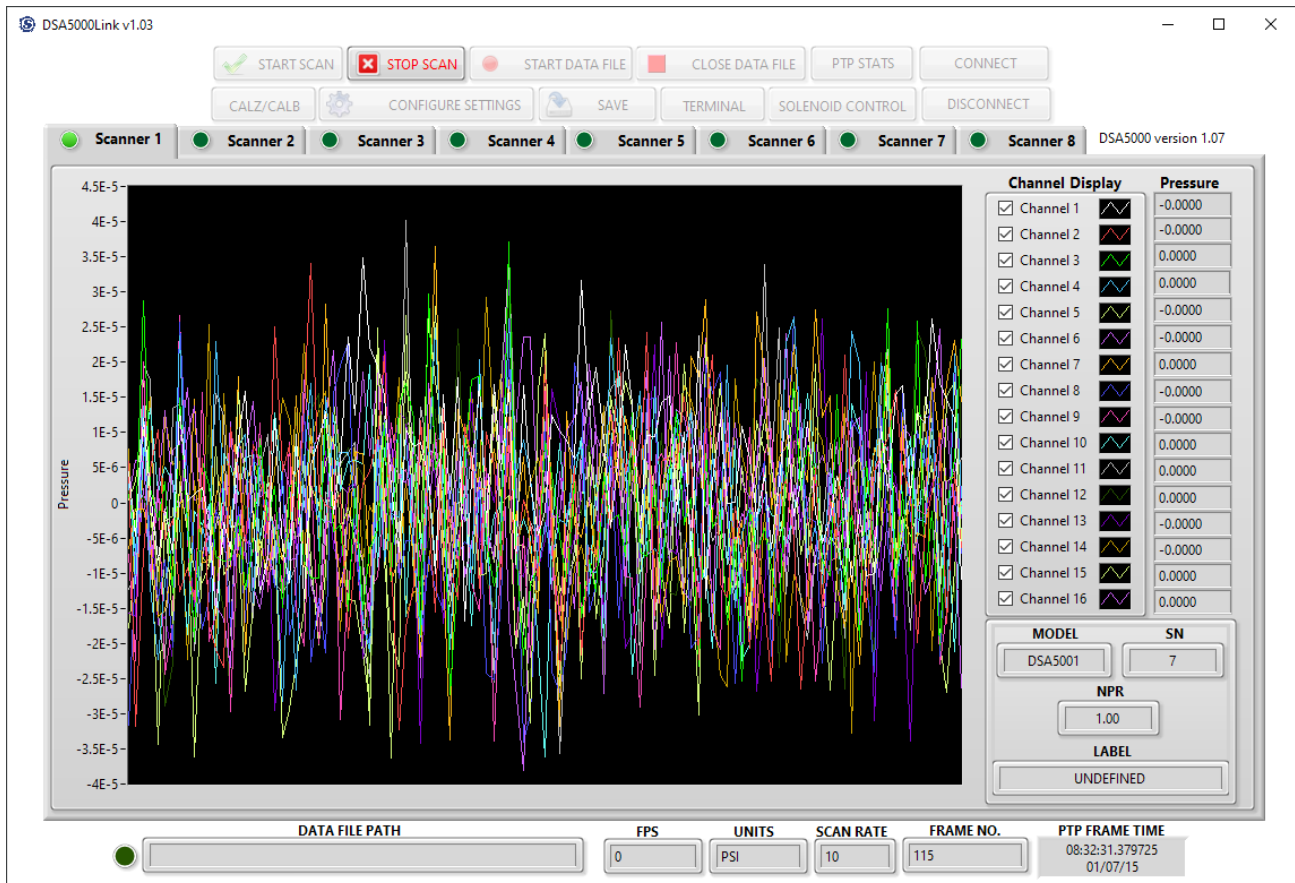# DSA5000Link

Software Manual
Software Version 1.03

Scanivalve

PREFACE

WARNINGS, CAUTIONS, AND NOTES

The WARNING! symbol indicates that danger of injury to persons and the environment and/or considerable damage (mortal danger, danger of injury) could occur if the respective safety precautions are not taken.

The CAUTION! symbol indicates danger to the system and material if the respective safety precautions are not taken.

The ESD note symbol indicates that proper precautions for handling Electrostatic Sensitive Devices need to be taken when performing the related operation. This includes the use of grounded work surfaces and personal wrist straps to prevent damage to sensitive electronic components.

WARRANTY

Scanivalve Corporation, Liberty Lake, Washington, hereafter referred to as Seller, warrants to the Buyer and the first end user that its products will be free from defects in workmanship and material for a period of twelve (12) months from date of delivery. Written notice of any claimed defect must be received by Seller within thirty (30) days after such defect is first discovered. The claimed defective product must be returned by prepaid transportation to Seller within ninety (90) days after the defect is first discovered. Seller's obligations under this Warranty are limited to repairing or replacing, at its option, any product or component part thereof that is proven to be other than as herein warranted.

Surface transportation charges covering any repaired or replacement product or component part shall be at Seller's expense; however, inspection, testing and return transportation charges covering any product or component part returned and redelivered, which proves

not to be defective, shall be at the expense of Buyer or the end user, whomever has returned such product or component part.

This Warranty does not extend to any Seller product or component part thereof which has been subjected to misuse, accident or improper installation, maintenance or application; or to any product or component part thereof which has been repaired or altered outside of Seller's facilities unless authorized in writing by Seller, or unless such installation, repair or alteration is performed by Seller; or to any labor charges whatsoever, whether for removal and/or reinstallation of the defective product or component part or otherwise, except for Seller's labor charges for repair or replacement in accordance with the Warranty. Any repaired or replacement product or component part thereof provided by Seller under this Warranty shall, upon redelivery to Buyer, be warranted for the unexpired portion of the original product warranty.

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, ARISING

BY OPERATION OF LAW OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND IN NO EVENT SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

In the event of a failure:

     1) Notify Scanivalve Corporation, Customer Service Department. Include model number and serial number. On receipt of this information, service data or shipping instructions will be forwarded. This may be transacted by telephone or e-mail.

     2) On receipt of shipping instructions, forward the product, transportation prepaid. Repairs will be made and the product returned.

     3) All shipments should be made via "Best Way." The product should be shipped in the original packing container or wrapped in protective material and surrounded by a minimum of four (4) inches of a shock absorbing material.

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PACKAGING FOR SHIPMENT

If the product must be shipped, whether being returned to Scanivalve or relocated to another location, it must be packaged properly to minimize the risk of damage. The recommended method of packing is to place the instrument in a container, surrounded on all sides with at lease four inches of shock attenuating material such as Styrofoam peanuts.

IMPORTANT NOTICE

Please note that the product specifications and other information contained in this manual are subject to change without notice. Scanivalve Corporation makes an effort and strives to provide complete and current information for the proper use of the equipment. If there are any questions regarding this manual or the proper use of the equipment, contact Scanivalve Corporation.

CONTACT INFORMATION

If there are any questions or concerns regarding any Scanivalve product, please do not hesitate to contact us at the following:

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Scanivalve Corporation is an ISO 9001:2015 certified company.

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SECTION 1: SPECIFICATIONS

GENERAL SPECIFICATIONS

Minimum System Requirements:
> Windows 10 (64-bit)
>> ** Region settings must have period "." set as decimal*
> LabVIEW Runtime Engine 2024 (*requires 64-bit OS)*
> 2 GB RAM
> 1.5 GB Hard Drive Free Space
> 1920x1080 Screen Resolution *(recommended)*

DSA5000 Software version Requirements:
> Standalone / Single Module - Version 1.01 and higher
> SSEP - Version 1.07 and higher *(recommended)*

Maximum Scan Rate:
> 5000Hz (Samples/Channel/Second)

Expected Data Format:
> Binary

Number of DSA Scanners Supported Per Instance:
> Standalone / Single Module - 1
> When Using SSEP - 8

Allowable number of Instances:
> Dependant upon network and system limitations

Note: Network limitations may directly affect high-speed data acquisition.
Note: Collecting data to a file at high scan rates can create CSV files too large to open in Microsoft® Excel®.

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SECTION 2: INTRODUCTION

DSA5000Link Overview

DSA5000Link can be used to configure and collect data from a single DSA5000 series pressure scanner manufactured by Scanivalve Corp. DSA5000Link is intended to be an entry level interface for the DSA scanner, while also serving as a functional LabVIEW® example program.

While using DSA5000Link, certain features of the DSA will be inaccessible or unused for ease of use. If the user wishes to access these features that are not used by the program, the source VIs for DSA5000Link that are included with the download can be modified to meet the end-use requirements.

To utilize the full potential of the DSA5000 scan rate, data is transmitted from the scanner in TCP Binary format and converted from binary to ASCII in real-time by DSA5000Link. This data can be collected in a file and saved on the host computer, displayed in real-time in the scrolling chart, or both simultaneously.

For detailed information on the DSA scanner hardware and software, please see the DSA5000 user manual.

Note: DSA5000Link does not support legacy DSA3000, DSA3200, DSA3300, or DSA-PTP scanners.
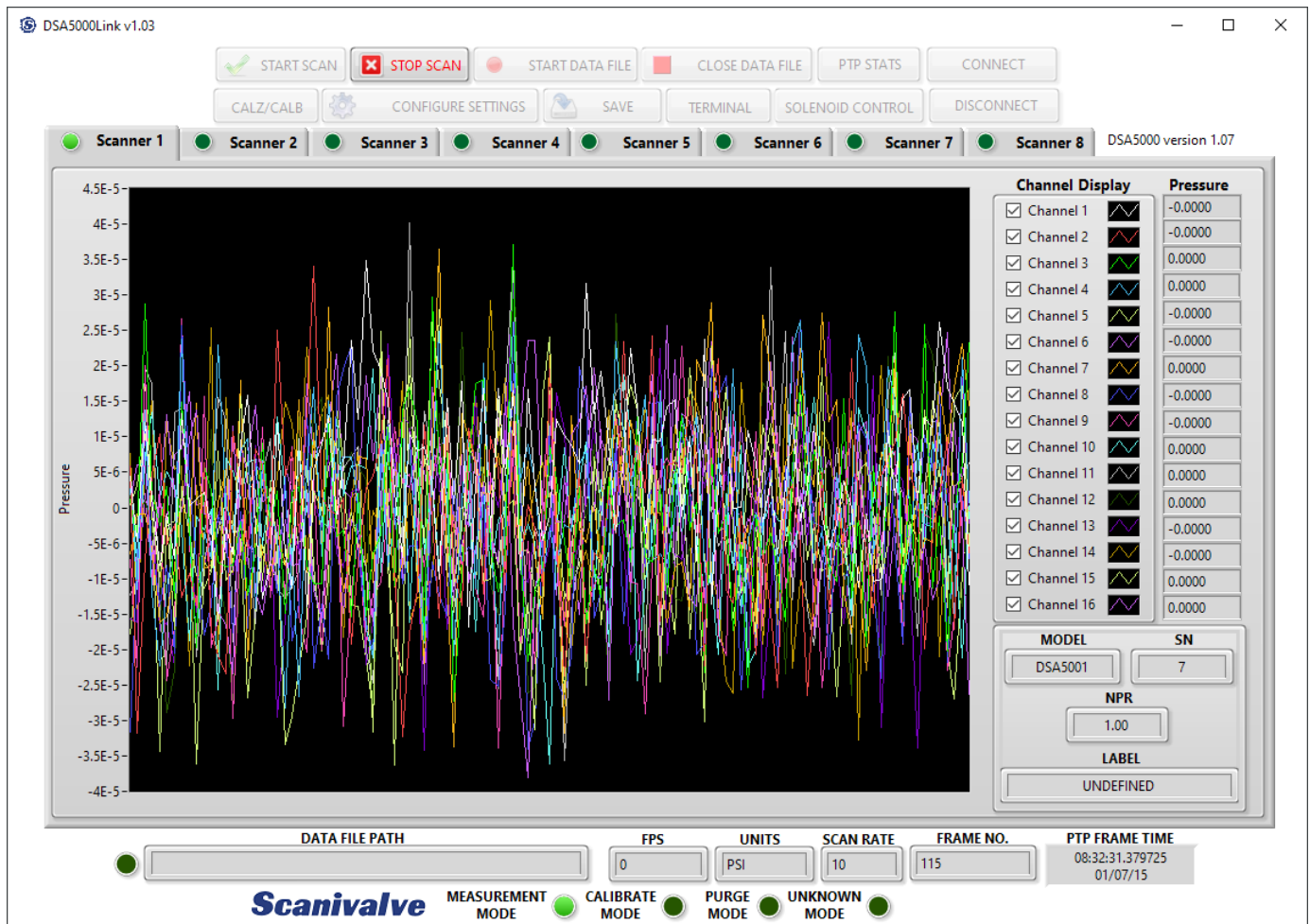

FIGURE 2.1- DSA5000Link

SECTION 3: INSTALLATION

OVERVIEW

To install DSA5000Link, the software must be downloaded from the Scanivalve website, installed, and the computer rebooted after successful installation. This section covers the entire installation process in detail. If you encounter unexpected difficulties, contact your IT department or Scanivalve Technical Support.

DOWNLOAD

DSA5000Link can be downloaded from the Scanivalve website at no charge. Visit www.scanivalve.com/support/software-downloads as shown in Figure 3.1 and select the DSA5000Link download. Download should begin automatically. Note which folder the files are being downloaded to.
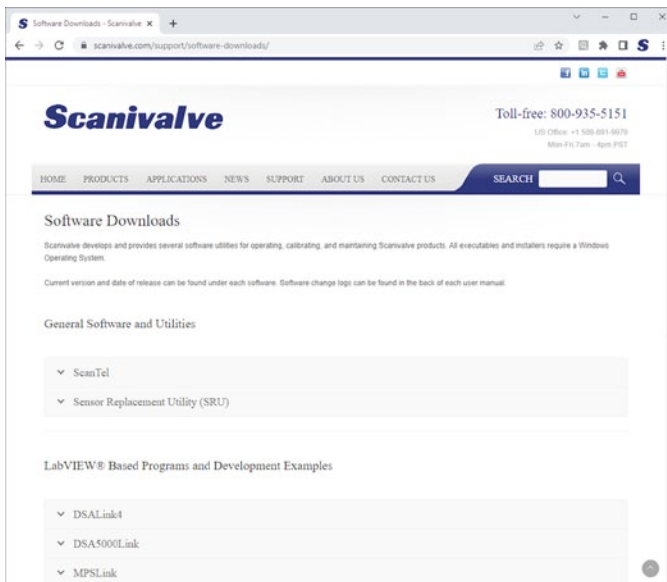

FIGURE 3.1- SCANIVALVE SOFTWARE DOWNLOADS

INSTALL

Once the files are downloaded, navigate to the folder where the downloaded files are located. Navigate through the "installer" folders until you find the DSA5000Link Installer. Run the installation application. Follow the instructions as outlined by the setup wizard.

If the NI LabVIEW Runtime Engine 2022 is not already installed on the computer, this installer will direct you to install it. Follow the wizard to complete the installation.

RESTART

The LabVIEW® Runtime Engine may require that you restart the computer before running DSA5000Link. If the LabVIEW® Runtime Engine is already installed, a restart may not be necessary. When convenient, and before attempting to use DSA5000Link, restart the computer if prompted by the installer.

REGION SETTINGS

DSA5000Link requires the period to be used as the decimal, as the program uses CSV (comma-separated values) to parse incoming data. If this is not set, DSA5000Link may not parse or receive pressure data correctly.

This can be changed in Windows by going to:
    Control Panel > Region > Additional Settings
    Change Decimal Symbol to " . ".
    Click Apply > OK > Apply > OK and restart DSA5000Link.

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SECTION 4: OPERATION

OVERVIEW

This section explains general operation and proper use of the DSA5000Link software. A compatible Host IP Address and a valid connection is required for the program to run. If an incorrect IP Address is input or the connection is invalid, DSA5000Link will not operate. See "Using a Static IP Address" section of the DSA5000 manual for information on communications and changing the IP addresses to establish a compatible network.

An overview of the DSA front panel is shown in Figure 4.1, and details of each function are included in this section. For details regarding the individual LabVIEW® VIs, see Appendix A.

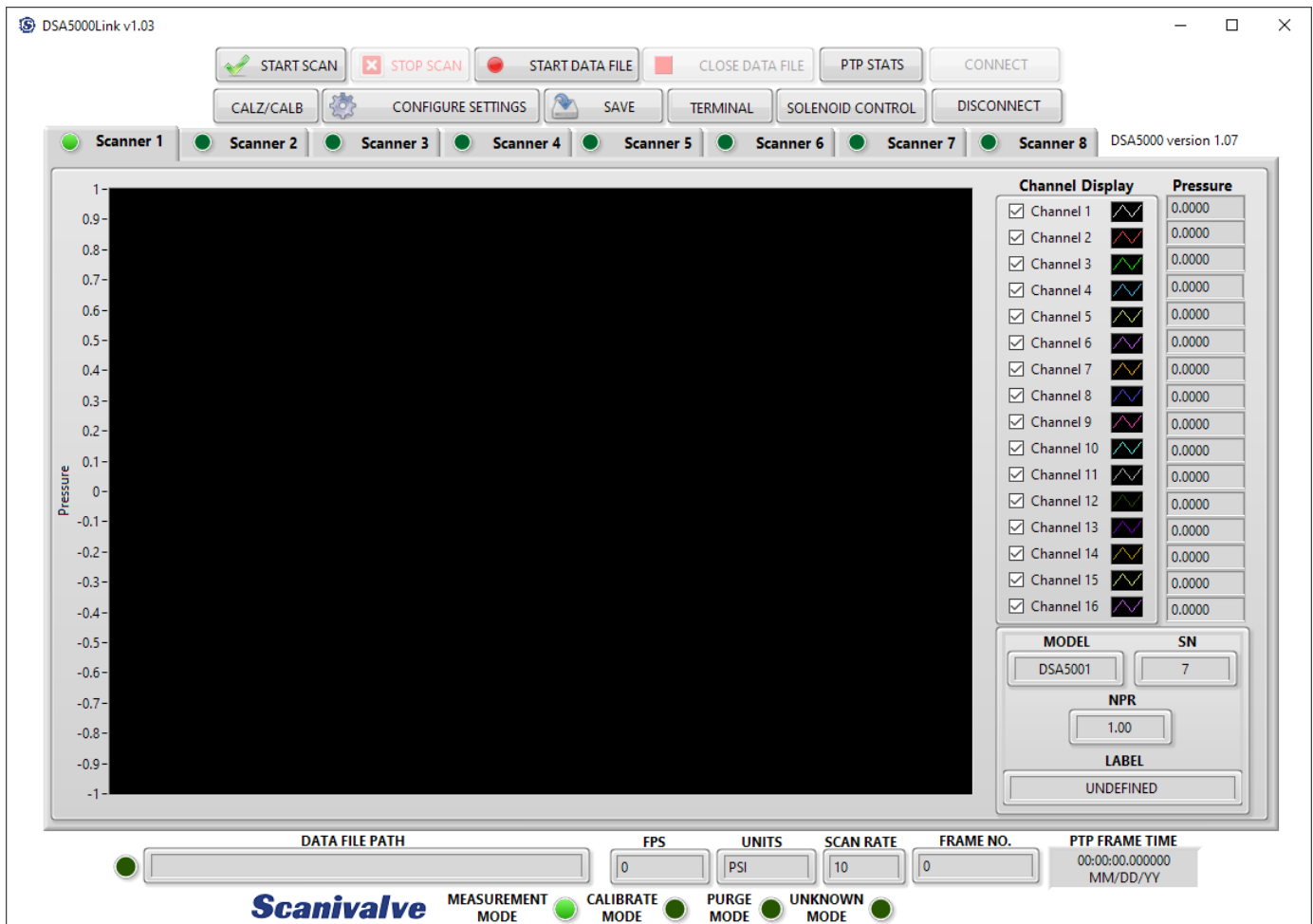*Note: DSA5000Link does not support legacy DSA3000, DSA3200, DSA3300, or DSA-PTP scanners.*

FIGURE 4.1- DSA5000LINK OVERVIEW

CONNECTING

To connect a DSA to DSA5000Link, the DSA must be powered on and allowed to finish booting up which can take up to 30 seconds. Once the DSA has finished the boot sequence, the IP Address of the DSA can be input into DSA5000Link and the connect button clicked.

If you do not input a correct or compatible IP Address, DSA5000Link will not run. If the Cancel button is clicked, the program will close.
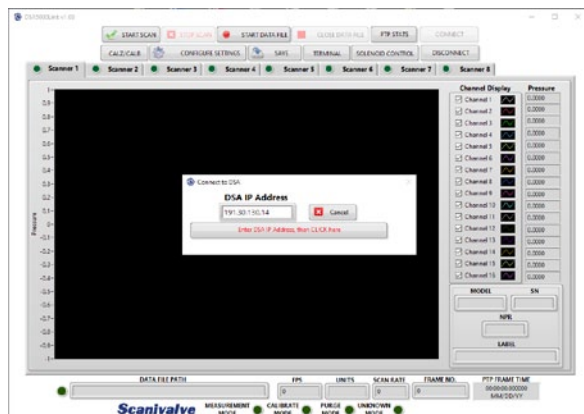
The connect screen can be seen in Figure 4.2.

FIGURE 4.2 - CONNECT TO DSA5000

The host computer and DSA must have a compatible IP Address in order to successfully connect. The DSA and host computer must have the first two or three octets of their IP Addresses matching in order to be compatible.

Example of matching the first three octets (recommended):
Host computer: 191.30.90.100
DSA module: 191.30.90.125
Subnet: 255.255.255.0

Example of matching the first two octets:
Host computer: 191.30.1.100
DSA module: 191.30.90.125
Subnet: 255.255.0.0

The IP address of a Windows 7, 8, or 10 host computer can be changed[*] under:
> Control Panel -> Network and Sharing Center -> Local Area Connection/Ethernet -> Properties -> Internet Protocol Version 4 (TCP/IPv4) -> Properties

[*] *Changing the IP address of the host computer may require administrative rights.*

The IP address of the computer can quickly be found using Windows Command Prompt and the command "ipconfig." Remember that this will show all available network connections, including WIFI and, if applicable, multiple Ethernet ports.

Refer to the appropriate DSA manual for details on changing the IP Address of the DSA scanner.

If the application fails to leave the connect screen, then there is likely an issue with one of the following:
- Host and DSA IP addresses are non-compatible.
- The DSA is not powered on or booted up.
- The IP Address input in DSA5000Link is incorrect (whether entered wrong, or the IP address of the DSA isn't what was entered or expected).
- There is more than one device on the network using the same IP address.
- The network cable is unplugged.
- A firewall or anti-virus program is preventing a connection to the DSA.
- There is a hardware problem with the scanner.

If you are still unable to connect after troubleshooting the previously mentioned issues, please contact Scanivalve Technical Support.

STATUS BAR

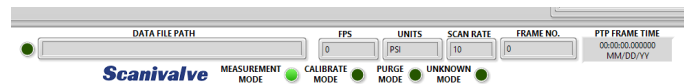After successfully connecting to an DSA, the status bar will populate with the current settings of the DSA.

FIGURE 4.3 - STATUS BAR

The following areas are always shown in the status bar:

CURRENT VALVE STATUS - Across the bottom, DSA5000Link will show the current valve state of the module. Each mode has a green light that will be lit when in that state. Figure 4.3 shows the module is in Measurement Mode. The valve state can be changed using the "Solenoid Control" button.

Note: the valve state will only physically change if 90-120PSI control pressure is active at the CTL SUPPLY port.

DATA FILE PATH - This area will show the directory destination where data is being collected. This will only show if the "Start Data File" button has been clicked. When a data file is open and ready to collect data from the DSA, the destination will show, and the green indicator will light bright green.

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If the indicator is dark green and the file path is blank, data will not be collected to a file.

FPS - The current FPS setting, or Frames Per Scan, in the DSA module.

UNITS - The current Engineering Unit setting in the DSA module.

SCAN RATE - The current scan rate setting in the DSA module.

FRAME NO. - When the module is scanning or in SCAN mode, this will show the current frame number in the scan. This value will reset every time a new scan is initiated.

PTP FRAME TIME - When the module is scanning or in SCAN mode, this will show the current internal time of the DSA5000. This time may or may not be synchronized with a PTP Grandmaster, and only represents the internal time of the DSA scanner.

CHANNEL DISPLAY AND SELECTION

This column will allow you to configure which channels are shown in the scrolling graph area. Each channel will have an On / Off checkbox (checked means on, or will appear in the graph area), the associated color of the line for this channel, and the current pressure value (the units of the value are based on the UNITS setting in the status bar).
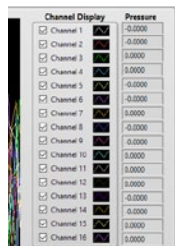

FIGURE 4.4 - CHANNEL DISPLAY AND SELECTION

The values in the Pressure column will only update when the module is scanning.

Note: the graph area will only display 50,000 frames of data before it starts to scroll. This will reset when a new scan is executed.

ACTION BUTTONS

At the top of the screen are the action buttons that will execute actions or bring up additional dialog windows.
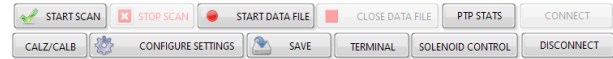

FIGURE 4.5 - ACTION BUTTONS

START SCAN

To scan pressure data from the DSA, simply press the Scan button. Upon pressing the Scan button, the DSA will begin scanning at a rate and duration specified by the Scan Settings. The program will display data and/or write to a data file at the rate defined by the scan settings. The bar graph will autoscale to the largest pressure value currently seen by each DSA.

The Stop button is the only button which is not disabled while scanning.

STOP SCAN

Once clicked, this will execute a STOP command and stop any action in the DSA module. Primarily used to stop a scan.

START DATA FILE

The Start Data File button allows a user to log data directly to a .CSV which can be easily opened by Microsoft Excel. Upon pressing the Start Data File button, a window will open prompting the user to name and specify a location to save the file. A data file is not required to start a scan. However, if the data is to be written to a file for analysis, the Start Data File button must be pressed before initiating a Scan. If a data file is already started, the Start Data File button will be disabled.

CLOSE DATA FILE

The Close Data File button will close the currently open data file so a user can access their scan data. If there is no data file open, then DSA5000Link ignores the press of this button. It is recommended to close the data file once you have collected your desired data set.

PTP STATS

This will open a window with statistical information about Precision Time Protocol (PTP). Note that most of this information will only be helpful is PTP is enabled (PTPEN == 1) in the DSA5000 and a PTP Grandmaster is present on the network.

The top area will show the current UTCOFFSET set in the DSA5000. This is set under LIST PTP. This is the time used to correct or offset the internal time of the DSA from the received PTP time.

The next two indicators will indicate if PTP messages are being received by the DSA5000. UTC Updated will light

green if the current received time is being updated. If PTP messages are not being received, or the time is not being received by the DSA5000, this indicator will be grey.

The second indicator will alert if the UTC Offset being received by the PTP Grandmaster is valid. The indicator will be green if the UTC Offset is valid. If the offset is valid, that time will be displayed in the area below the indicator. The example in figure 4.6 shows a received UTC offset of 37 seconds.

The next section is the current Offset From Master, which is the time difference between the DSA5000's time, and the PTP Grandmaster's time. This is displayed in seconds.

Current PTP Time shows the current internal time of the DSA5000 in a date time format, and in a PTP time stamp (seconds and nanoseconds from Epoch).

You can set the UTCOFFSET value of the DSA in the next area. Enter a time as hh:mm:ss and click apply. This change will show in the top Current UTCOFFSET bar.

Set a custom time allows you to configure the internal time of the DSA5000 to any date and time if not PTP Grand-master is present on the network, or if PTP is disabled in the DSA5000. Enter the date and time as YYYY/mm/dd hh:mm:ss.
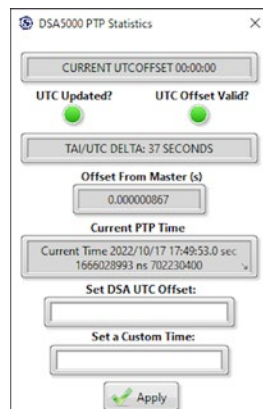

FIGURE 4.5 - PTP STATS

CALZ/CALB
The CALZ/CALB button allows a user to perform a zero calibration of the DSA scanner. Upon pressing this button, the program will execute a CALZ or a CALB, dependent on the configuration on the DSA. This command can take up to eleven seconds to execute. A status window will appear when the button is pressed as shown in Figure 4.6, and dis-appear when the CALZ is complete. When the DSA requires a CALB, another window will be presented to enter in the current barometric pressure (in PSIA).
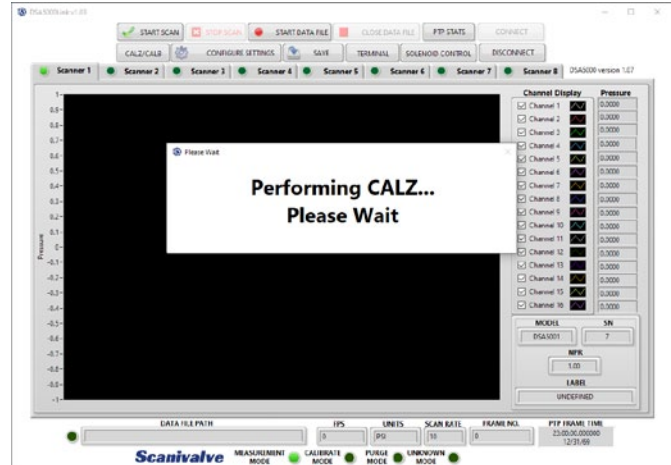

FIGURE 4.7 - CALZ

CONFIGURE SETTINGS
The Configure Settings button will open the Scan Settings window as shown in Figure 4.8. This window allows the user to change the scan rate, frames per scan, and units. When the settings are configured appropriately, simply click the Apply button and then the Close "X" when the settings change is complete. All other buttons are disabled on the home screen when the Configure Settings tab is active.
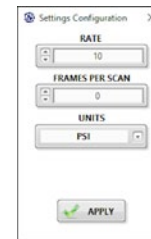

FIGURE 4.8 - SCAN SETTINGS

SAVE
The Save Settings button will save the current configura-tion settings to the DSA. Upon pressing the save button, a warning will appear while the DSA executes the save. The warning will disappear upon completion of the save, and normal operations can resume.

Note: the save can be very fast, so the dialog window may not appear for a long duration of time.

TERMINAL
This button will open a new dialog window that will provide simply terminal style emulator where ASCII commands can be sent to the DSA module. When a command is entered, press the ENTER key to execute the command. If the command warrants a response from the DSA, it will be

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displayed in the area below. See figure 4.9 for an example.

Figure 4.9 - Terminal

SOLENOID CONTROL

The Solenoid Control button will open a new window with options to change the valve state, or mode, of the DSA5000. Simply click on the mode to change the solenoid state. Use the "X" to close the window. The state will update in the status bar.

The valve state, or mode, of the DSA5000 will only properly change if 90-120PSI control pressure is active at the CTL SUPPLY port. See the DSA5000 Manual for more information on the valve states, modes, and control pressure.
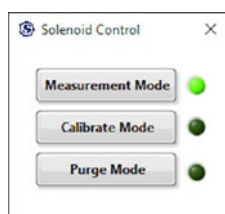

Figure 4.10 - Solenoid Control

DISCONNECT

The Disconnect button is available on the home screen when all other tabs have been closed and the DSA is not scanning. It is unavailable while scanning and while tabs are open to prevent accidental misuse of the program. It is recommended to Disconnect from the DSA before closing the DSA5000Link application. Pressing the Disconnect button will enable the Connect button should a user wish to reconnect or connect to a different DSA scanners.

SSEP Module Selection

Module Tabs are provided when utilizing the SSEP features of the DSA5000. Each of these tabs will be populated with module information and data when SSEP is in use.

Figure 4.11 - SSEP Module Selection

When SSEP is not utilized, or only one module is being used, only the tab for Module 1 will display module data and information.

If modules are discovered with SSEP, tabs will be activated for the number of modules found (maximum of 8). The green status light will be bright green when a module is found and is active. A dim light means no module is active for this tab.

Figure 4.12 - SSEP Modules Found

Note: SSEP must be pre-configured prior to using DSA-5000Link. See the DSA5000 User Manual for more information.

When using SSEP, all settings and actions will only be directed to Module 1, or the controller. No actions or communications are possible with modules 2 - 8. However, the controller module will send all applicable commands and settings to all discovered SSEP responder modules when needed.

When scanning, data for each module will be displayed for the module in the different tabs. The serial number, nominal pressure range, and label will be displayed for each module on each tab.

APPENDIX

APPENDIX A: VI DESCRIPTIONS

DSA5000Link - This is the main VI which calls each of the below VIs. DSA5000Link serves as a basic graphical user interface as well as a functional example program to collect data from the DSA5000 series scanner.

CALZWait.vi - This VI is for DSA5000 executable use and features a popup window controlled by the StatusCheckDSA5k. vi Boolean "Ready?" value letting the user know that the device is performing a CALZ. Create a Boolean Refnum from the "Ready?" terminal of StatusCheckDSA5k.vi to control this VI. This VI will run until the scanner status returns "STATUS: READY". Inputs are Error In and Boolean Refnum. Output is Error Out. Used in conjunction with StatusCheckDSA5k.vi

CommandDSA5k.vi - A VI used to send commands to the DSA5000 scanner over an appropriately established Telnet connection. A hard-coded 25ms delay is built into this VI. Inputs are Error In, Timeout, Command to device, and Connection ID. Outputs are Connection ID and Error Out.

ConfigureConnectDSA5k.vi - A VI used to connect to the DSA5000 scanner with error handling letting the user know whether the connection was successful. Read and Write Controls to Automatic Config File.vi is used to remember the previous IP Address that was input when the VI is called. Connect.vi is used to connect to the device over the telnet port (port 23). Inputs are IP Address, and Error In. Outputs are IP Address, Connection ID Out, and Error Out.

ConnectDSAL4.vi - A VI used to connect to the DSA5000 scanner via the Telnet port (port 23). Inputs are IP Address, Timeout, and Error In. Outputs are Connection ID Out, and Error Out.

DisconnectDSA5k.vi - A VI used to disconnect from the DSA5000 scanner. Inputs are Connection ID and Error In. Output is Error Out.

DSA5000Settings.vi - A VI used to configure the DSA5000 settings. This VI Calls the GetSettings.vi to get current settings, and Command.vi to change DSA5000 settings. Inputs are Connection ID In and Error In. Outputs are Connection ID Out and Error Out.

GetSettings.vi - A VI used to get specific settings from the DSA5000. These settings include RATE, FPS, UNITS and VER. This VI calls CommandDSA5k.vi to query settings and ReadDSA5k.vi to read the results. Inputs are Connection ID In and Error In. Outputs are Connection ID Out, Error Out, RATE, FPS, UNITS and VER.

GrandmasterUTCOffset.vi - A VI used to verify that the UTC Offset is valid and up to date. This VI calls CommandDSA5k.vi and ReadDSA5k.vi. Inputs are Connection ID In and Error In. Outputs are Connection ID Out, Error Out, TAI/UTC Delta, UTC Updated?, and UTC Offset Valid?.

PTPOffsetFromMaster.vi - A VI used to query the Offset from the PTP master in seconds. This VI calls CommandDSA5k.vi and ReadDSA5k.vi. Inputs are Connection ID In and Error In. Outputs are Connection ID Out, Error Out, and Offset From Master (s).

PTPStatistics.vi - A VI used to visualize and set PTP settings when applicable. This VI GrandmasterUTCOffset.vi, PTPOffsetFromMaster.vi, CommandDSA5k.vi and ReadDSA5k.vi. Inputs are Connection ID In, and Error In. Outputs are Connection ID Out and Error Out.

Read and Write Controls to Automatic Config File.vi - A VI used to recall and save previous or new control values. This VI calls Read and Write Controls to Config File.vi. Inputs are Action, Control References, and Error In. Output is Error Out.

Read and Write Controls to Config File - A VI to be used with Read and Write Controls to Automatic Config File.vi. Inputs are Error In, Control References, Configuration File Reference In, and Action. Outputs are Error Out and Configuration File Reference Out.

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ReadDSA5k.vi - A VI used to read Telnet responses from the DSA5000 scanner. This VI is not intended to read data from the DSA scanner over the binary server. Inputs are Connection ID In, Timeout, and Error In. Outputs are Error out, Data Out, and Connection ID Out.

SAVEWait.vi - This VI serves no functional purpose outside of being a pop-up window letting the user know that a save is taking place. A 1.5 second delay is hard coded to allow time for the save to complete. Input is Error In. Output is Error Out.

ScanTimeoutCalc.vi - A VI used to configure the Scan structure timeout based on the DSA5000 scan rate. Input is RATE. Output is Timeout.

SolenoidControl.vi - A VI used to change and query the current state of the DSA5000 control solenoids. This VI calls SolenoidState.vi and CommandDSA5k.vi. Inputs are Connection ID In and Error In. Outputs are Connection ID Out and Error Out.

SolenoidState.vi - A VI used to query the state of the DSA5000 Solenoids. This VI calls CommandDSA5k.vi and ReadDSA5k.vi. Inputs are Connection ID In, and Error In. Outputs are Connection ID Out, Error Out, CAL (Boolean), PX (Boolean), PRG (Boolean), and UNK (Boolean).

StatusCheckDSA5k.vi - A VI used to query the DSA5000 scanner for "STATUS: READY". This VI can be used in conjunction with a while loop and stopped once the DSA5000 scanner is "READY". This VI calls Command.vi to send the Status command, and Read.vi to read the response. Inputs are Connection ID, Timeout, and Error In. Outputs are Connection ID Out, Ready?, and Error Out.

Terminal.vi - A VI used to query and configure DSA5000 advanced settings. This VI is similar to a command line interface. This VI calls TerminalReadWrite.vi. Inputs are Connection ID In, and Error In. Outputs are Connection ID Out and Error Out.

TerminalReadWrite.vi - A VI used to ensure that unsupported Terminal commands are not used in Terminal.vi. This VI calls Command.vi to send commands, and Read.vi to read responses. Inputs are Terminal Command, Connection ID In, and Error In. Outputs are Connection ID Out, Error Out, and Data Out.

Data File Header.vi - A VI used to create the header for the data file based on the LIST SYS output.

Data to CSV.vi - A VI used to turn the arrays of pressure data and time stamps to a .csv string.

LIST SYS Parse.vi - A VI used to parse the LIST SYS output. This VI controls how the binary data packet is read and parsed based on the number of scanners in the system.

LIST SYS LED Driver.vi - A VI used to turn the LED indicators on and off based on the number of scanners in the system.

MODEL Parse.vi - A VI used to determine whether the DSA scanner is an absolute or differential pressure scanner. Used to determine whether a CALB or CALZ command should be issued.

Scan Read and Parse.vi - A VI used to read the binary data packet from the DSA scanner based on the number of scanners in the system. This VI will read the binary data packet, convert the packet, and output the data in an array.

APPENDIX B: SOFTWARE CHANGE LOG

Version 1.00 - Initial Release. This version only works with DSA5000 v1.00 (October 2022)

Version 1.01 - Adjusted binary packet conversion for DSA5000. This version only works with DSA5000 v1.01 and higher (December 2022)

Version 1.02 - Added ability to perform CALB with absolute DSA5000s. Resolved an issue with binary server connection caching (November 2023)

Version 1.03 - Added features to support SSEP. Modified GUI elements. (April 2024)

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DSA5000Link Manual
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