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# Software Requirements Specification

for

## JADEC Calorimetry Data Acquisition and Control System

### JADEC-12 Release

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## Revision History

Name	Date	Description	Revision
Vincent Burzi	9/22/2020	Initial Release	1.0
Vincent Burzi	9/22/2020	Modified Stand-Alone TrendViewer: removed the graph expand / collapse button as it shall not be supported in the stand-alone software (Figure 1 and Figure 2).	1.1
Vincent Burzi	9/22/2020	<ul style="list-style-type: none"> <li>• Section formatting (Header and Page number corrections)</li> <li>• Cross-reference fixes</li> <li>• Minor wording changes</li> </ul>	1.2
Vincent Burzi	5/14/2021	Modifications based on implementation of Chiller Panel Data Acquisition and Tag Editor Driver Configuration.	1.3

# 1 Introduction

## 1.1 Purpose

The purpose of this Software Requirement Specification (SRS) document is to define the requirements for new features and improvements the JADEC Calorimetry Data Acquisition and Control System Software. These improvements and modifications focus on software changes related to integration of Chiller Panel Data and Stand-Alone tools for the system and shall be known collectively as the JADEC-12 Release. The starting point for this specification is JADEC-11 Release of the software. This document does not cover any feature or functionality already part of the software system that is not being changed. In addition, this document does not provide a full view of the test system (hardware and software). It is recommended that the reader familiarize themselves with the existing test system operation and system documentation before continuing.

## 1.2 Document Conventions

Software Requirements are uniquely identified with requirement tag ID within square brackets. Some examples are shown below:

[OE1] = Operating Environment Requirement #1

[OE2] = Operating Environment Requirement #2

[FR-NTR1] = Feature Requirement for Navigate Tag Relationships #1

[FR-NTR2] = Feature Requirement for Navigate Tag Relationships #2

[FR-NTR3] = Feature Requirement for Navigate Tag Relationships #3

All user interfaces shall be considered mockup or example interfaces unless otherwise specified. All implemented user interfaces are subject to change and may differ from the examples shown in this document. All implemented user interfaces shall have a consistent look across the software.

All items to be determined are listed as TBD and highlighted in yellow.

## 1.3 Project Scope

The scope of this project is to implement new features for Calorimetry Data Acquisition and Control System. These changes shall affect the TrendSafe PC Software, TrendSafe RT Software, Configuration Database, and the Storage Database (both Commercial and Federal).

## 1.4 References

### Document References:

1. Johnson Controls SDC Test Block Software System Design Specification, Document Revision 2.0, 2/16/2016
2. SRS for JADEC Calorimetry Data Acquisition and Control System 2.0, Document Revision 2.6, 10/18/2017
3. SRS for Gas Block Addition to the JADEC Calorimetry Data Acquisition and Control System Software Version 2.0, Document Revision 1.8, 4/6/2018
4. SRS for JADEC Calorimetry Data Acquisition and Control JADEC-7 Release, Document Revision 1.3, 12/13/2018
5. SRS for JADEC Calorimetry Data Acquisition and Control JADEC-8 Release (Safety Shutdown), Document Revision 1.2, 5/6/2019
6. SRS for JADEC Calorimetry Data Acquisition and Control JADEC-9 Release (Acoustic), Document Revision 1.5, 10/10/2019
7. SRS for JADEC Calorimetry Data Acquisition and Control JADEC-10 Release, Document Revision 1.2, 7/30/2020
8. SRS for JADEC Calorimetry Data Acquisition and Control JADEC-11 Release (Process Control Software Modifications), Document Revision 1.2, 9/2/2020

## 2 Overall Description

### 2.1 Operating Environment

**[OE1]** Main Controller Operating Environment: The Main Controller Software shall run on a National Instruments cRIO-9039 CompactRIO Controller running the NI Linux Real-Time Operating System.

**[OE2]** Test Block Software Operating Environment: The Test Block Software shall run on desktop computer running Windows 7 operating system. The computer shall have 3 monitors each supporting a native resolution of 1920x1200.

### 2.2 Design and Implementation Constraints

**[DIC1]** Development Environment: The software shall be designed using National Instruments LabVIEW 2015 SP1 (32-bit).

**[DIC2]** Database Management System: Microsoft SQL Server 2014 Enterprise Edition shall be used as the database management system.

**[DIC3]** Trident Multi-Channel Acoustic Analyzer: Trident Multi-Channel Acoustic Analyzer by ViAcoustics shall be used on the Gas Blocks to acquire and analyze acoustic data. Version v8.0.2 or newer of the acoustic software shall be used.

## 2.3 Assumptions and Dependencies

1. The Main Controller cRIO-9039 has the resources (CPU, RAM, and Disk) to support execution of the required number of processes. It is difficult to determine the resource needs of the controller as the number of mobile racks, power analyzers and tags for each system is variable.
2. The database servers shall have the resources required to support the data storage needs of the system.
3. The database servers shall have the resources required to support the connection and query load of all JADEC test blocks operating simultaneously.
4. The JCI network shall support the network load required by all JADEC test blocks operating simultaneously.

# 3 System Features

## 3.1 Stand-Alone Trend Viewer (B600-10)

### 3.1.1 Description

The Stand-Alone TrendViewer is an independent application that shall allow a user to review tag data acquired by the JADEC TrendSafe System. The Stand-Alone TrendViewer shall require access to the JADEC database system and file server where compressed data is stored.

The Stand-Alone TrendViewer shall provide the ability to view both raw and compressed tag data for a specified data set. The data set shall be created by allowing the user to select one or more TR Instances that were run on the same test system. The compressed tag data for the data set will be copied to the user's local machine and made available for use by the viewer. The raw tag data shall be loaded from the database as needed.

### 3.1.2 User Interface

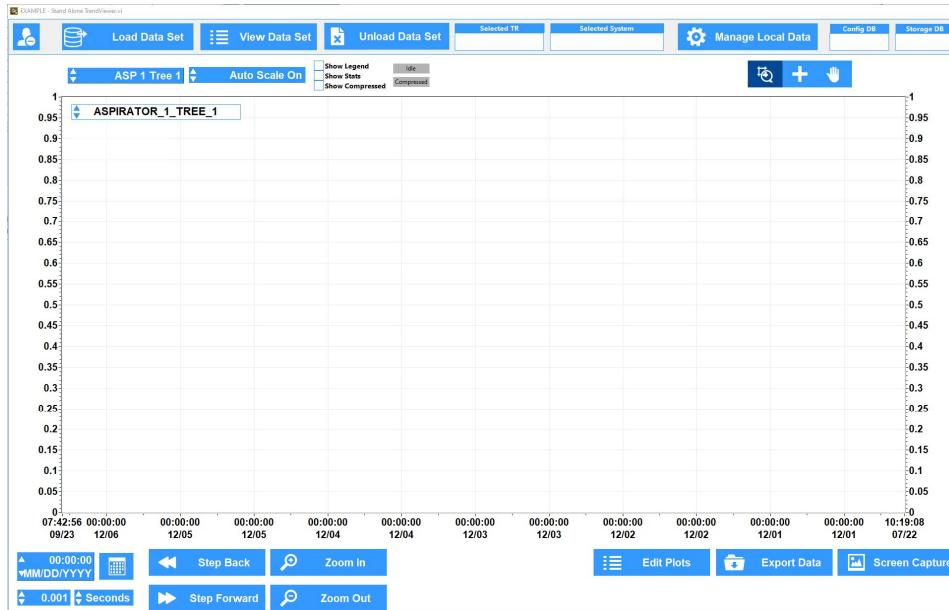


Figure 1. Stand-Alone TrendViewer Main User Interface

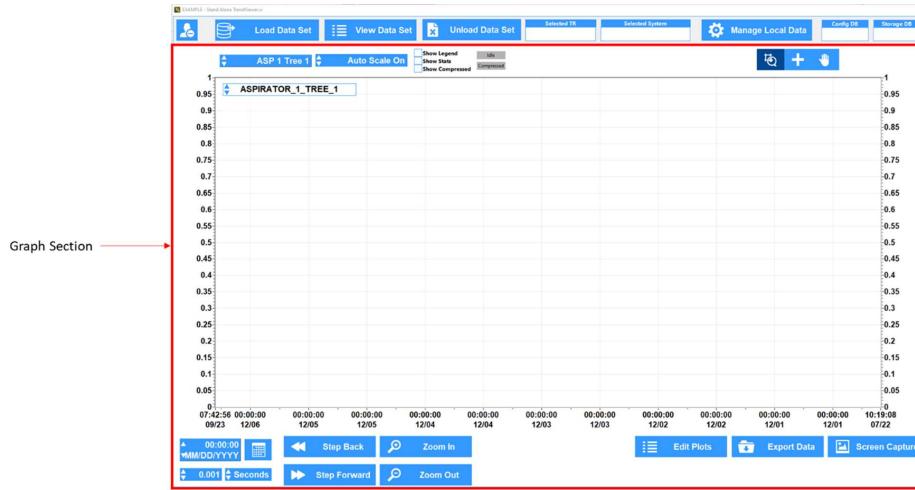


Figure 2. Stand-Alone TrendViewer – Graph Section Highlighted



Figure 3. Stand-Alone TrendViewer Graph Time Span Controls



Figure 4. User Login Dialog

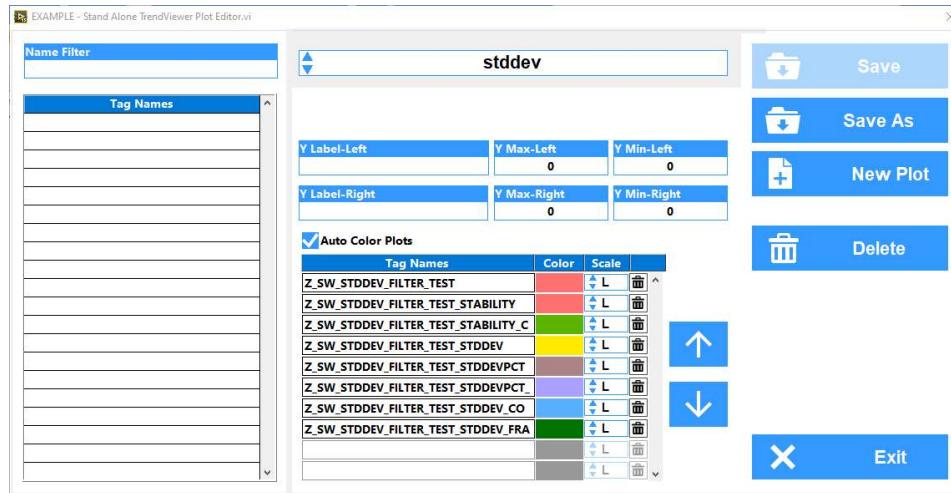
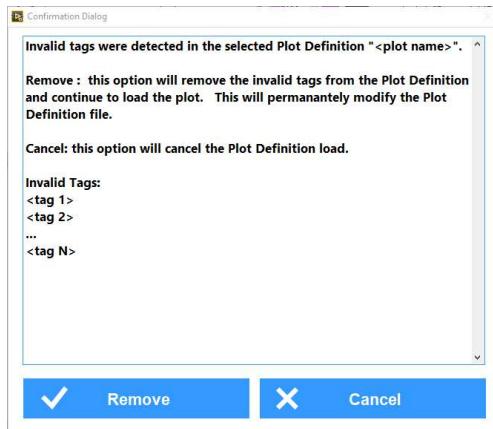
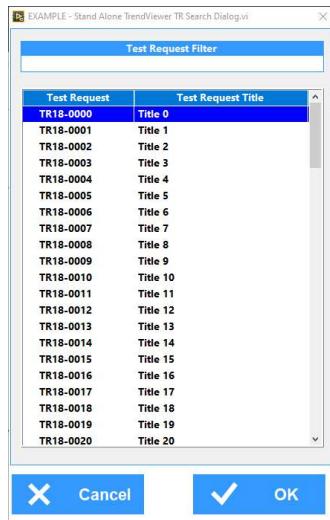


Figure 5. Plot Editor Dialog

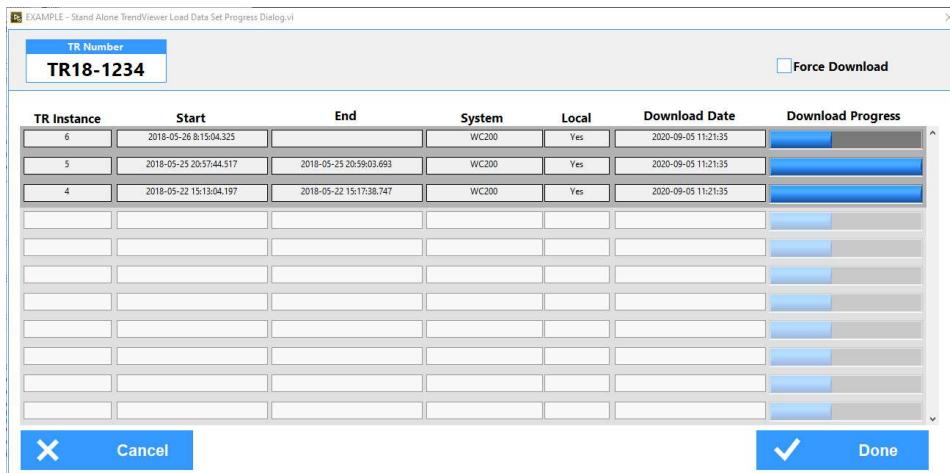


**Figure 6. Plot Invalid Tags Dialog**

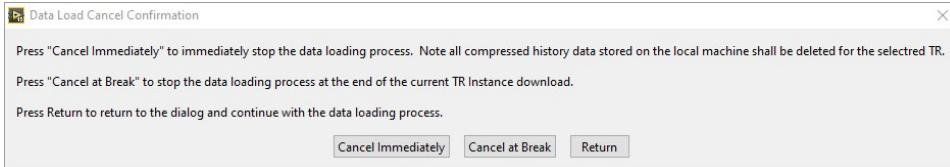
**Figure 7. Stand-Alone TrendViewer Load Data Set Dialog**



**Figure 8.** Stand-Alone TrendViewer TR Search Dialog

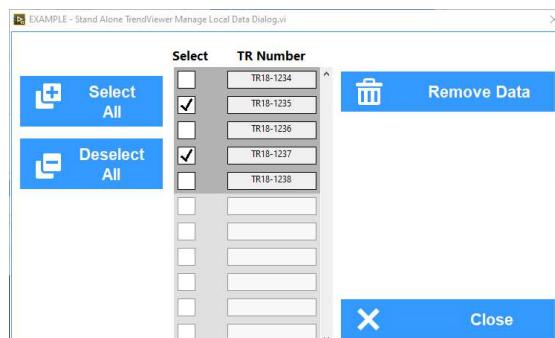


**Figure 9. Stand-Alone TrendViewer Load Data Set Progress Dialog**



**Figure 10. Stand-Alone TrendViewer Load Data Set Cancel Confirmation Dialog**

**Figure 11. Stand-Alone TrendViewer View Data Set Dialog**



**Figure 12.** Stand-Alone TrendViewer Manage Local Data Dialog



**Figure 13. Stand-Alone TrendViewer Screen Capture Dialog**



Figure 14. Stand-Alone TrendViewer Data Export Dialog

### 3.1.3 Functional Requirements

Feature Requirements: Stand-Alone Trend Viewer [FR-JADEC12-SATV]

**[FR-JADEC12-SATV1]** The Stand-Alone TrendViewer shall be an executable file that can run on a Windows 10 computer.

**[FR-JADEC12-SATV2]** The user interface shall be configured for a screen resolution of 1920x1200. Horizontal and vertical scroll bars shall be enabled on the main screen to allow lower resolution monitors to operate the software.

**[FR-JADEC12-SATV3]** The Stand-Alone TrendViewer shall require connections to both the JADEC Configuration Database and JADEC Storage Database (either commercial or federal). The connection to the databases shall be made a using UDL file that shall be stored in the “Configuration Data” folder located in the folder that contains the executable file. The Storage Database UDL file name shall be “StorageDB.UDL”. The Configuration Database UDL file name shall be “ConfigurationDB.UDL”.

**[FR-JADEC12-SATV4]** The state of the Storage DB and Configuration DB connection shall be displayed on the user interface on the top right corner, as shown in Figure 1. The database status indicators shall display a status of ONLINE or OFFLINE.

**[FR-JADEC12-SATV5]** The User Login button shall be located on the top left corner of the Stand-Alone TrendViewer user interface, as shown in Figure 1.

**[FR-JADEC12-SATV6]** The User Login button shall be enabled, and the user shall be able to log in when the Configuration database is online. The User Login button shall be disabled, and the user shall not be able to log in when the Configuration Database is offline. The user shall be able to logout regardless of the Configuration database state.

**[FR-JADEC12-SATV7]** When the Login button is pressed the User Login Dialog (Figure 4) shall be presented to the user. Upon successful login of a user the Login button shall display the Logout icon.

**[FR-JADEC12-SATV8]** When the Logout button is pressed the current data set (if any) shall be unloaded.

**[FR-JADEC12-SATV9]** Stand-Alone TrendViewer control enable states shall be implemented as defined in Table 1.

Control(s)	User Security Level	Additional Enabled Conditions	Additional Disabled Conditions
Load Data Set button	Operator	Storage DB is ONLINE	
View Data Set button	Operator	Data Set Loaded	
Unload Data Set button	Operator	Data Set Loaded	
Manage Local Data button	Operator		Data Set Loaded
Graph Section (all controls, Figure 2)	Operator	Data Set Loaded	

Table 1. Stand-Alone TrendViewer Control Enable States

**[FR-JADEC12-SATV10]** The Load Data Set button shall present the Load Data Set Dialog (Figure 7). The Load Data Set Dialog shall be used to select a new TR Data Set for viewing in the TrendViewer.

**[FR-JADEC12-SATV11]** A TR Data Set is one or more TR Instances from the same main test system (test block). Defining the TR Data Set serves two purposes. First, it defines the compressed history data that is needed on the local machine. The second purpose is to define the tag list required by the Stand-Alone TrendViewer. The tag list shall be generated by combining the main system (test block) tag list and the dynamic equipment system tag lists that may be associated with the selected TR Instances.

**[FR-JADEC12-SATV12]** If a data set is currently loaded in the Stand-Alone TrendViewer it shall populate the TR Number and TR Instance List in the Load Data Set Dialog (Figure 7), otherwise the dialog shall be blank when opened.

**[FR-JADEC12-SATV13]** The Load Data Set Dialog (Figure 7) Cancel button shall always be enabled.

**[FR-JADEC12-SATV14]** The Load Data Set Dialog (Figure 7) Cancel button shall close the dialog without any change to the data set.

**[FR-JADEC12-SATV15]** The Warning Message Indicator (Figure 7) is the yellow box at the top of the screen that shall be made visible when a warning condition has occurred. The warning indicator shall not be visible when there is no warning to display.

Warning Title	Warning Description
No TR Instances Found	No TR Instances found in the database for the specified TR.
System Mismatch	The selected TR Instances are from different systems. All selected TR Instances must be from the same system.

Table 2. Example Warning Messages

**[FR-JADEC12-SATV16]** The Load Data Set Dialog (Figure 7) "Select TR" button shall open the TR Search Dialog (Figure 8).

**[FR-JADEC12-SATV17]** The TR Search Dialog (Figure 8) shall be used to select a single TR for the Data Set.

**[FR-JADEC12-SATV18]** The Cancel button on the TR Search Dialog (Figure 8) shall be enabled at all times. The Cancel button shall close the dialog with no TR selected. When the dialog is closed with the Cancel button the TR Number indicator on the Load Data Set Dialog (Figure 7) shall remain unchanged.

**[FR-JADEC12-SATV19]** The OK button on the TR Search Dialog (Figure 8) shall be enabled when a valid value is selected in the Test Request List and disabled otherwise. The OK button shall close the dialog setting the highlighted row as the currently selected TR. When the dialog is closed with the OK button the TR Number indicator on the Load Data Set Dialog (Figure 7) shall be set to the currently selected TR.

**[FR-JADEC12-SATV20]** The Test Request list on the TR Search Dialog (Figure 8) shall be populated with all Test Requests in the database. The TR list may be filtered by entering text in the “Test Request Filter” control.

**[FR-JADEC12-SATV21]** The “Test Request Filter” on the TR Search Dialog (Figure 8) shall be a string control. The filter control shall be used to filter the test request list.

**[FR-JADEC12-SATV22]** The Load Data Set Dialog (Figure 7) “TR Number” shall be an indicator that displays the currently selected TR which shall be selected in the TR Search Dialog (Figure 8).

**[FR-JADEC12-SATV23]** If no TR Instances exist for the selected TR the “No TR Instances Found” warning message (Table 2) shall be displayed in the warning message indicator (Figure 7). The warning message shall be cleared if the TR Number is cleared (blank) or a new TR Number is entered.

**[FR-JADEC12-SATV24]** When a TR is selected the TR Instances list shall be populated from the database. All TR Instances (open, suspended, and closed) shall be displayed in the list. Instances shall be listed in the table by the TR Instance number in descending order (newest to oldest).

**[FR-JADEC12-SATV25]** The TR Instance List shall consist of the columns defined in Table 3.

Column Name	Column Description
Select	Check box control that shall allow the user to select the TR Instance for download.
TR Instance	The TR Instance number.
Start	The time the TR Instance was opened on the test block.
End	The time the TR Instance was suspended or closed on the test block. This field shall be blank if the TR Instance is currently open on the test block.
System	The name of the test block system where the TR Instance was run.
Local	Indicates if the TR Instance data already exists on the local disk. The field is set to Yes if the data is local and No otherwise.
Download Date	Specifies the date the TR Instance data was downloaded to the local machine.

Table 3. TR Instance List Columns

**[FR-JADEC12-SATV26]** The Select checkboxes in the TR Instance List shall allow the user to select TR Instances for inclusion in the data set. The data set must include one or more TR Instances and all TR Instances must be from the same system.

**[FR-JADEC12-SATV27]** The Load Data Set Dialog shall allow selection of the currently active (open) TR Instance for the specified TR. Acquiring the data for the active TR Instance shall require the Stand-Alone TrendViewer to copy the compressed history data files from the test system machine where the TR Instance is active.

**[FR-JADEC12-SATV28]** If TR Instances are selected from different systems the “System Mismatch” warning message (Table 2) shall be displayed in the warning message indicator (Figure 7). The warning message shall be cleared if the TR Instance selections are modified such that they are all from a single system.

**[FR-JADEC12-SATV29]** The Load Data Set Dialog (Figure 7) Deselect All button shall be enabled when one or more TR Instances are selected and disabled otherwise.

**[FR-JADEC12-SATV30]** The Load Data Set Dialog (Figure 7) Deselect All button shall deselect all TR Instances in the TR Instance list.

**[FR-JADEC12-SATV31]** The Load Data Set Dialog (Figure 7) Select All button shall be enabled when the TR Instance list is populated with one or more rows and disabled otherwise.

**[FR-JADEC12-SATV32]** The Load Data Set Dialog (Figure 7) Select All button shall select all TR Instances in the TR Instance list.

**[FR-JADEC12-SATV33]** The Load Data Set Dialog (Figure 7) Force Download checkbox shall always be enabled.

**[FR-JADEC12-SATV34]** The Load Data Set Dialog (Figure 7) Force Download checkbox shall be used during the download data operation to force the download of compressed history data for TR Instances that already exist locally.

**[FR-JADEC12-SATV35]** The Load Data Set Dialog (Figure 7) Load Data Set button enable state shall be implemented as defined in Table 4.

State	Conditions
Enabled	One or more TR Instances are selected all from the same system.
Disabled	No TR Instances selected OR TR Instances selected with “System Mismatch” warning

Table 4. Download Data Button Enable State Logic

**[FR-JADEC12-SATV36]** The Load Data Set Dialog (Figure 7) Load Data Set button shall close the Load Data Set Dialog and open the Load Data Set Progress Dialog (Figure 9).

**[FR-JADEC12-SATV37]** The Load Data Set Progress Dialog (Figure 9) shall indicate progress of loading process for each TR Instance. The TR Number and Force Download shall be indicators populated based on the selections the user made in the Load Data Set Dialog. The TR Instance list shall be populated with only the TR Instances selected in the Load Data Set Dialog (Figure 7).

**[FR-JADEC12-SATV38]** The Cancel button on the Load Data Set Progress Dialog (Figure 9) shall be enabled when the load process is active and disabled once the load process is completed. The Cancel button shall be used to cancel the load process.

**[FR-JADEC12-SATV39]** When the Cancel button is pressed the user shall be presented with a confirmation dialog (Figure 10) with three options. "Cancel Immediately" shall immediately stop the data loading process, delete all compressed history data for the selected TR from the local machine and leave the progress dialog window open with the Done button enabled (the user shall use the Done button to close the dialog). "Cancel at Break" shall stop the data loading process at the end of the current TR Instance download and leave the progress dialog window open with the Done button enabled (the user shall use the Done button to close the dialog). "Return" shall return to the progress dialog without stopping the data loading process.

**[FR-JADEC12-SATV40]** The Done button on the Load Data Set Progress Dialog (Figure 9) shall be enabled when the load process is completed and disabled when the load process is active. The Done button shall be used to close the dialog.

**[FR-JADEC12-SATV41]** When the data set load is completed the TR Number specified in the Load Data Set Dialog (Figure 7) shall be entered into the Selected TR indicator and the system name shall be entered into the Selected System indicator (Figure 1).

**[FR-JADEC12-SATV42]** The View Data Set button (Figure 1) shall present the View Data Set dialog (Figure 11). This dialog shall display the TR Instances that are part of the current data set.

**[FR-JADEC12-SATV43]** The Unload Data Set button (Figure 1) shall clear the current data set from the Stand-Alone TrendViewer. Clearing the data set shall clear the data set information (TR and TR Instance list) from the TrendViewer application memory. This shall result in clearing the Selected TR, Selected System, and disabling the Graph Section (Figure 2) as well as effecting the enable state of other controls as per Table 1. Clearing the data set shall not remove any downloaded data from the local disk.

**[FR-JADEC12-SATV44]** The Manage Local Data button shall present the Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)).

**[FR-JADEC12-SATV45]** The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) shall allow the user to delete all compressed tag data stored locally for one or more Test Requests.

**[FR-JADEC12-SATV46]** The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) TR Number list shall display all of the TRs that have compressed tag data stored locally. The user can select one or more TR to delete using the Select check box.

**[FR-JADEC12-SATV47]** The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Select All button shall be enabled when the TR list is populated with one or more rows and disabled otherwise.

[FR-JADEC12-SATV48] The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Select All button shall select all TRs in the TR list.

[FR-JADEC12-SATV49] The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Deselect All button shall be enabled when one or more TR are selected and disabled otherwise.

[FR-JADEC12-SATV50] The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Deselect All button shall deselect all TRs in the TR list.

[FR-JADEC12-SATV51] The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Remove Data button shall be enabled when one or more TRs are selected in the TR list.

[FR-JADEC12-SATV52] The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Remove Data button shall delete all compressed tag data for the selected TRs from the local drive.

[FR-JADEC12-SATV53] The Manage Local Data Dialog ([Figure 12](#)[Figure 12](#)) Close button shall close the dialog and shall always be enabled.

[FR-JADEC12-SATV54] The Center Point Timestamp Control in the bottom left of the TrendViewer UI (Figure 1 and Figure 3) shall be used to define the center point of the graph x-axis.

[FR-JADEC12-SATV55] The Span Controls in the bottom left of the TrendViewer UI (Figure 1 and Figure 3) shall be used to define the total time span of the graph x-axis. The Span Controls is composed of two separate controls – a numeric value that defines the span and the unit for the span. The span unit is a drop-down control with the following values: Seconds, Minutes, Hours, Days, Weeks, Months and Years.

[FR-JADEC12-SATV56] The Step Back Control in the bottom left of the TrendViewer UI (Figure 1 and Figure 3) shall be used to decrement the Center Point Timestamp by  $\frac{1}{2}$  of the span value. The graph x-axis and data set shall be updated appropriately.

[FR-JADEC12-SATV57] The Step Forward Control in the bottom left of the TrendViewer UI (Figure 1 and Figure 3) shall be used to increment the Center Point Timestamp by  $\frac{1}{2}$  of the span value. The graph x-axis and data set shall be updated appropriately.

[FR-JADEC12-SATV58] The Zoom In Control in the bottom left of the TrendViewer UI (Figure 1 and Figure 3) shall be used to decrease the Span by  $\frac{1}{2}$  (a span of 10 minutes is reduced to 5 minutes). The graph x-axis and data set shall be updated appropriately.

[FR-JADEC12-SATV59] The Zoom Out Control in the bottom left of the TrendViewer UI (Figure 1 and Figure 3) shall be used to increase the Span by 2 (a span of 10 minutes is increase to 20 minutes). The graph x-axis and data set shall be updated appropriately.

[FR-JADEC12-SATV60] The Plot Selector (top left corner of the Graph Section, Figure 2) shall be modified to validate the plot definition file against the current tag list. If invalid tags are detected in the plot definition the dialog in Figure 6 shall be presented to the user to resolve the issue.

[FR-JADEC12-SATV61] The Edit Plots button (Figure 1) shall open the Plot Editor Dialog (Figure 5).

**[FR-JADEC12-SATV62]** The Plot Editor Dialog (Figure 5) shall be modified to validate the plot definition file against the current tag list. If invalid tags are detected in the plot definition the dialog in Figure 6 shall be presented to the user to resolve the issue.

**[FR-JADEC12-SATV63]** The Plot Editor Dialog (Figure 5) functionality, with the exception of the tag validation check, shall remain unchanged from the current TrendSafe PC Software.

**[FR-JADEC12-SATV64]** The Export Data button (Figure 1) shall open the Data Export Dialog (Figure 14).

**[FR-JADEC12-SATV65]** The Data Export Dialog (Figure 14) has been modified to support only a single Graph for the Stand-Alone TrendViewer, otherwise all functionality shall remain unchanged from the current TrendSafe PC Software.

**[FR-JADEC12-SATV66]** The Screen Capture button (Figure 1) shall open the Screen Capture Dialog (Figure 13).

**[FR-JADEC12-SATV67]** The Screen Capture Dialog (Figure 13) has been modified to support only a single Graph for the Stand-Alone TrendViewer, otherwise all functionality shall remain unchanged from the current TrendSafe PC Software.

**[FR-JADEC12-SATV68]** To support inclusion of active TR Instances (TR Instances that are open on a test block) the compressed history data folder on each test block computer shall be shared on the JCI network. This shared path shall be specified as a system attribute for each test system in the Configuration Database (tblSystemAttribute). These database entries shall be created and maintained manually by a system administrator.

### 3.1.4 Additional Detail

1. In regards to the Force Download functionality ([FR-JADEC12-SATV34]) the TR Instance compressed data zip files can have overlapping data files if they were suspended / opened on the same day. This can lead to incomplete data on these dates that the instances overlap if the data is not unzipped in the proper order (from oldest to newest). This is not an issue if the data is all downloaded and unzipped at the same time but can be an issue if some data already exists locally and additional data is downloaded at a different time. To overcome this issue the Force Download checkbox will ensure that all selected TR Instance data is downloaded and unzipped in the correct order even if some data already exists locally.

An example of the issue is detailed below:

- Instance 1 ends on the same day Instance 2 starts (9/15/2020).
- Instance 1 will have a history data file for each tag on 9/15/2020 but it will have data only until the TR was suspended (say noon).
- Instance 2 will have a history data file for each tag on 9/15/2020 as it was opened on that day and suspended a few days later. The history data files included in the instance 2 zip file will have the complete days data for 9/15/2020.

2. The compressed tag history data files shall be stored on the users local machine organized by TR Number, then System, and then Tag Name (Figure 15). Within the Tag Name folders shall be data files for each day data was collected (Figure 16). Each TR Instance shall add folders and data to the collection of existing data under the <TR Number> folder. Because the data for each TR Instance

shall be comingled with the other TR Instance data all data management shall be done at the TR Number level.

...\\History\\<TR Number>\\<SYSTEM Name>\\<TAG Name>\\<date>.HST

Name	Date modified	Type
AMBIENT_TEMP	9/11/2020 8:37 AM	File folder
AMPS_PH_A_LINE	10/22/2019 4:20 PM	File folder
AMPS_PH_B_LINE	10/22/2019 4:20 PM	File folder
AMPS_PH_C_LINE	10/22/2019 4:20 PM	File folder
BLD_TIP_DIA_STG1	9/11/2020 8:37 AM	File folder
BLD_WL_SPD	9/11/2020 8:37 AM	File folder
BLD_WL_STG1	9/11/2020 8:37 AM	File folder
C_G	9/11/2020 8:37 AM	File folder
C_HP1	9/11/2020 8:37 AM	File folder
C_HP2	9/11/2020 8:37 AM	File folder
C_PI	9/11/2020 8:37 AM	File folder
C_PS1	9/11/2020 8:37 AM	File folder
C1	9/11/2020 8:37 AM	File folder
C2	9/11/2020 8:37 AM	File folder
C3	9/11/2020 8:37 AM	File folder
C4	9/11/2020 8:37 AM	File folder
C5	9/11/2020 8:37 AM	File folder
C6	9/11/2020 8:37 AM	File folder
C7	9/11/2020 8:37 AM	File folder
C8	9/11/2020 8:37 AM	File folder

Figure 15. Compressed History Data Storage – Tag Data Folders

Name	Date modified	Type
20200911.HST	9/11/2020 8:38 AM	HST File
20200910.HST	9/11/2020 8:37 AM	HST File
20200909.HST	9/9/2020 6:57 PM	HST File
20200824.HST	8/24/2020 1:26 PM	HST File
20200813.HST	8/13/2020 6:22 PM	HST File
20200812.HST	8/12/2020 3:24 AM	HST File
20200809.HST	8/12/2020 12:25 PM	HST File
20200808.HST	8/8/2020 9:33 AM	HST File
20200806.HST	8/6/2020 12:31 PM	HST File
20200804.HST	8/4/2020 10:40 AM	HST File
20200802.HST	8/4/2020 10:36 AM	HST File
20200731.HST	8/3/2020 11:39 AM	HST File
20200730.HST	7/31/2020 12:08 AM	HST File
20200739.HST	7/30/2020 9:31 AM	HST File
20200728.HST	7/28/2020 8:06 PM	HST File
20200727.HST	7/27/2020 9:33 PM	HST File
20200725.HST	7/25/2020 11:05 AM	HST File
20200720.HST	7/20/2020 2:09 PM	HST File
20200714.HST	7/14/2020 3:57 PM	HST File
20200711.HST	7/14/2020 3:30 PM	HST File

Figure 16. Compressed History Data Storage – Tag Data Files

3. The plot definition files shall remain stored in a single folder for use by the Stand-Alone TrendViewer regardless of the data set used. This means that some plot definitions may not be valid depending upon the data set loaded (which defines the system and tag list). Validation of the plot definition file (during plot selection and plot editing) shall be implemented similar to the tag list validation already done in the TrendSafe PC software when the user selects a Tag List.
4. Viewing of the raw data retrieved from the database shall not be limited to the time spans defined by the TR Instances that make up the current data set. The user shall be able to view the raw data for any time period that exists in the database for the selected system.
5. No change shall be made to the software processes used to limit the number of raw data points that can be displayed on the TrendViewer graph. The maximum raw data points shall be specified by setting the “points.graph.max.raw” field in the [Trend Viewer] section of the “TrendSafe

Configuration.ini" file. Setting this field's value to a value less than zero shall result in the software using the graph plot area pixel width to define the maximum raw data points. The current plot area pixel width for the small graphs in the TrendSafe PC TrendViewer is 853 pixels. The plot area pixel width for the Stand-Alone TrendViewer graph mock-up user interface is approximately 1700 pixels.

### 3.1.5 Issues

None

## 3.2 Stand-Alone Test Request Editor (B600-39)

### 3.2.1 Description

The Stand-Alone Test Request (TR) Editor is an independent application that shall allow a user to view, edit and create test requests for the JADEC TrendSafe System. The Stand-Alone TR Editor shall require access to the JADEC database system.

A Save As button, a Move button, and a Close button shall be added to the TR Editor. These new features shall be available in both the Stand-Alone TR Editor and the JADEC TrendSafe PC Software. The Save As button shall allow the user to save an existing TR as a new TR. The Move button shall allow a TR to be transferred to a different test system. The Close button shall be used to close a TR that is in the pending state.

The TR Editor is already part of the JADEC TrendSafe PC Software. Functionality that currently exists in the TR Editor that is detailed in previous SRS documents and will not be documented in this SRS. It is assumed that all currently specified and implemented functionality shall be included in the Stand-Alone TR Editor. Only new features and changes to existing functionality and behaviors shall be detailed in this SRS.

### 3.2.2 User Interface

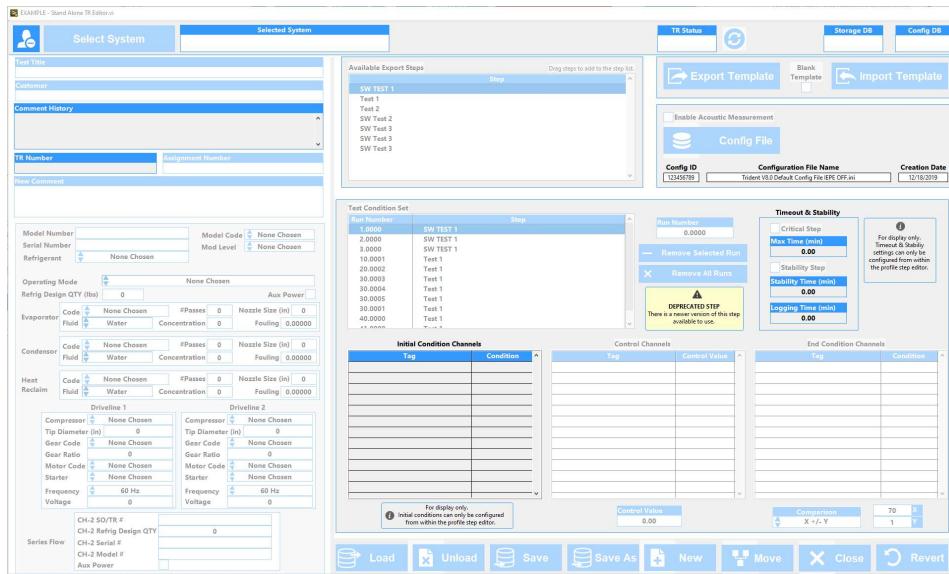


Figure 17. Stand-Alone Test Request Editor (proposed)

The screenshot shows the TR Editor Subpanel with several tabs open:

- Test Title:** Fields for Test Title, Customer, and Comment History.
- TR Number:** Fields for TR Number and Assignment Number.
- New Comment:** A text area for adding comments.
- Model Number:** Fields for Model Number, Model Code, and Refrig Design QTY (lbs).
- Serial Number:** Fields for Serial Number, Mod Level, and Refrigerant.
- Operating Mode:** A dropdown menu showing "None Chosen".
- Refrig Design QTY (lbs):** A field showing "0".
- Aux Power:** A dropdown menu showing "None Chosen".
- Evaporator:** Fields for Code, Fluid, and Concentration.
- Condenser:** Fields for Code, Fluid, and Concentration.
- Heat Reclaim:** Fields for Code, Fluid, and Concentration.
- Driveline 1:** Fields for Compressor, Gear Ratio, Motor Code, Starter, Frequency, and Voltage.
- Driveline 2:** Fields for Compressor, Gear Ratio, Motor Code, Starter, Frequency, and Voltage.
- CH-2 SD/TR #:** A field showing "0".
- CH-2 Refrig Design QTY:** A field showing "0".
- CH-2 Serial #:** A field showing "0".
- Aux Power:** A field showing "0".

On the right side, there is a step editor:

- Available Export Steps:** A list of steps including SW TEST 1, Test 1, Test 2, SW Test 3, SW Test 3, and SW Test 3.
- Export Template:** Buttons for "Export Template" and "Import Template".
- Config File:** Fields for Config ID (123456789), Configuration File Name (Trident V8.0/Default Config File (EPIC OFF)), and Creation Date (12/18/2019).
- Test Condition Set:** A table showing step details like Step Number, Step, Run Number, and Status.
- Initial Condition Channels:** Three tables for Initial Condition Channels, Control Channels, and End Condition Channels.
- Timeout & Stability:** Settings for Critical Step, Stability Step, and Logging Time.
- Buttons:** Load, Unload, Save, Save As, New, Move, Close, and Revert.

Figure 18: TR Editor Subpanel



Figure 19: User Login Dialog

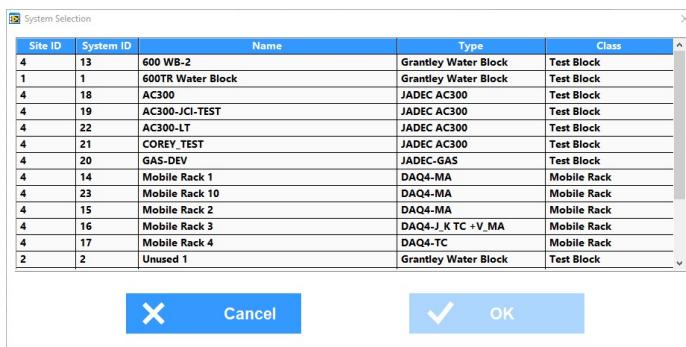


Figure 20: System Selection Dialog

*Proprietary and Confidential*

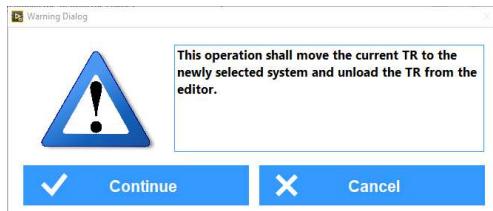


Figure 21: TR System Move TR Warning Dialog

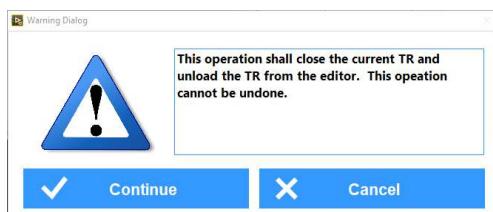


Figure 22: TR System Close TR Warning Dialog



Figure 23. Test Request Editor – Current Button Layout



Figure 24. Test Request Editor – New Button Layout



Figure 25. Enter New Test Request Dialog

### 3.2.3 Functional Requirements

Feature Requirements: Stand-Alone TR Editor [FR-JADEC12-SATE]

**[FR-JADEC12-SATE1]** The Stand-Alone TR Editor shall be an executable file that can run on a Windows 10 computer.

**[FR-JADEC12-SATE2]** The user interface shall be configured for a screen resolution of 1920x1200. Horizontal and vertical scroll bars shall be enabled on the main screen to allow lower resolution monitors to operate the software.

**[FR-JADEC12-SATE3]** The TR Editor shall require connections to both the JADEC Configuration Database and JADEC Storage Database (either commercial or federal). The connection to the databases shall be made using UDL files that shall be stored in the “Configuration Data” folder located in the folder that contains the executable file. The following shall be the UDL file names: “StorageDB.UDL” (Storage Database UDL File) and “ConfigurationDB.UDL” (Configuration Database UDL File).

**[FR-JADEC12-SATE4]** The state of the Storage DB and Configuration DB connection shall be displayed on the user interface on the top right corner, as shown in Figure 17. The Storage DB and Config DB indicators shall display a status of ONLINE or OFFLINE.

**[FR-JADEC12-SATE5]** The User Login button shall be located on the top left corner of the Stand-Alone TR Editor user interface, as shown in Figure 17.

**[FR-JADEC12-SATE6]** The User Login button enable state logic shall be implemented as defined by Table 5.

State	State Logic
Enabled	Configuration Database is Online
Disabled	Configuration Database is Offline OR Test Request is loaded in the editor

Table 5 User Login Button Enable State Logic

**[FR-JADEC12-SATE7]** When the Login button is pressed the User Login Dialog (Figure 19) shall be presented to the user. Upon successful login of a user the Login button shall display the Logout icon.

**[FR-JADEC12-SATE8]** When the Logout button is pressed the selected system shall be cleared.

**[FR-JADEC12-SATE9]** The Select System button shall require a minimum user security level of Operator.

**[FR-JADEC12-SATE10]** The Select System button enable state logic shall be implemented as defined by Table 6.

State	State Logic
Enabled	Storage Database is Online AND User is logged in with sufficient security permissions AND No TR Loaded
Disabled	Storage Database is Offline OR No user is logged in OR User does not have sufficient security permissions OR TR Loaded

Table 6 Select System Button Enable State Logic

**[FR-JADEC12-SATE11]** The Select System button shall present the System Selection Dialog (Figure 20) to the user. The system selection list shall be populated with all systems with a class of “Test Block”.

**[FR-JADEC12-SATE12]** The System Selection Dialog cancel button shall always be enabled. Pressing the cancel button shall close the dialog making no system selection.

**[FR-JADEC12-SATE13]** The System Selection Dialog OK button shall be enabled when a system is selected from the list. Pressing the OK button shall select the system and close the dialog.

**[FR-JADEC12-SATE14]** The Selected System indicator shall display the name of the System currently selected. If no system is selected this indicator shall be blank.

**[FR-JADEC12-SATE15]** The status of the currently loaded TR shall be displayed at the top of the Stand-Alone TR Editor user interface, TR Status indicator shown in Figure 17. The TR Status indicator shall be blank when no TR is loaded in the editor. When a TR is loaded in the editor the TR Status indicator shall be updated with the TR’s status (PENDING or OPEN).

**[FR-JADEC12-SATE16]** A Refresh button shall be located next to the TR Status indicator. When pressed the Refresh button shall update the TR Status indicator with the status of the currently loaded TR. The Refresh button shall be enabled when a TR is loaded and disabled otherwise.

**[FR-JADEC12-SATE17]** The TR Editor subpanel (Figure 18) enable state logic shall be implemented as defined by Table 7.

State	State Logic
Enabled	Storage Database is Online AND Configuration Database is Online AND System is selected
Disabled	Storage Database is Offline OR Configuration Database is Offline OR No System is selected

Table 7 TR Editor Subpanel Enable State Logic

**[FR-JADEC12-SATE18]** A Move button shall be added to the TR Editor subpanel as shown in Figure 24. The existing TR Editor control buttons (Figure 23) shall be modified to allow for space to add the new Move button.

**[FR-JADEC12-SATE19]** The Move button enable state logic shall be implemented as defined by Table 8.

State	State Logic
Enabled	Storage Database is Online AND TR Loaded AND TR Saved AND Not SYSTEM TR AND TR Status indicator == 'Pending'
Disabled	Storage Database is Offline

**Table 8 Move Button Enable State Logic**

**[FR-JADEC12-SATE20]** The Move button shall be used to move the TR from the current test system to a different test system and unload the TR from the editor. When the Move button is pressed a message dialog box ([Figure 21](#)[Figure 21](#)) shall be presented to the user indicating to them that changing the system selection shall move the TR to the new system and unload the TR from the editor. The user shall have the ability to continue or cancel the move operation from this dialog.

**[FR-JADEC12-SATE21]** When the Move operation is confirmed by the user the System Selection Dialog (Figure 20) shall be presented. The system selection list shall be populated with systems of class "Test Block" that have the same block type (air, gas, water) as the currently selected system. This shall ensure that a TR is not moved from a test block of one type to a test block of a different type.

**[FR-JADEC12-SATE22]** In the Move System Selection Dialog (Figure 20) when the Cancel button is selected the TR shall not be moved and the dialog shall be closed.

**[FR-JADEC12-SATE23]** In the Move System Selection Dialog (Figure 20) when a new system is selected and the OK button is pressed the software shall attempt to immediately move the TR to the newly selected system in the database. If the move is successful a confirmation dialog shall be presented to the user and the TR shall be unloaded from the editor. If the move fails because the TR status is no longer pending (the TR is now open or closed) a failure dialog shall be presented to the user. In either case the system selection dialog shall be closed.

**[FR-JADEC12-SATE24]** The TR Manager in the TrendSafe PC Software shall check when opening the TR that the TR can be opened on the current system. If the TR has been moved to a different system an error dialog shall be presented to the user and the TR shall be removed from the list of available TRs to open.

**[FR-JADEC12-SATE25]** A Save As button shall be added to the TR Editor subpanel as shown in Figure 24. The existing TR Editor control buttons (Figure 23) shall be modified to allow for space to add the new Save As button.

**[FR-JADEC12-SATE26]** The Save As button enable state logic shall be implemented as defined by Table 9. The Save As button shall not be available for a New TR - a TR just created using the New TR button that has not been saved to the database yet.

State	State Logic
Enabled	Storage Database is Online AND (TR Loaded) AND (Not a New TR)
Disabled	Storage Database is Offline

Table 9 Save As Button Enable State Logic

**[FR-JADEC12-SATE27]** When pressed the Save As button shall prompt the user to specify a new TR Number and a new Test Title using the existing Enter New TR Dialog, Figure 25. If the dialog is canceled the TR will not be saved. If the OK button is pressed on the dialog the newly entered TR number will be validated. If the new TR number is valid the TR will be saved as the new TR number. The TR number and Test Title shall be updated on the user interface upon a successful save as operation.

**[FR-JADEC12-SATE28]** A Close button shall be added to the TR Editor subpanel as shown in Figure 24. The existing TR Editor control buttons (Figure 23) shall be modified to allow for space to add the new button.

**[FR-JADEC12-SATE29]** The Close button enable state logic shall be implemented as defined by Table 10.

State	State Logic
Enabled	Storage Database is Online AND TR Loaded AND TR Saved (no pending changes) AND Not SYSTEM TR AND TR Status indicator == 'Pending'
Disabled	Storage Database is Offline

Table 10 Close Button Enable State Logic

**[FR-JADEC12-SATE30]** The Close button shall be used to close a TR that is in the pending state and unload the TR from the editor. When the Close button is pressed a message dialog box ([Figure 22](#)[Figure 22](#)) shall be presented to the user to confirm the close TR operation. The user shall have the ability to continue or cancel the close operation from this dialog.

### 3.2.4 Additional Detail

1. The block type (water, air, gas) is to be added to the Configuration Database `tblSystemTypeAttribute` table. Currently the block type info is stored locally at the block in the configuration file. However, to support the stand-alone TR editor the block type information may need to be in the database.
2. The TR Editor Subpanel permissions will remain unchanged. Currently the TR Editor cannot be accessed without permissions to select the TR Editor in the panel selection drop down selector on the TrendSafe PC Main UI. A similar mechanism is used on the Stand-Alone TR Editor. The user cannot access the TR Editor subpanel until they select a system. Operator level security permission is required to access the Select System button needed to unlock the TR Editor subpanel.
3. The TR Move operation shall unload the TR from the editor upon completion of the operation. This is because the TR will no longer belong to the currently selected System in the TR Editor.
4. The software currently validates that a TR number is unique when the TR number is entered. However, the TR number record is not saved until a later time when the user saves the TR. Between the time the TR number is validated, and the TR is saved another user can duplicate the TR number in the database. This is an issue in the current TrendSafe PC TR Editor and will continue to be an issue with the stand-alone TR Editor.
5. The Storage Database Selection (Commercial or Federal) shall be selected manually by configuring the appropriate Storage Database UDL file when installing and configuring the Stand-Alone TR Editor.
6. Currently the TR Editor sets the `tblTestRequest.charCurrentEditingOwner` to the computer name. To support editing from either the TrendSafe PC or Stand-Alone editor the owner string will need to be modified. New name will be <computer name> for TrendSafe PC editing (unchanged) and <computer name>-StandAlone for Stand-Alone TR Editor.
7. Currently the TrendSafe PC Software Database status indicator on the Main user interface is set to yellow if a change is pending on the test blocks currently open TR. This behavior shall remain unchanged. If the currently open TR is modified either with the TrendSafe PC TR Editor screen or the Stand-Alone TR Editor, the change shall be indicated with the Database status indicator.
8. Given the multi-client architecture of the system the status of a TR and the system that it is assigned must be determined at the time an operation on that TR is performed by the database (such as Opening a TR or Moving a TR). The database shall be the arbiter of the TR state (such as status and assigned system) when an operation is performed on the TR.

### 3.2.5 Issues

None

### 3.3 Chiller Panel Data (B600-41)

#### 3.3.1 Description

The TrendSafe system shall be modified to acquire chiller panel data from the unit under test. A new (fourth) user interface screen shall be added to the system. This new screen shall provide controls to configure the chiller panel connection, display the chiller data in a table, and provide two additional graphs tag plots. Data collected from the chiller panel shall be stored to the storage database as a string value. In addition, the system shall support mapping tags to specific chiller panel headers for use in the system.

#### 3.3.2 User Interface

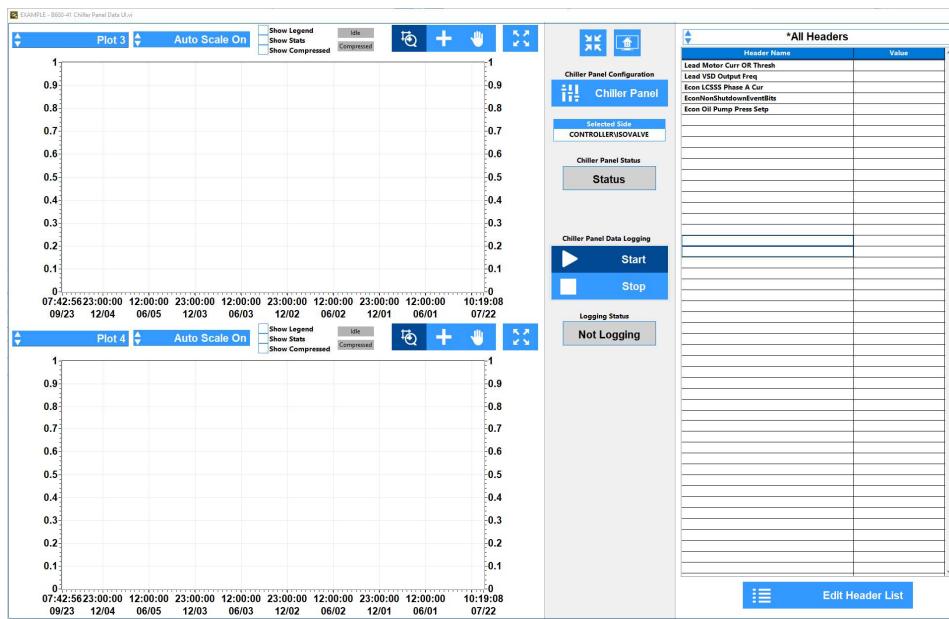


Figure 26. Chiller Panel Data User Interface (Screen #4)



Figure 27: Screen Capture Dialog

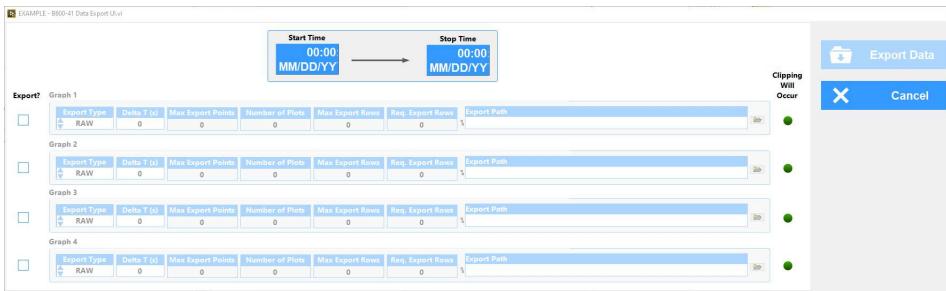


Figure 28: Data Export Dialog

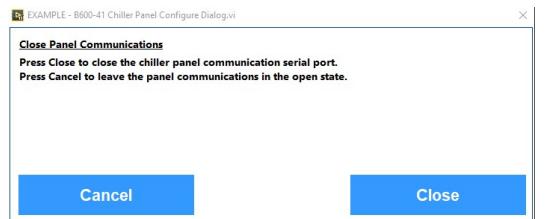


Figure 29: Chiller Panel Configuration Dialog – Close Panel Communications

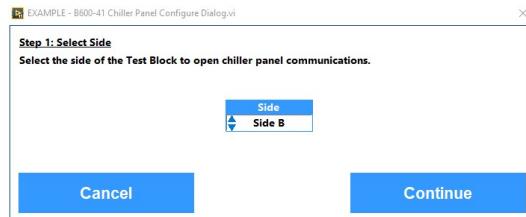


Figure 30: Chiller Panel Configuration Dialog - Step 1 Select Side

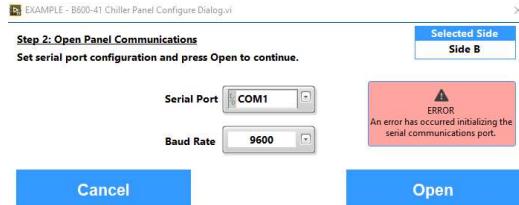


Figure 31: Chiller Panel Configuration Dialog – Step 2 Open Panel Communications



Figure 32: Chiller Panel Configuration Dialog – Step 3 Configure Headers



Figure 33: Chiller Panel Configuration Dialog – Step 4, Sub-Step A Ready System (Stop Panel Data)

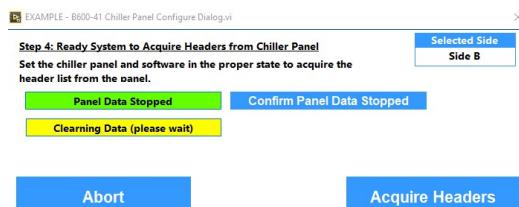
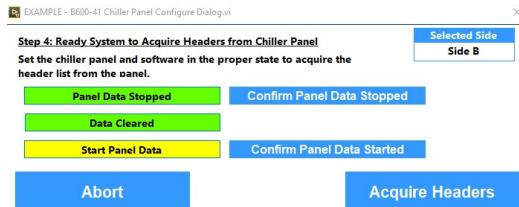
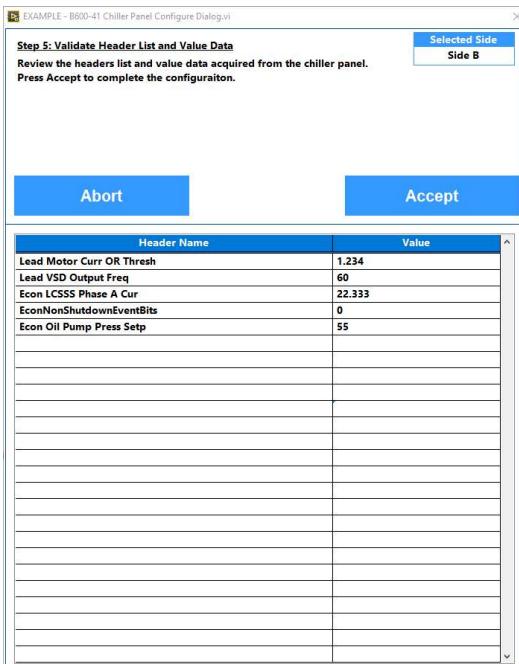


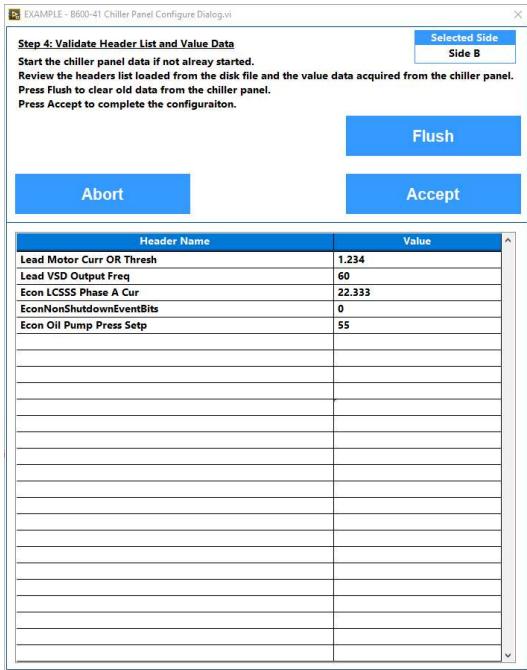
Figure 34: Chiller Panel Configuration Dialog – Step 4, Sub-Step B Ready System (Clearing Data)

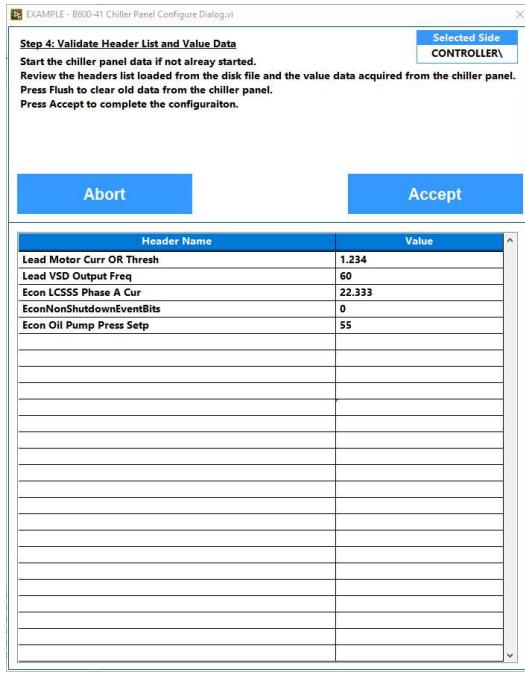


**Figure 35: Chiller Panel Configuration Dialog – Step 4, Sub-Step C Ready System (Start Panel Data)**



**Figure 36: Chiller Panel Configuration Dialog – Step 5 Validate Header List and Value Data**





**Figure 37: Chiller Panel Configuration Dialog – Step 4 Validate Header List and Value Data (Load Header List from Disk)**

### **3.3.3 Functional Requirements**

Feature Requirements: Chiller Panel Data [FR-JADEC12-CPD]

**[FR-JADEC12-CPD1]** A TrendSafe driver shall be created to acquire Chiller Panel data. The Chiller Panel Driver shall execute on the TrendSafe PC system. The Chiller Panel Driver shall acquire data from the chiller panel via a serial port configured on the test block PC computer.

**[FR-JADEC12-CPD2]** The Chiller Panel driver shall support tags for mapping chiller panel headers and associated values to TrendSafe tags. The Chiller Panel tag definition is detailed in [Table 11](#).

Field	Definition	Example
Tag Name	<user defined>	PANEL_ACTIVE-COOLING-SP
Tag Type	AO	
Driver	CONTROLLER\CHILLERPANEL	
Driver Parameters	<header name>	Cooling Setup

**Table 11. Chiller Panel Driver Tag Definition**

**[FR-JADEC12-CPD3]** The Driver Parameters shall consist of a single string that defines the chiller panel header name. The header name specified in the tag shall be used to map the tag to data from the chiller panel. For this mapping to be successful the header name specified must match the chiller panel header name exactly (case sensitive).

**[FR-JADEC12-CPD4]** When mapping a chiller panel header to a TrendSafe tag the software shall convert the chiller panel data value to a floating point numeric with a default value of NaN (not a number) for any data values that do not properly convert. The software shall not perform any validation testing on the chiller panel data value, nor will it attempt to perform any specialized conversion on the data value.

**[FR-JADEC12-CPD5]** When chiller panel data logging is enabled via the Chiller Panel Data Logging Start button (Figure 26), the chiller panel driver shall log data from the chiller panel at a maximum rate of 1Hz (once per second). Note, the chiller panel scan rate is configurable from 0.1 seconds to 60 seconds. If the chiller panel scan rate is configured to operate faster than 1Hz the data will be downsampled to ~1Hz. The additional data received from the panel shall be discarded. If the chiller scan rate is slower than 1Hz the driver scan rate shall be reduced to match the slower chiller panel scan rate, updating the tags and log file at the slower scan rate.

**[FR-JADEC12-CPD6]** When chiller panel data logging is enabled the driver shall store panel data to data files in 5-minute blocks. These data files shall be stored locally on disk in a temporary folder. These data files shall be uploaded to the JADEC Storage Database after each 5-minute block is completed and the database is online. Once the file is uploaded to the database the file shall be removed.

**[FR-JADEC12-CPD7]** When chiller panel data logging is enabled the driver shall update all Chiller Panel tags with the panel data value (converted to floating point numeric). The chiller panel tag values shall be transmitted to the TrendSafe RT system. Transmittal to the RT system shall allow the tags to be used by the calculation driver and snapshot process.

**[FR-JADEC12-CPD8]** When the chiller panel data logging transitions from enabled to disabled the chiller panel tags shall be updated with NaN.

**[FR-JADEC12-CPD9]** The Chiller Panel User Interface (Figure 26) shall be placed on monitor #4 with a screen resolution of 1920x1200. It is expected that the Chiller Panel UI shall be located to the right of the TrendViewer UI (monitor #3).

**[FR-JADEC12-CPD10]** Graph 3 and Graph 4 located on the Chiller Panel UI are two additional graphs for general system use. These graphs are not specific to the chiller panel, they are used to display system tag plots. These graphs shall respond to the plot controls already existing on the TrendViewer UI.

**[FR-JADEC12-CPD11]** The TrendViewer Screen Capture Dialog shall be modified to support the two additional graphs (graphs 3 & 4) as shown in [Figure 27](#)[Figure 27](#). The controls to capture Graph 3 and Graph 4 shall be added to the dialog. All existing graph functionality shall remain unchanged.

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**[FR-JADEC12-CPD12]** The TrendViewer Data Export Dialog shall be modified to support the two additional graphs (graphs 3 & 4) as shown in [Figure 28](#)[Figure 28](#). The controls to capture Graph 3 and Graph 4 shall be added to the dialog. All existing functionality shall remain unchanged.

**[FR-JADEC12-CPD13]** The Chiller Panel Configuration button (Figure 26) shall have a user security level of Operator. Additional enable state logic for the button is defined in [Table 12](#)[Table 12](#).

State	State Logic
Enabled	<none>
Disabled	No TR Loaded OR Logging Status == Logging

**Table 12. Chiller Panel Configuration Button Additional Enable State Logic**

**[FR-JADEC12-CPD14]** The Chiller Panel Configuration button (Figure 26) shall initiate the Chiller Panel Configuration process (Figure 29 to Figure 37).

**[FR-JADEC12-CPD15]** The Chiller Panel Status indicator (Figure 26) shall indicate the current state of the Chiller Panel connection in the TrendSafe Software as defined in [Table 13](#)[Table 13](#).

Text	Color	Description
Disabled	Grey	Chiller panel connection is disabled because no TR is loaded.
Uninitialized	Yellow	Chiller Panel is uninitialized. The software is not properly configured to acquire data from the Chiller Panel. Need to successfully complete the chiller panel configuration dialog.
Error	Red	The chiller panel driver has encountered an error. This could be a failed initialization, a data validation failure (# of data points received did not match the # of headers), or a data acquisition error.
Running	Green	The chiller panel driver is successfully configured. Once in the running state the driver will continuously read from the panel parse the data and display it in the header list. The driver can be logging or not logging in this state.

**Table 13. Chiller Panel Status Indicator**

**[FR-JADEC12-CPD16]** The Chiller Panel Data Logging radio buttons (Start / Stop) (Figure 26) shall be used to start or stop logging of chiller panel data within the TrendSafe PC Software.

**[FR-JADEC12-CPD17]** The Chiller Panel Data Logging radio buttons shall have a user security level of Operator. Additional enable state logic for the button is defined in [Table 14](#)[Table 14](#).

State	State Logic
Enabled	Chiller Panel Status = Running
Disabled	Chiller Panel Status != Running

**Table 14. Chiller Panel Data Logging Radio Button Additional Enable State Logic**

**[FR-JADEC12-CPD18]** The Chiller Panel Data Logging radio buttons (Figure 26) shall be set to the Stop on startup and after configuration of the chiller panel.

**[FR-JADEC12-CPD19]** The Chiller Panel Data Logging radio buttons (Figure 26) shall enable logging of the chiller panel data when the Start button is selected.

**[FR-JADEC12-CPD20]** The Chiller Panel Data Logging radio buttons (Figure 26) shall disable logging of the chiller panel when the Stop button is selected.

**[FR-JADEC12-CPD21]** The Logging Status indicator shall indicate the current state of the Chiller Panel data Logging in the TrendSafe Software as defined in [Table 15](#)[Table 15](#).

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Text	Color	Description
Not Logging	Grey	Chiller Panel Data Logging radio button is set to Stop
Logging	Green	Chiller Panel Data Logging radio button is set to Start AND Chiller Panel Status == Running
Error	Red	Chiller Panel Data Logging radio button is set to Start AND Chiller Panel Status == Error

**Table 15. Logging Status Indicator**

**[FR-JADEC12-CPD22]** If an error occurs in the Chiller Panel Driver while acquiring data from the Chiller Panel the Chiller Panel Status indicator shall be set to Error and the Logging Status Indicator shall be set to Error and color shall be set to Red ([Table 15](#)[Table 15](#)).

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**[FR-JADEC12-CPD23]** The Chiller Panel Configuration button (Figure 26) shall open the Chiller Panel Configuration Dialog. If the Chiller Panel [Status is equal to Running](#)[serial communications port is open](#) the dialog shall present a screen to close the chiller panel communications (Figure 29). If the Chiller Panel [Status is not Running \(Uninitialized or Error\)](#)[serial communications port is closed](#) the dialog shall present a screen to open the chiller panel communications (Figure 30).

**[FR-JADEC12-CPD24]** The dialog screen for closing the chiller panel communications (Figure 29) shall have a Cancel button and a Close button. Both buttons shall be enabled when entering the dialog. The Cancel button shall exit the dialog and leave the chiller panel communications in the open state. The Close button shall close the chiller panel communication (close the serial port) and exit the dialog window.

**[FR-JADEC12-CPD25]** When opening the chiller panel communications, the dialog shown in Figure 30 shall be presented as the first step. In this step of the dialog the user shall select the side of the test block for chiller panel connection.

**[FR-JADEC12-CPD26]** The chiller panel open communications dialog (Figure 30) shall have a Cancel button and a Continue button. Both buttons shall always be enabled. The Cancel button shall exit the dialog and leave the chiller panel communications in the closed state. The Continue button shall move the user to the next step of the opening process using the selected test block side.

**[FR-JADEC12-CPD27]** The number of sides supported for the test block and the serial configuration (port and baud rate) for each side shall be stored locally for each test system.

**[FR-JADEC12-CPD28]** The dialog screen shown in Figure 31 shall be used for step two of opening the chiller panel. In this step the user shall review and modify the serial communications options (port and baud rate) used by the PC to connect to the chiller panel and then open the selected serial port. When this screen is presented the serial port and baud rate selections shall be set to the configuration values stored for the selected side of the test system.

**[FR-JADEC12-CPD29]** The dialog screen shown in Figure 31 the Selected Side shall be an indicator displaying the side selected in Step 1.

**[FR-JADEC12-CPD30]** The dialog screen shown in Figure 31 the Cancel button shall always be enabled. The Cancel button shall leave the serial port in the closed state and exit the dialog.

**[FR-JADEC12-CPD31]** The dialog screen shown in Figure 31 the Open button shall be enabled when a valid serial port and baud rate are selected. The Open button shall start the serial port opening process. While the serial port is opening the Open button shall be disabled. If the serial port opening process is successful, the dialog shall move to Step 3. If the serial port opening process fails the Error dialog shall be displayed as shown in Figure 31, the Open button shall be enabled, and the user shall have the option to try again or cancel the configuration.

**[FR-JADEC12-CPD32]** Upon successful opening of the serial port changes made to the serial port and baud rate in Figure 31 shall be stored for the test block side so they can be used as the starting values.

**[FR-JADEC12-CPD33]** The dialog screen shown in Figure 32 shall be used for step three of opening the chiller panel. In this step the user shall decide which method to use for getting panel headers. Panel Data Headers can be acquired from the chiller panel or headers can be loaded from disk (previously stored). Note, the process of configuring the chiller panel will fork after this step, taking different paths and having different screens for loading headers from panel and loading from file.

**[FR-JADEC12-CPD34]** The dialog screen shown in Figure 32 the Selected Side shall be an indicator displaying the side selected in Step 1.

**[FR-JADEC12-CPD35]** The dialog screen shown in Figure 32 the Abort button shall always be enabled. The Abort button shall close the serial port and exit the dialog.

**[FR-JADEC12-CPD36]** The dialog screen shown in Figure 32 the “Acquire from Panel” button shall always be enabled. This button shall be used to begin the process of acquiring the header list from the chiller panel. The “Acquire from Panel” button shall advance the dialog to Step 4 shown in Figure 33.

**[FR-JADEC12-CPD37]** The dialog screen shown in Figure 32 the “Load from File” button shall be enabled if a chiller panel header list for the selected side exists on the system. If a header list file does not exist, the button shall be disabled and grayed out. The “Load from File” button shall load the header list from file, flush any existing serial data from the chiller panel, and advance the dialog to Step 4 shown in Figure 37.

**[FR-JADEC12-CPD38]** The dialog screen shown in Figure 33 shall be used for step four of opening the chiller panel when acquiring the header list from the panel. In this step the user shall place the chiller panel and the TrendSafe PC software into the proper state to acquire the header list. This screen shall lead the user through the process required to ready the system. This process shall have three sub-steps: (A) Figure 33: stopping the chiller panel from outputting data on the serial port, (B) Figure 34: clearing data from the serial port on the PC, and (C) Figure 35: starting the chiller panel serial output data.

**[FR-JADEC12-CPD39]** The dialog screen shown in Figure 33, Figure 34 and Figure 35 the Selected Side shall be an indicator displaying the side selected in Step 1.

**[FR-JADEC12-CPD40]** The dialog screen shown in Figure 33, Figure 34 and Figure 35 the Abort button shall always be enabled. The Abort button shall close the serial port and exit the dialog.

**[FR-JADEC12-CPD41]** In Step 4 (Ready System), Sub-step A (Stop Panel Data) the dialog (Figure 33) shall indicate to the user that they must stop the data output from the chiller panel by illuminating the "Stop Panel Data" indicator yellow. Once the user has performed the action at the chiller panel, they are to press the "Confirm Panel Data Stopped" button. When the confirm button is pressed the "Stop Panel Data" indicator shall change from yellow to green and the text shall change to "Panel Data Stopped." The "Confirm Panel Data Stopped" button shall be disabled-hidden once pressed.

**[FR-JADEC12-CPD42]** In Step 4 (Ready System), Sub-step B (Clearing Data) the dialog (Figure 34) shall indicate to the user that the TrendSafe PC software is clearing the serial port data by illuminating the "Clearing Data (please wait)" indicator yellow. Once the software has completed the clearing data action the indicator shall be set to Green and the text shall change to "Data Cleared".

**[FR-JADEC12-CPD43]** In Step 4 (Ready System), Sub-step C (Start Panel Data) the dialog (Figure 35) shall indicate to the user that they must start the data output from the chiller panel by illuminating the "Start Panel Data" indicator yellow. Once the user has performed the action at the chiller panel, they are to press the "Confirm Panel Data Started" button. When the confirm button is pressed the "Start Panel Data" indicator shall change from yellow to green and the text shall change to "Panel Data Started." The "Confirm Panel Data Started" button shall be disabled-hidden once pressed.

**[FR-JADEC12-CPD44]** The dialog screen shown in Figure 33, Figure 34 and Figure 35 the "Acquire Headers" button shall be enabled when all three sub-steps have been completed (the Confirm Panel Data Started button is pressed), and disabled at all other times. The "Acquire Headers" button shall acquire the header list from the chiller panel, and then advance the dialog to Step 5 shown in Figure 36.

**[FR-JADEC12-CPD45]** The dialog screen shown in Figure 36 shall be used for step five of opening the chiller panel when acquiring headers from the panel. In this step the header list and value data shall be acquired from the panel and displayed for review by the user. The user shall review and validate the header list and value data.

**[FR-JADEC12-CPD46]** The dialog screen shown in Figure 36 the Selected Side shall be an indicator displaying the side selected in Step 1.

**[FR-JADEC12-CPD47]** The dialog screen shown in Figure 36 the Abort button shall always be enabled. The Abort button shall close the serial port and exit the dialog.

**[FR-JADEC12-CPD48]** The dialog screen shown in Figure 36 the Accept button shall be disabled when the software is waiting to acquire the header list and value data from the chiller panel. Once the header list and value data has been received the Accept button shall be enabled. The Accept button shall complete the panel configuration and exit the dialog. Completion of the panel configuration shall result in creation (or replacement) of the chiller panel header list file for the currently selected side of the test system.

**[FR-JADEC12-CPD49]** The dialog screen shown in Figure 37 shall be used for step four of opening the chiller panel when loading headers from file. In this step the header list and value data shall be loaded from a file on the local disk and displayed for review by the user. In addition, the software shall acquire value data from the chiller panel and display it in the table. The user shall review and validate the header list and value data.

**[FR-JADEC12-CPD50]** The dialog screen shown in Figure 37 the Selected Side shall be an indicator displaying the side selected in Step 1.

**[FR-JADEC12-CPD51]** The dialog screen shown in Figure 37 the Abort button shall always be enabled. The Abort button shall close the serial port and exit the dialog.

**[FR-JADEC12-CPD52]** ~~The dialog screen shown in Figure 37 the Flush button shall always be enabled. The Flush button shall clear all incoming data from the PC serial port buffer. The Flush button is intended to allow the user to clear any old data being transmitted from the chiller panel.~~

**[FR-JADEC12-CPD53][FR-JADEC12-CPD52]** The dialog screen shown in Figure 37 the Accept button shall always be enabled. The Accept button shall complete the panel configuration and exit the dialog.

**[FR-JADEC12-CPD54][FR-JADEC12-CPD53]** The chiller panel header list file(s) shall be deleted from the local disk when the current TR is closed or suspended.

**[FR-JADEC12-CPD55][FR-JADEC12-CPD54]** The chiller panel data shall be stored in the Storage Database. A preliminary design for the database table is shown in Figure 38.

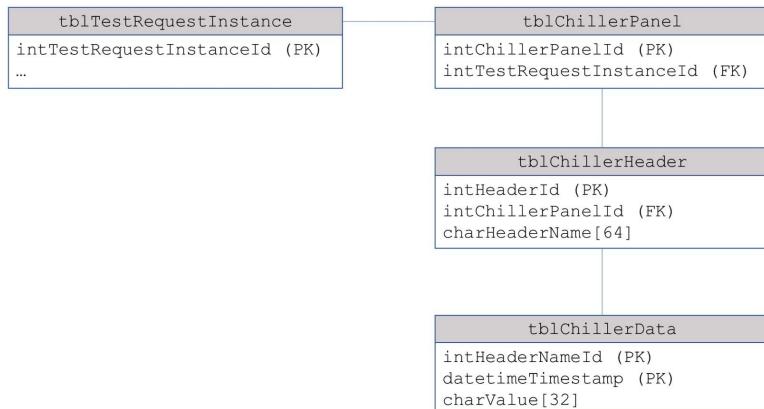


Figure 38: Chiller Panel Data Storage Design (preliminary)

**[FR-JADEC12-CPD56]** The chiller header name shall be stored in database (tblChillerHeader.charHeaderName) as a string with a maximum size of 64 characters. A header name exceeding the maximum size shall be truncated to the maximum size

**[FR-JADEC12-CPD57]** The chiller data values shall be stored in database (tblChillerData.charValue) as a string with a maximum size of 32 characters. A data value exceeding the maximum size shall be truncated to the maximum size

**[FR-JADEC12-CPD58]** The chiller panel data shall be linked to the current test request via the table “tblTestRequestInstance” and the foreign key “intTestRequestInstanceId”. This relationship shall allow the chiller panel data to be related to snapshots. The chiller panel data can be queried for a specific time span, which can be defined by the snapshot start and stop time.

### 3.3.4 Additional Detail

#### Chiller Panel Data Analysis

Maximum Header Name String Length = 25 characters  
Maximum Data Value String Length = 13 characters

Block Type	File Name	Notes
AC	YLAA Ver 22_04_21_2020_07_53_21.csv	
AC	YLAA ver17_01_04_2019_14_38_13.csv	
AC	YMCA_04_28_2020_09_10_57.csv	
AC	YVAA0550 Pilot_09_04_2020_14_14_50.csv	More data than header strings.
AC	YVAA0550 Proto_05_20_2020_10_30_18.csv	Data Row 12697, Column 2 has 533 characters of bad data. Data Row 15264, Column 2 has 302 characters of bad data. Data Row 15265, Column 2 has 302 characters of bad data.
AC	YVFA0359_01_29_2019_16_17_59.csv	
WC	2 Stage_06_25_2019_08_11_01.csv	More headers than data.
WC	NZ2C_09_03_2020_10_29_17.csv	Data row 7 parsing error.
WC	YKQ4_08_04_2020_11_16_02.csv	
WC	YMC2_04_28_2020_12_40_07.csv	

Table 16. Chiller Panel data files used for analysis.

### 3.3.5 Issues

None

### 3.4 Tag Editor Driver Configuration (B600-60)

#### 3.4.1 Description

The Hardware Path user interface on the Tag Editor shall be modified to provide an optional process for driver configuration based on the selected driver. The driver string entry control shall be replaced with a drop-down control with fixed options that the user can select from. The driver parameters may continue to be directly entered by the user, imported from a spreadsheet, or the new Configuration Dialog can be used. The Configuration Dialog shall provide specific function lists and parameter fields based on the driver selected. These function and parameter fields shall be combined by the software to generate the driver parameter string.

#### 3.4.2 User Interface

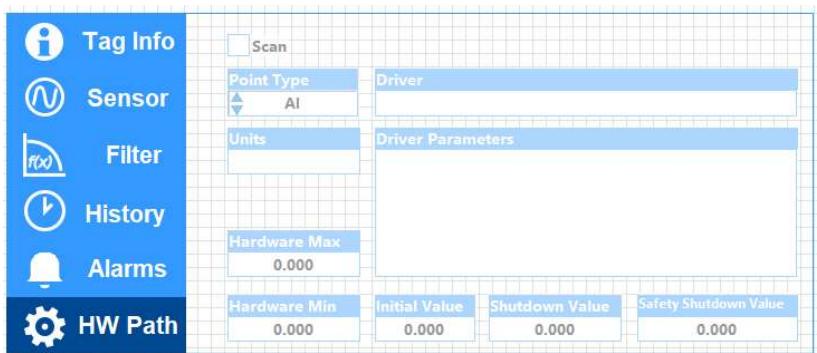


Figure 39. Tag Editor – Hardware Path (current)

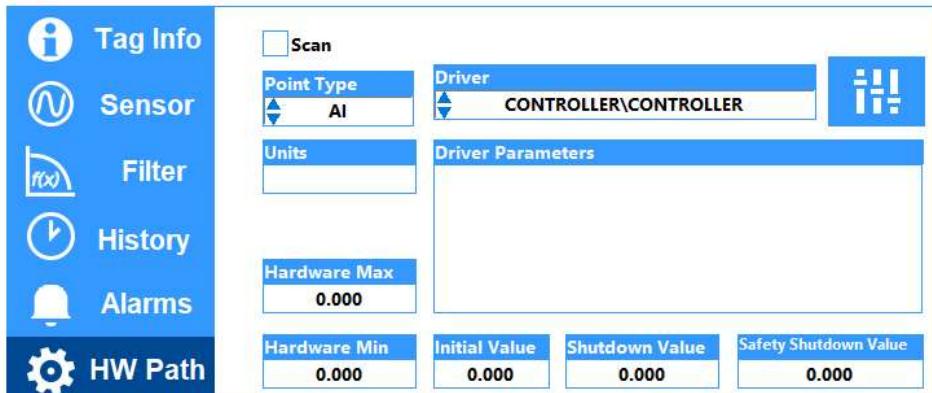


Figure 40. Tag Editor - Hardware Path (proposed)

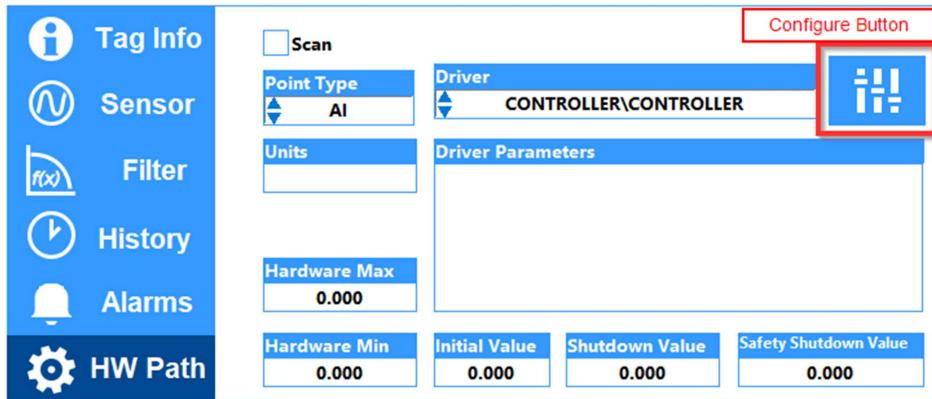


Figure 41. Tag Editor – Configure Button

Driver Name	Number of Parameters
CONTROLLER\CALC	1
CONTROLLER\CONTROLLER	None
CONTROLLER\FUNCTION	Variable (0 to N)
CONTROLLER\ISOVALVE	1 (state) or 4 (actuate)
CONTROLLER\MANUAL	None
CONTROLLER\MOBILERACK	3
CONTROLLER\REFPROP	Variable (1 or 2)
CONTROLLER\SCANENGINE	3
CONTROLLER\XITRON	6
CONTROLLER\YOKOGAWA	4

Table 17. Driver Name List

Function	Max Params	Required	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
ABS	N	FALSE	X	Parameter 1	Parameter 2	Parameter 3	Parameter N						
AND	10	TRUE	Aspirator 1 Value	Aspirator 1 Enable	Aspirator 2 Value	Aspirator 2 Enable	Aspirator 3 Value	Aspirator 3 Enable	Aspirator 4 Value	Aspirator 4 Enable	Aspirator 5 Value	Aspirator 5 Enable	
ASP_AVGTEMP	10	TRUE	Aspirator 1 Value	Aspirator 1 Enable	Aspirator 2 Value	Aspirator 2 Enable	Aspirator 3 Value	Aspirator 3 Enable	Aspirator 4 Value	Aspirator 4 Enable	Aspirator 5 Value	Aspirator 5 Enable	
ASP_MAXTEMP	10	TRUE	Aspirator 1 Value	Aspirator 1 Enable	Aspirator 2 Value	Aspirator 2 Enable	Aspirator 3 Value	Aspirator 3 Enable	Aspirator 4 Value	Aspirator 4 Enable	Aspirator 5 Value	Aspirator 5 Enable	
ASP_MINTEMP	10	TRUE	Aspirator 1 Value	Aspirator 1 Enable	Aspirator 2 Value	Aspirator 2 Enable	Aspirator 3 Value	Aspirator 3 Enable	Aspirator 4 Value	Aspirator 4 Enable	Aspirator 5 Value	Aspirator 5 Enable	
ATAN2	2	TRUE	X	Y									
AVG	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
C_TO_F	1	TRUE	Temp (C)										
CFQ	6	TRUE	Air Pressure	Percent Load	Measured Capacity	Full Load Capacity	Measured Efficiency	Full Load Efficiency					
CFM	4	TRUE	Conditions	wi	vdisch	q							
CFN	6	TRUE	Air Pressure	Percent Load	Measured Capacity	Full Load Capacity	Measured Efficiency	Full Load Efficiency					
COP_H	2	TRUE	Q_CD	Total kW									
COP_HR	3	TRUE	Q_EV	Q_HRC	Total kW								
COP_R	2	TRUE	Q_EV	Total kW									
COP_SHC	3	TRUE	Q_EV	Q_CD	Total kW								
CP	1	TRUE	Temp (F)										
DENSITY	1	TRUE	Temp (F)										
DYN_VISC	1	TRUE	Temp (F)										
EER	2	TRUE	Q_EV	Total kW									
EFFTR	6	TRUE	polytrophic	phpt	hptr	hdisch	hsuct	hextra					
ENERGY_BAL	4	TRUE	Q_EV	Q_CD	Q_HRC	Total kW							
EXP	1	TRUE	X										
F_TO_C	1	TRUE	Temp_degF										
FREEZE_P	1	TRUE	Temp_degF										
GT	2	TRUE	X	Y									
HS	6	TRUE	wst	wi	psuct	tsuct	pf	tf					
IMP_SPEED	1	TRUE	MOTOR_RPM										
IMVEL_CORR	9	TRUE	dpipe	Temp_degF	Pressure_psig	wrtf	rf	c2	c4	c5	c9		
INDEX	N	FALSE	index	array value 0	array value 1	array value 2	array value 3	array value N					
INRANGE	5	TRUE	Value In	Low Limit	High Limit	In Range Value	Out of Range Value						
KW_TON	2	TRUE	Q_EV	Total kW									
LT	2	TRUE	X	Y									
MACH	2	TRUE	EVAP_SHELL_PRESS	MOTOR_RPM									
MAX	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
MAX_INDEX	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
MMX_MAG	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
MMX	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
MIN_INDEX	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
MOD	2	TRUE	X	Y									
MW	2	TRUE	Entering Temp (F)	Volume flow (gpm)									
OFLLOW	6	TRUE	porif	torif	delp	kdp	dpipe	dorif					
OMEGA	2	TRUE	EVAP_SHELL_PRESS	COND_SHELL_PRESS									
OR	N	TRUE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
PARALLEL_3_WAY	6	TRUE	Position (%)	V3 Position (%)	V1 Max Cv	V2 Max Cv	V3 Max Cv	Return position <0:V1,V2>					
PI	0	TRUE											
POW	2	TRUE	X										
PRODROUTE	2	TRUE	Selectable	String Suffix									
Q_CD	3	TRUE	Cond Entering Temp (F)	Cond Leaving Temp (F)	Cond Volume Flow (gpm)								
Q_EV	3	TRUE	Evap Entering Temp (F)	Evap Leaving Temp (F)	Evap Volume Flow (gpm)								
Q_HR	3	TRUE	Heat Rec Entering Temp (F)	Heat Rec Leaving Temp (F)	Heat Rec Volume Flow (gpm)								
Q_IN	1	TRUE	Total kW										
QF	4	TRUE	polytrophic	q	wi	vdisch							
QG_CD	4	TRUE	Cond Entering Temp (F)	Cond Leaving Temp (F)	Cond Volume Flow (gpm)	Cond DeltaT <sup>o</sup> (ft. H2O)							
QG_EV	4	TRUE	Evap Entering Temp (F)	Evap Leaving Temp (F)	Evap Volume Flow (gpm)	Evap DeltaT <sup>o</sup> (ft. H2O)							
QG_HR	4	TRUE	Heat Rec Entering Temp (F)	Heat Rec Leaving Temp (F)	Heat Rec Volume Flow (gpm)	Heat Rec DeltaT <sup>o</sup> (ft. H2O)							
RD	6	TRUE	porif	torif	delp	kdp	dpipe	dorif					
REM	2	TRUE	X	Y									
RND	1	TRUE	X										
ROUTE	2	TRUE	Source Tag Name	Destination Tag Name									
SELECT	3	TRUE	Switch	Off Value	On Value								
SUM	N	FALSE	Parameter 1	Parameter 2	Parameter 3	...	Parameter N						
SWITCH	5	TRUE	Index	Low Range	Rising Switch	High Range	Falling Switch						
SWITCHCHANGE	1	TRUE	Index										
THERM_COND	1	TRUE	Temp (F)										
THETA	5	TRUE	EVAP_SHELL_PRESS (psi)	COND_SHELL_PRESS (psi)	DISCHARGE_TEMP (F)	SUBCOOLED_REFIG_TEMP (F)	COND_WTR_Q						
TON_R	1	TRUE	Q (Btu/h)										
TREE_AVGTEMP	3	TRUE	Aspirator #	Tree 1	Tree 2								
TS	6	TRUE	wst	wi	psuct	tsuct	pf	tf					
VAB	6	TRUE	Van Magnitude	Vbn Magnitude	Van Angle	Vbn Angle	Vcn Angle						
VBC	6	TRUE	Van Magnitude	Vbn Magnitude	Van Angle	Vbn Angle	Vcn Angle						
VCA	6	TRUE	Van Magnitude	Vbn Magnitude	Van Angle	Vbn Angle	Vcn Angle						
VIT_BAL	3	TRUE	Yin	Yin	Uin								
W	9	TRUE	polytrophic	hextra	hsuct	c5	vsuct	vdisch	pdisch	vextra	psuct		
WC	6	TRUE	porif	torif	delp	kdp	dpipe	dorif					
WI	11	TRUE	porif	orif_tc	delp	kdp	dpipe	dorif	rf	c2	c4	c5	c9
YC	6	TRUE	porif	torif	delp	kdp	dpipe	dorif					

Table 18. Function List

Proprietary and Confidential

Function	Max Params	Required	P1	P2
COMPRESS_FACTOR_PT	2	TRUE	Pressure (psi)	Temperature (F)
COMPRESS_FACTOR_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
CP_PT	2	TRUE	Pressure (psi)	Temperature (F)
CP_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
CP_TQ	2	TRUE	Pressure (psi)	Temperature (F)
CP_TQ_WATER	2	TRUE	Pressure (psi)	Temperature (F)
CV_PT	2	TRUE	Pressure (psi)	Temperature (F)
CV_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
DENSITY_PQ	2	TRUE	Pressure (psi)	Quality (0-1)
DENSITY_PQ_WATER	2	TRUE	Pressure (psi)	Quality (0-1)
DENSITY_PT	2	TRUE	Pressure (psi)	Temperature (F)
DENSITY_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
ENTHALPY_PQ	2	TRUE	Pressure (psi)	Quality (0-1)
ENTHALPY_PQ_WATER	2	TRUE	Pressure (psi)	Quality (0-1)
ENTHALPY_PS	2	TRUE	Pressure (psi)	Entropy (BTU/lbm-degF)
ENTHALPY_PS_WATER	2	TRUE	Pressure (psi)	Entropy (BTU/lbm-degF)
ENTHALPY_PT	2	TRUE	Pressure (psi)	Temperature (F)
ENTHALPY_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
ENTHALPY_TQ	2	TRUE	Temperature (F)	Quality (0-1)
ENTHALPY_TQ_WATER	2	TRUE	Temperature (F)	Quality (0-1)
ENTROPY_PQ	2	TRUE	Pressure (psi)	Quality (0-1)
ENTROPY_PQ_WATER	2	TRUE	Pressure (psi)	Quality (0-1)
ENTROPY_PT	2	TRUE	Pressure (psi)	Temperature (F)
ENTROPY_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
PRESSURE_TLIQ	1	TRUE	Temperature (F)	
PRESSURE_TLIQ_WATER	1	TRUE	Temperature (F)	
PRESSURE_TQ	2	TRUE	Temperature (F)	Quality (0-1)
PRESSURE_TQ_WATER	2	TRUE	Temperature (F)	Quality (0-1)
PRESSURE_TVAP	1	TRUE	Temperature (F)	
PRESSURE_TVAP_WATER	1	TRUE	Temperature (F)	
QUALITY_PT	2	TRUE	Pressure (psi)	Temperature (F)
QUALITY_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
SPECIFIC_VOL_PT	2	TRUE	Pressure (psi)	Temperature (F)
SPECIFIC_VOL_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
SPEED_SOUND_PQ	2	TRUE	Pressure (psi)	Quality (0-1)
SPEED_SOUND_PQ_WATER	2	TRUE	Pressure (psi)	Quality (0-1)
SPEED_SOUND_PT	2	TRUE	Pressure (psi)	Temperature (F)
SPEED_SOUND_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)
TEMPERATURE_PLIQ	1	TRUE	Pressure (psi)	
TEMPERATURE_PLIQ_WATER	1	TRUE	Pressure (psi)	
TEMPERATURE_PQ	2	TRUE	Pressure (psi)	Quality (0-1)
TEMPERATURE_PQ_WATER	2	TRUE	Pressure (psi)	Quality (0-1)
TEMPERATURE_PS	2	TRUE	Pressure (psi)	Entropy (BTU/lbm-degF)
TEMPERATURE_PS_WATER	2	TRUE	Pressure (psi)	Entropy (BTU/lbm-degF)
TEMPERATURE_PVAP	1	TRUE	Pressure (psi)	
TEMPERATURE_PVAP_WATER	1	TRUE	Pressure (psi)	
VISCOSITY_PT	2	TRUE	Pressure (psi)	Temperature (F)
VISCOSITY_PT_WATER	2	TRUE	Pressure (psi)	Temperature (F)

Table 19. Refrigerant Properties (REFPROP) Function List

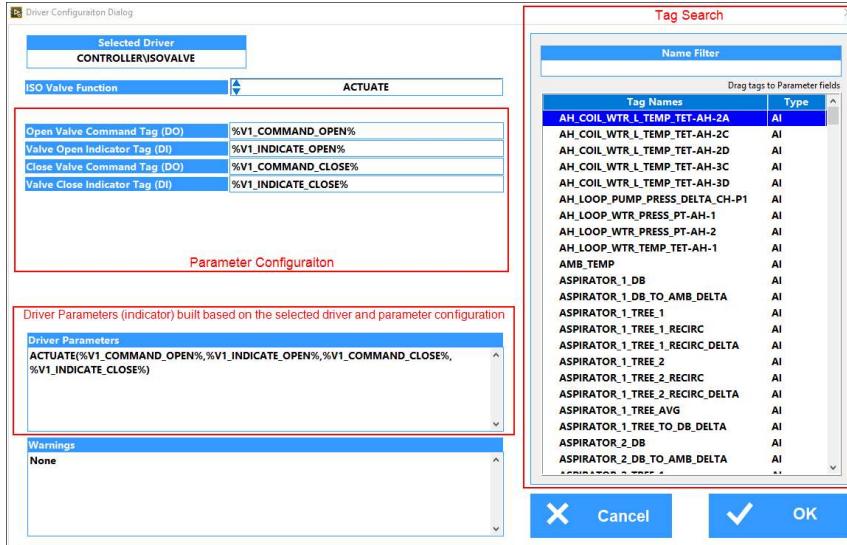


Figure 42. Tag Editor – Driver Configuration Dialog Overview

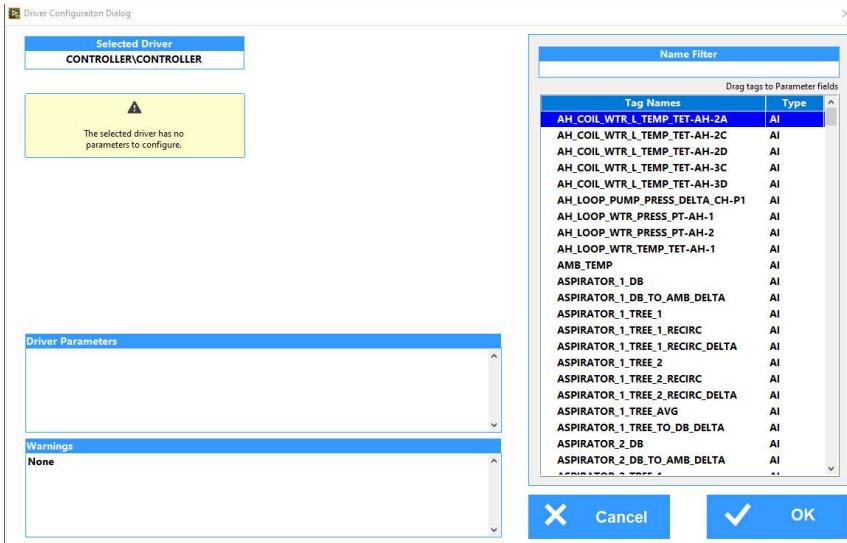


Figure 43. Tag Editor – Driver Configuration Dialog for the CONTROLLER\CONTROLLER Driver

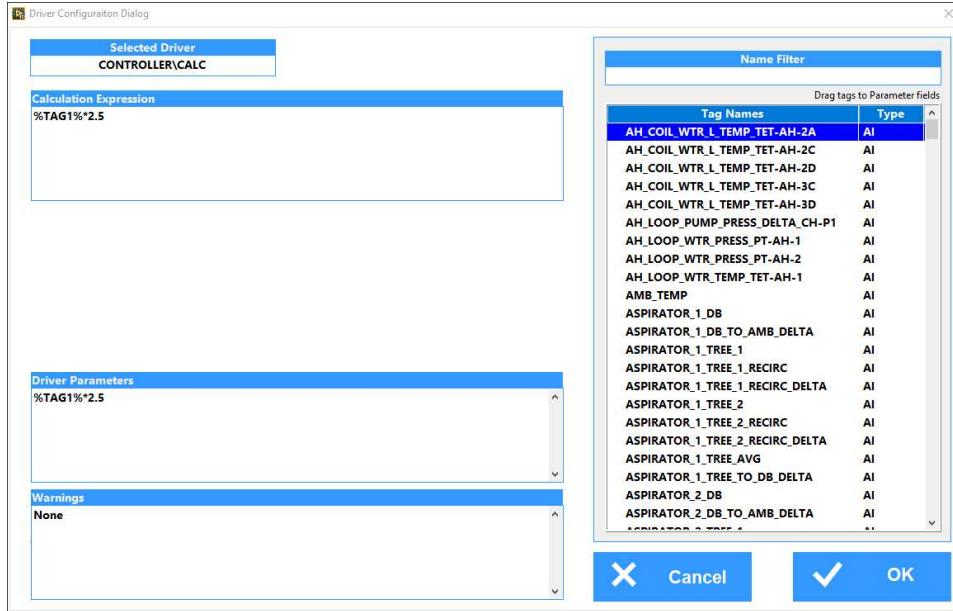


Figure 44. Tag Editor – Driver Configuration Dialog for the CONTROLLER\CALC Driver

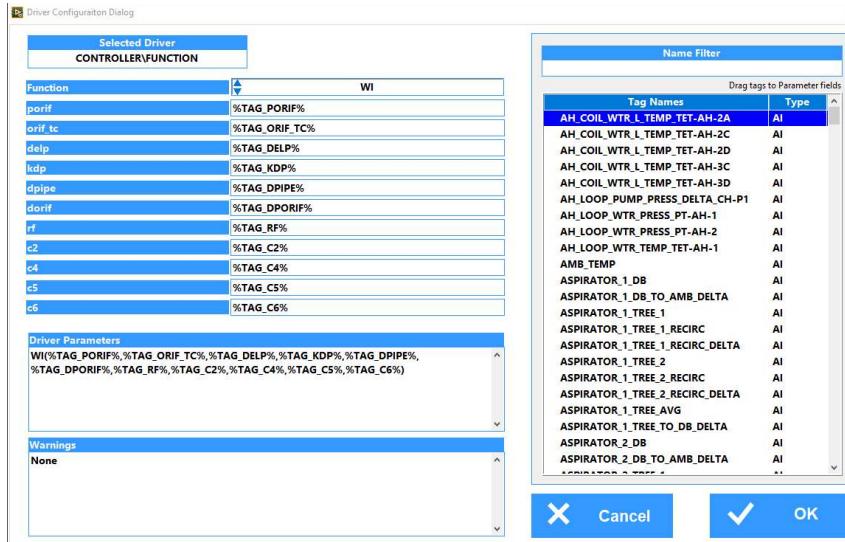


Figure 45. Tag Editor – Driver Configuration Dialog for the CONTROLLER\FUNCTION Driver (with a discrete number of inputs)

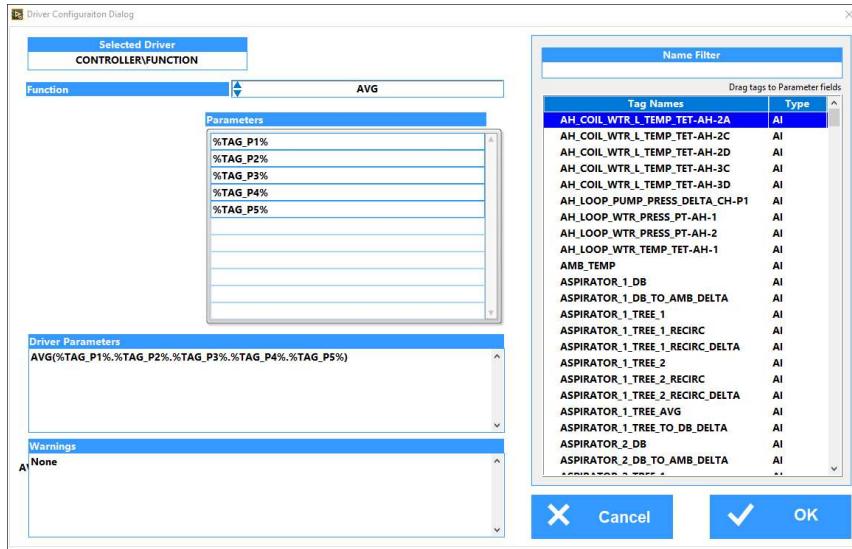


Figure 46. Tag Editor – Driver Configuration Dialog for the CONTROLLER\FUNCTION Driver (with an unbounded number of inputs)

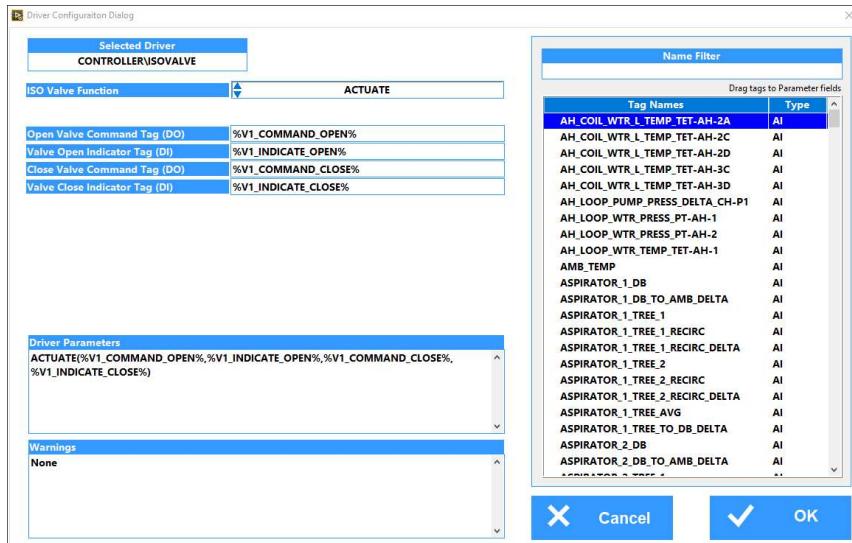


Figure 47. Tag Editor – Driver Configuration Dialog for the CONTROLLER\ISOVALVE Driver (Actuate)

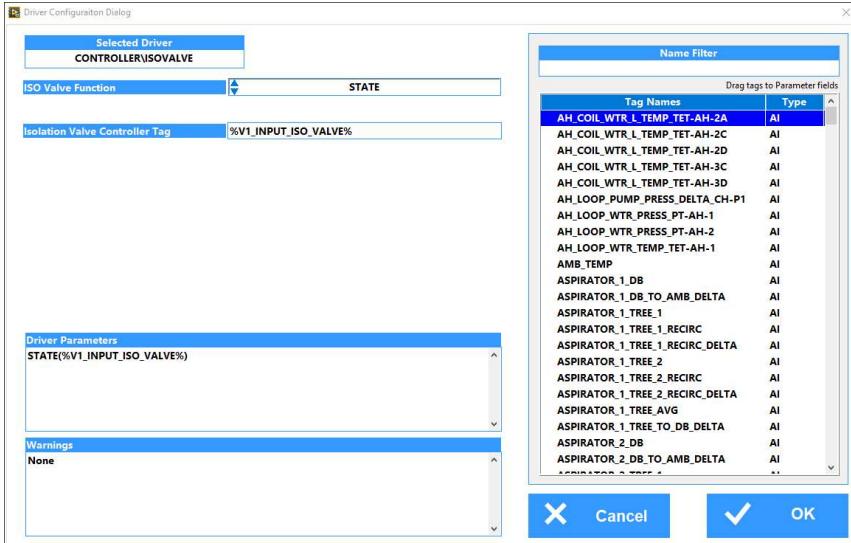


Figure 48. Tag Editor – Driver Configuration Dialog for the CONTROLLER\ISOVALVE Driver (State)

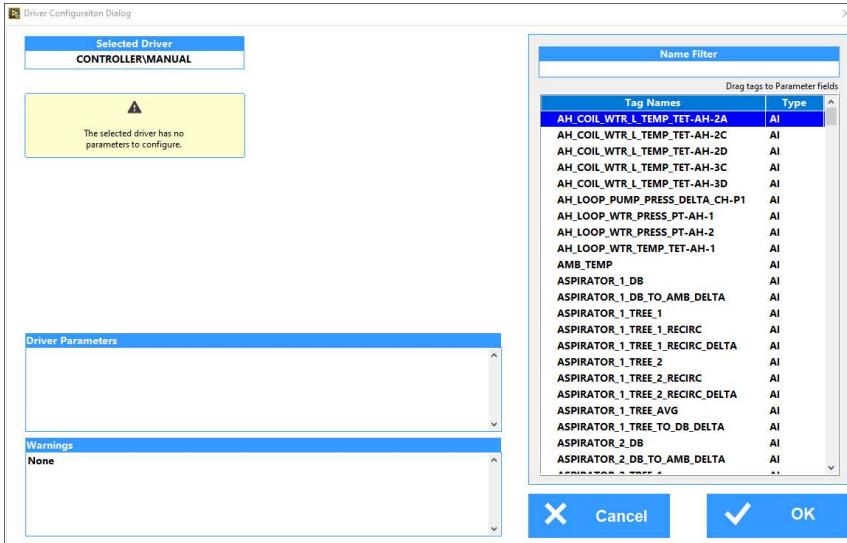


Figure 49. Tag Editor – Driver Configuration Dialog for the CONTROLLER\MANUAL Driver

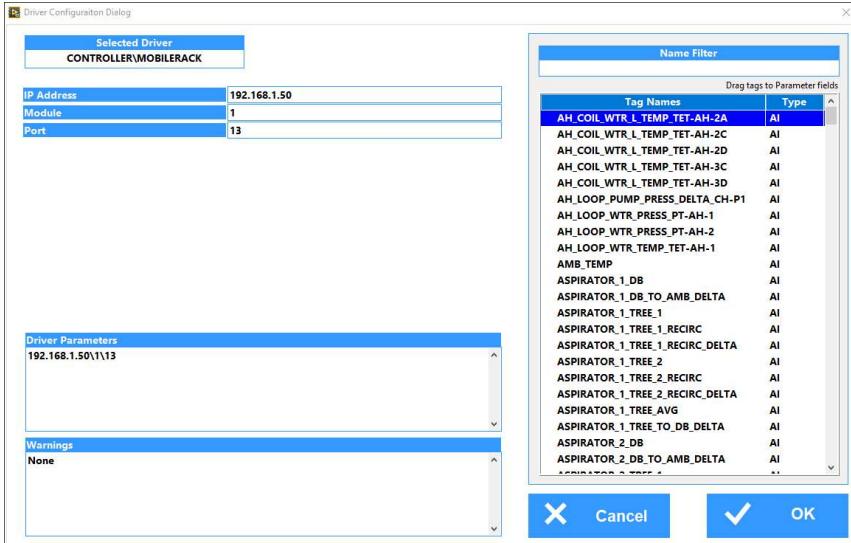


Figure 50. Tag Editor – Driver Configuration Dialog for the CONTROLLER\MOBILERACK Driver

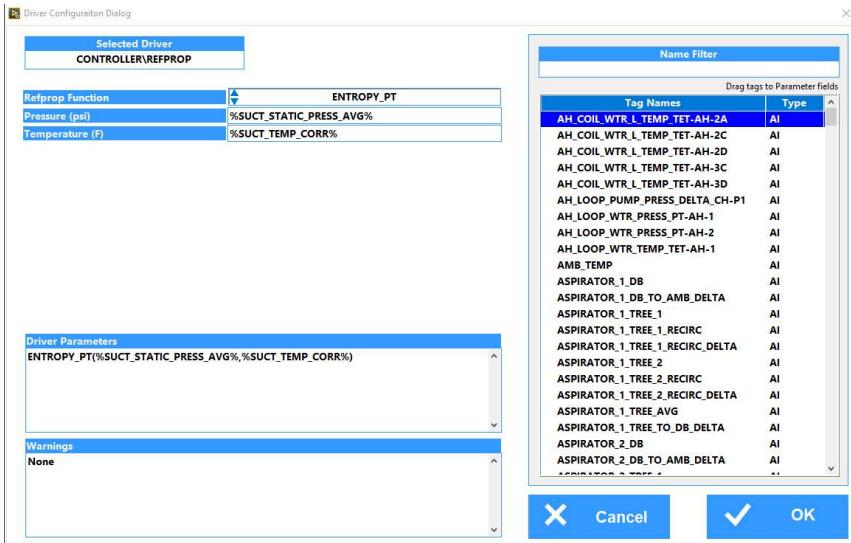


Figure 51. Tag Editor – Driver Configuration Dialog for the CONTROLLER\REFPROP Driver

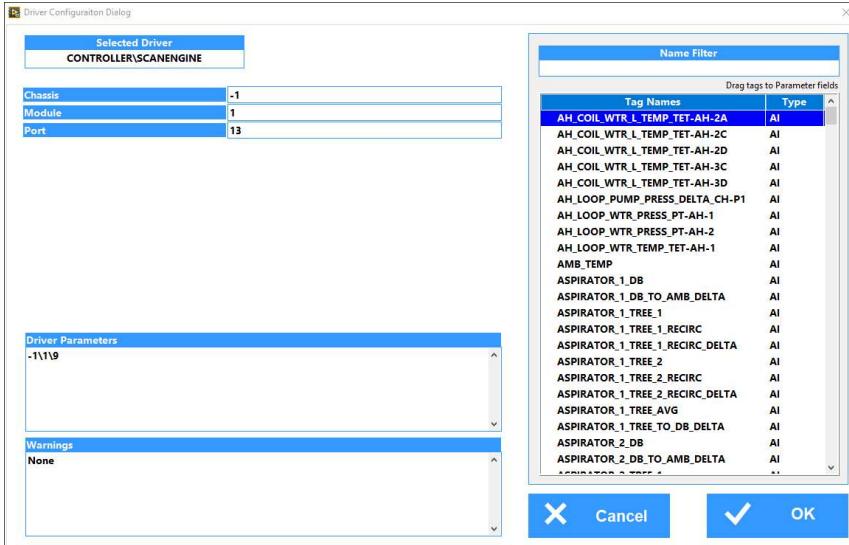


Figure 52. Tag Editor – Driver Configuration Dialog for the CONTROLLER\SCANENGINE Driver

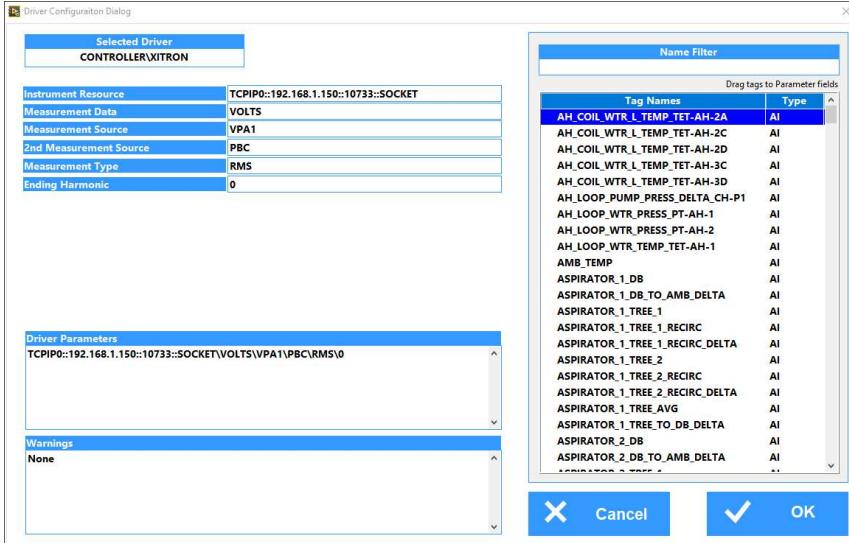


Figure 53. Tag Editor – Driver Configuration Dialog for the CONTROLLER\XITRON Driver

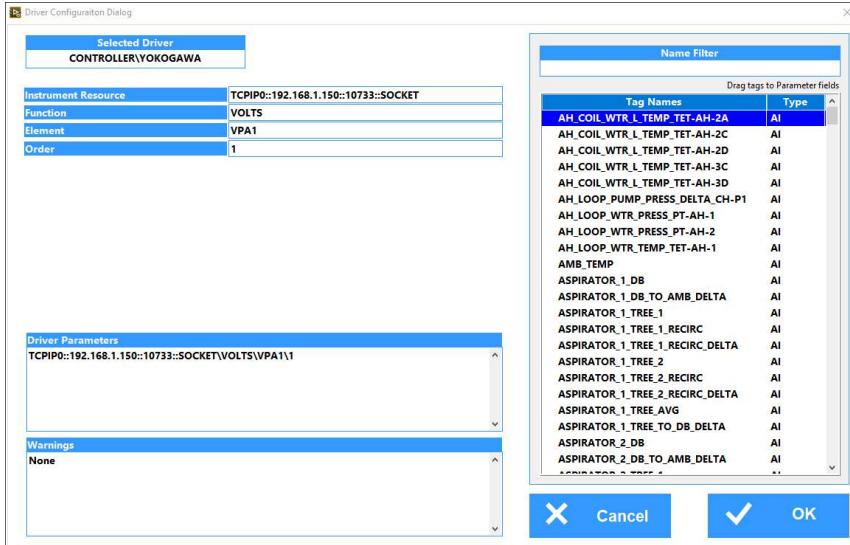


Figure 54. Tag Editor – Driver Configuration Dialog for the CONTROLLER\YOKOGAWA Driver

### 3.4.3 Functional Requirements

Feature Requirements: Tag Editor Driver Configuration [FR-JADEC12-TEDC]

**[FR-JADEC12-TEDC1]** The Tag Editor - Hardware Path user interface (Figure 39) shall be modified as shown in Figure 40. The Driver text control box shall be replaced with a drop-down control box. A button to access a configuration dialog shall be added to the user interface (Figure 41). The Driver Parameters text box shall remain a control. The user shall have the option to edit the driver parameters string using this control or edit it with the configuration dialog.

**[FR-JADEC12-TEDC2]** The Driver drop down control box shall be populated with the driver name strings detailed in Table 17. These string values shall be hard coded into the control. The default driver value shall be the “CONTROLLER\CONTROLLER” selection.

**[FR-JADEC12-TEDC3]** The Configuration Button (Figure 41) shall open the Driver Configuration Dialog (Figure 42). The Driver Configuration Dialog shall be used to generate the Driver Parameters string indicator based on the driver selected and the input parameters entered by the user.

**[FR-JADEC12-TEDC4]** When the Driver Configuration Dialog is opened, the driver and driver parameters currently specified on the HW Path user interface shall be used to populate the controls and indicators on the dialog (Figure 42). Any issues detected during this process shall be listed in the Warnings indicator text box. These issues may include unknown function names and incorrect number of parameters.

**[FR-JADEC12-TEDC5]** The Driver Configuration Dialog shall display the driver selected for the tag. The Selected Driver shall be an indicator only. The driver shall be selected in the tag editor prior to entering the configuration dialog.

**[FR-JADEC12-TEDC6]** The Driver Configuration Dialog shall present the user with parameter configuration inputs based on the selected driver ([Figure 43](#)[Figure 43](#) through Figure 54). The parameter configuration controls shall be text input controls. Some drivers shall have no configuration parameters, some drivers shall have a fixed number of parameters, and others shall have a variable number of parameters as detailed in Table 17.

**[FR-JADEC12-TEDC7]** The Warnings indicator text box shall list issues detected during the opening of the dialog, such as unknown function name or incorrect number of parameters. Additional issues detected during editing, such as blank parameters, shall be listed in the Warnings indicator.

**[FR-JADEC12-TEDC8]** The Tag List in the tag search area (Figure 42) shall allow the user to browse the current list of active tags, select a tag and drag the tag name to any of the parameter configuration text box controls.

**[FR-JADEC12-TEDC9]** The Name Filter in the tag search area (Figure 42) shall be a text box control that allows the user to filter the tag list based on the text entered in the control.

**[FR-JADEC12-TEDC10]** The Driver Configuration Dialog Cancel button shall always be enabled.

**[FR-JADEC12-TEDC11]** If no changes are pending the Cancel button shall close the dialog and the Driver Parameters string in the Tag Editor shall remain unchanged. If changes are pending and the Cancel button is pressed the user shall be asked to confirm the cancel action. If the user chooses to continue the cancel operation the dialog shall close, and any changes made to the Driver Parameters string shall be discarded. If the user decides to not cancel the configuration they shall be returned to the dialog.

**[FR-JADEC12-TEDC12]** The Driver Configuration Dialog OK button shall be enabled when the Driver Parameters string is valid for the selected driver. The OK button shall be disabled otherwise. The Driver Parameters string is valid when a function is selected (as appropriate) and the required parameters for that function have values entered (as appropriate). Note, some functions (Table 18 and Table 19) shall require all defined parameters to be entered. Conversely, other functions have optional parameters and the software shall not enforce parameter data entry for those functions. For functions that utilize an array input (N parameters) a minimum of two values must be entered. Note, some drivers have no functions or parameters resulting in a blank driver parameters string.

**[FR-JADEC12-TEDC13]** The Driver Configuration Dialog shall close when the OK button is pressed, and the Driver Parameters string in the Tag Editor shall be updated with the new string from the dialog.

**[FR-JADEC12-TEDC14]** The Function drop down control (Figure 45 and Figure 46) shall be populated with the list of supported functions (Table 18). That list of functions shall be stored in the Configuration Database. The Function drop down control tip strip shall be updated when a new function is selected. The tip strip is intended to provide a description about the function selected. The tip strip text shall be stored in the Configuration Database.

**[FR-JADEC12-TEDC15]** The Driver Configuration Dialog parameter configuration inputs for the Function driver shall vary based on the function selected. The type of parameter configuration inputs shall be based on the function. The type shall be either discrete inputs (Figure 45) or an array of inputs (Figure 46). If the function requires discrete inputs, the number of parameter configuration inputs, their labels and tip strips shall be driven by the function information stored in the Configuration Database. If the function requires an array of inputs, a string array control shall be presented to the user allowing the user to enter an unbounded number of parameters.

**[FR-JADEC12-TEDC16]** The Refprop Function drop down control (Figure 51) shall be populated with the list of supported refrigerant properties functions (Table 19). That list of refrigerant property functions shall be stored in the Configuration Database. The Refprop Function drop down control tip strip shall be updated when a new function is selected. The tip strip is intended to provide a description about the function selected. The tip strip text shall be stored in the Configuration Database.

**[FR-JADEC12-TEDC17]** The Driver Configuration Dialog parameter configuration inputs for the Refprop driver shall vary based on the function selected. The number of parameter configuration inputs shall be either 1 or 2 based on the Refrigerant Properties Function List (Table 19). The number of parameter configuration inputs, their labels and tip strips shall be driven by the Refrigerant Properties function information stored in the Configuration Database.

**[FR-JADEC12-TEDC18]** All data for the Driver Configuration Dialog stored in the Configuration Database shall be maintained by an Administrator using the database management system tools only. No tools shall be provided in the TrendSafe software to manage (edit, add, delete) this data.

#### 3.4.4 Additional Detail

The Driver Parameter string checking shall be performed only when using the Driver Configuration Dialog. No checking shall be added to the Tag Editor HW Path user interface or the tag list import function.

These new features shall impact the Tag Editor in the TrendSafe PC software and Stand-Alone Tag Editor software.

#### 3.4.5 Issues

None