specified file in CSV format.

NOTE

You will also receive the *Save As* prompt if a compressor connection is lost or you are disconnected.

14.7 Resetting Plot Data

To reset plot data, click the **Reset Plots** button (orange curl-arrow).

- All plots will be reset and the graph may momentarily clear.

NOTE

When resetting the plots, data recorded before resetting will not be saved to file if this option was selected when plotting was stopped.

14.8 Saving Plot Data to a CSV File

To save plot data to CSV file:

1. After stopping, a prompt asking whether the user would like to save the trend data to file displays. Select **Yes** to save data to a CSV file.

- A *Save As* window displays. Refer to "Figure 14-7 Save Data to a CSV File" on page 81.

2. Enter the **destination file name** and all trend data will be recorded to the specified file in CSV format.

NOTE

You will also receive the Save As prompt if a compressor connection is lost or you are disconnected.

14.9 Loading a Saved or Pre-configured Watch Group

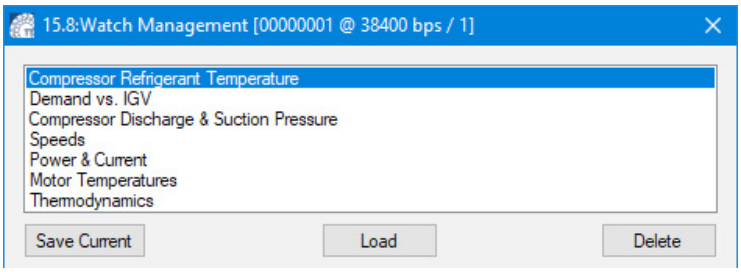
To load a saved or pre-configured watch group:

1. From the *Compressor Data Trending* window, click the **Manage Watch Configurations** button.

Figure 14-8 Managed Watch Configurations Button

The *Watch Management* window displays.

Figure 14-9 Watch Management Window



2. Select the desired watch configuration (if any exist) from the listing.
3. To load the selected watch configuration, either **double-click the item in the listing** or click the **Load** button.

- The watch configuration will display in the *Watched Parameters* listing on the main form and each item's plot color will be adjusted as saved.

NOTE

Once deleted, the configuration can not be retrieved. It would have to be recreated manually.

14.10 Deleting a Saved or Pre-configured Watch Group

To delete a saved or pre-configured watch group:

1. Click the **Manage Watch Configurations** button (wrench & screwdriver).

- The watch configuration management form displays.

2. Select the **desired watch configuration** (if any exist) from the listing.
3. Click **Delete.**

- A prompt verifying whether you really want to delete the selected watch configuration displays.

4. Select **Yes** to remove the watch configuration.

14.11 Saving the Active Watch Configuration for Later Recall

To save the active watch configuration for later recall:

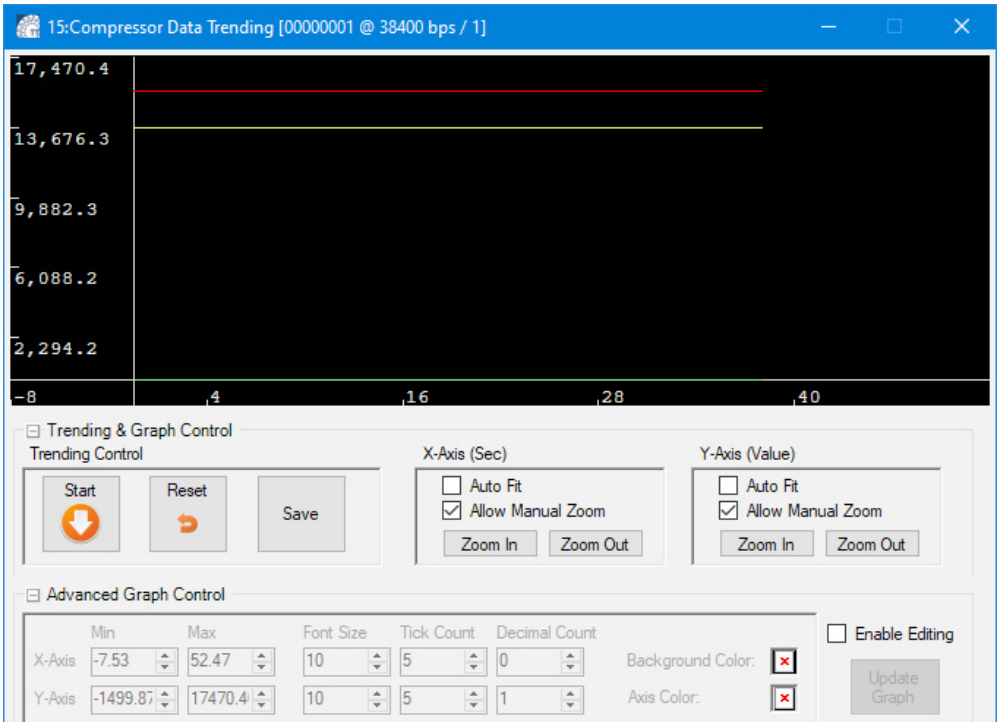
1. Add **at least one parameter** to the *Watched Parameters* listing.
2. Click the **Manage Watch Configurations** button (wrench & screwdriver).

- The watch configuration management form displays.

3. Click the **Save Current** button. A form requesting a name for the watch configuration will appear.
4. Enter a name and click **OK** to save the current watch configuration.

14.12 Trending Tool

Figure 14-10 Compressor Data Trending



14.13 Valve Control Setup (VTT/VTX Only)

Once connected, select the **Motor Cooling Valve tool icon** from the *SMT Suite Launcher Strip.*

Figure 14-11 Motor Cooling Valve Tool Icon

To view or modify the Valve settings:

VTT/VTX

1. Click the Motor Cooling Valve tool icon.

This section includes: Motor Cooling, VFD Cooling, IFV calibration, and Staging.

2. Select the IFV tab to calibrate the IFV.
3. Select the appropriate other tabs and modify as necessary.

Figure 14-12 Valve Control Setup - Motor Cooling

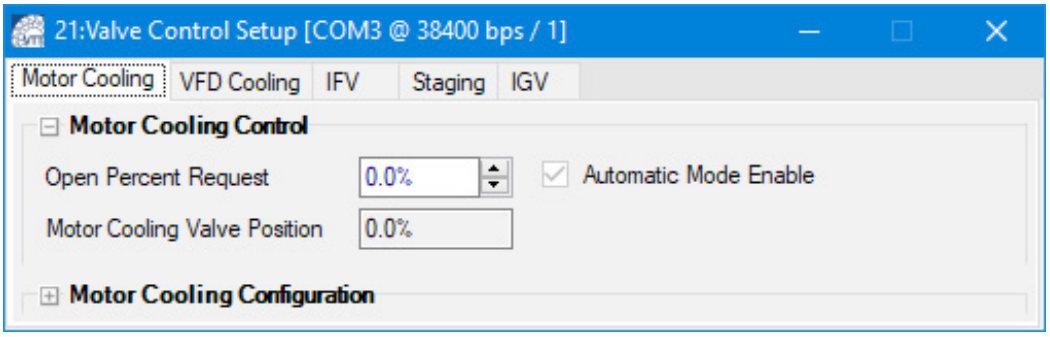
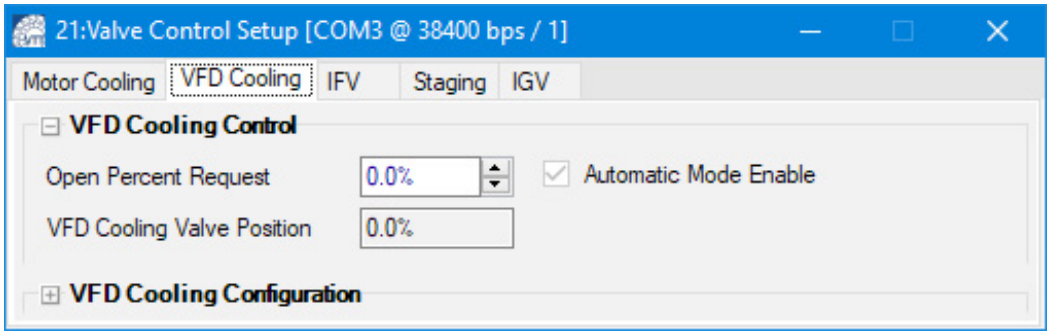


Figure 14-13 Valve Control Setup - VFD Cooling



14.14 Valve Control Tool

Figure 14-14 Valve Control Setup - IFV

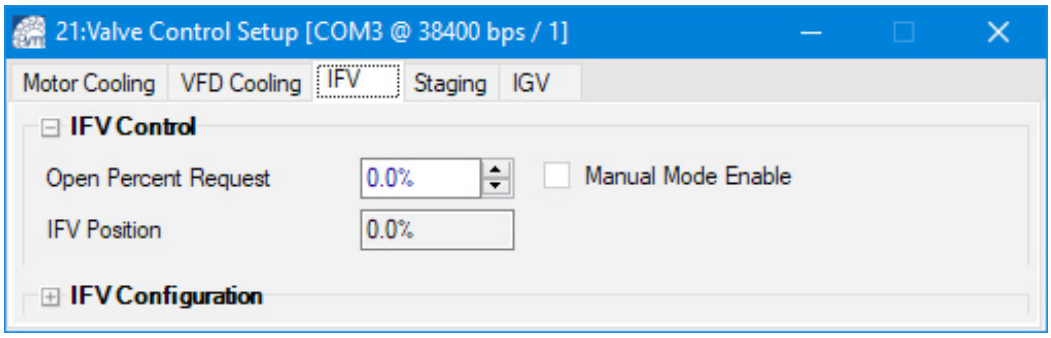


Figure 14-15 Valve Control Setup - Staging

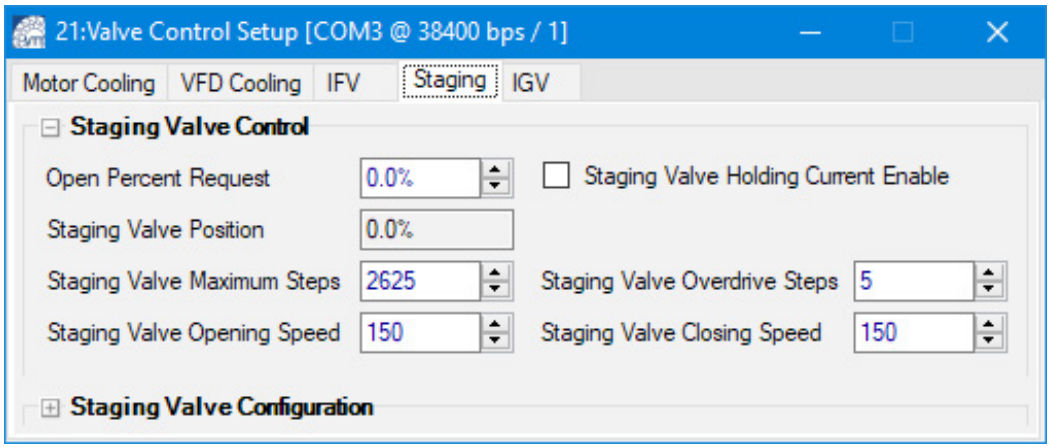
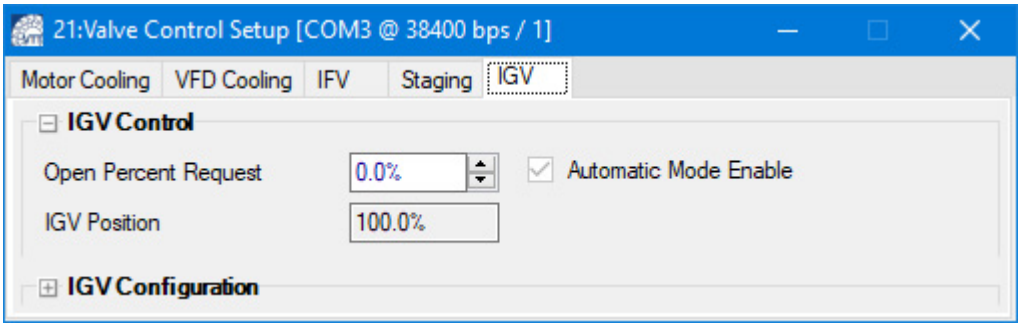


Figure 14-16 Valve Control Setup - IGV



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Troubleshoot

Spare Parts

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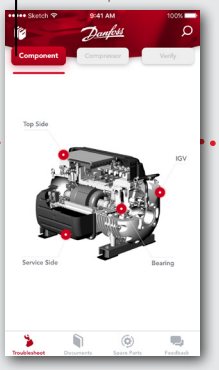
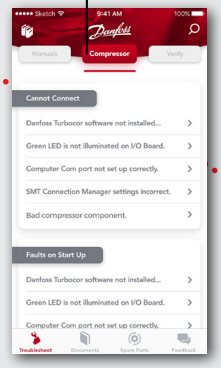
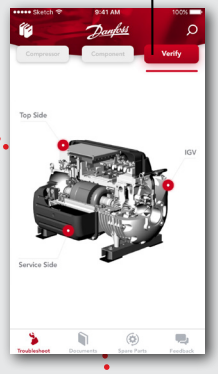


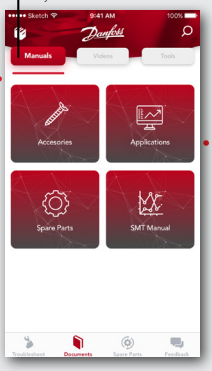
The user can select from a list of symptoms in the app that match the problems exhibited by the compressor being serviced. The app will then list potential causes, solutions to the problem, and service literature to reference for further information.



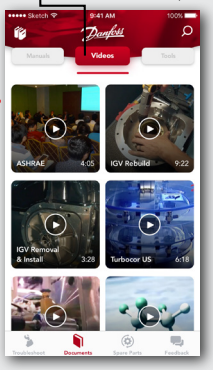
The app provides the correct operating parameters for key components: no need to keep reference documents on hand.

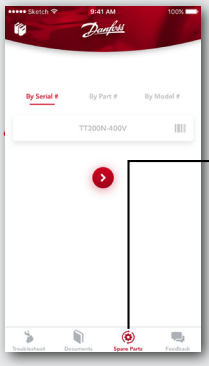


You no longer need to keep hundreds of pages of parts catalogs and training manuals. With the app, all of this information is at your fingertips on your smart device.



With the app, you can access videos made by Danfoss Turbocor® that demonstrate how to remove, install, and rebuild key components on Danfoss Turbocor® compressors.





TurboTool® helps you to quickly identify the required spare parts. A quick scan of the compressor serial # using your smartphone camera or by entering the part # or model #, and the app will display potential spare parts kits.

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