

MPSLINK

SOFTWARE MANUAL

SOFTWARE VERSION 1.01



Scanivalve

PREFACE

WARNINGS, CAUTIONS AND NOTES



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



The CAUTION ! symbol indicates danger for 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 needs 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.

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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.

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not to be defective, shall be at the expense of Buyer or the end user, whichever 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, EXPRESS 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 least 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 ISO9001:2015 certified company.

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SECTION 1: SPECIFICATIONS

GENERAL SPECIFICATIONS

Minimum System Requirements:

Windows 7 or newer (64-bit)
LabVIEW Runtime Engine 2022 requires 64-bit O.S
512 MB RAM
1.5 GB Hard Drive Free Space
1920x1080 Screen Resolution (recommended)

MPS Software version Requirements: 2.00 and newer

Maximum Scan Rate: 850Hz (Samples/Channel/Second)

Expected Data Format:

MPS4264:

SVRSEL 2 - Binary LabVIEW® Packet Format

MPS4232:

SIM 64 - Simulated 64 LabVIEW® Packet

Number of MPS Scanners Supported Per Instance: 1-8

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 with multiple MPS modules at high scan rates can create CSV files too large to open in Microsoft® Excel®.

SECTION 2: INTRODUCTION

MPSLINK OVERVIEW

MPSLink can be used to configure and collect data from a single, or multiple, MPS4264 series pressure scanners manufactured by Scanivalve Corp. MPSLink is intended to be an entry level interface to the MPS scanner, while also serving as a functional LabVIEW® example program. While using MPSLink, certain features of the MPS 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 MPSLink can be downloaded and modified from the Scanivalve LabVIEW® Development Kit at no charge.

To utilize the full potential of the MPS scan rate, data is transmitted from the scanner in TCP Binary format and converted from binary to ASCII real-time by MPSLink. This architecture will require that the SVRSEL variable be set to 2 on all MPS scanners to be used with this application. Details on setting SVRSEL to 2 can be found in Section 4: Operation- “Configuring the MPS for MPSLink” on page 5.

For detailed information on the MPS scanner hardware and software, please see the MPS4264 user manuals.



FIGURE 2.1- MPSLINK HOME SCREEN

SECTION 3: INSTALLATION

OVERVIEW

To install MPSLink, 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

MPSLink 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 MPSLink download. Download should begin automatically. Note which folder the files are being downloaded to.

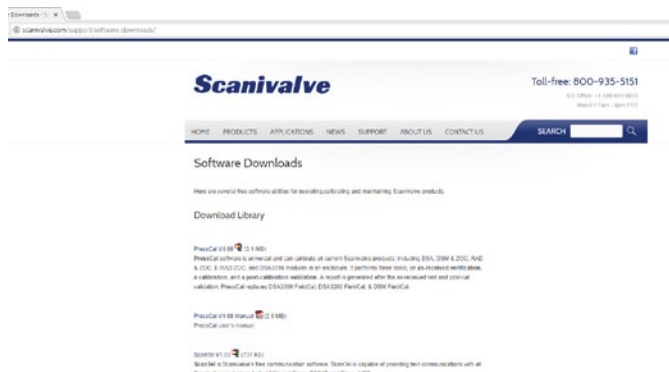


FIGURE 3.1- SCANIVALVE SOFTWARE DOWNLOADS

INSTALL

Once the files are downloaded, navigate to the folder where the downloaded files are located. Run the “setup” application. Follow the instructions as outlined by the setup wizard as shown in Figure 3.2.

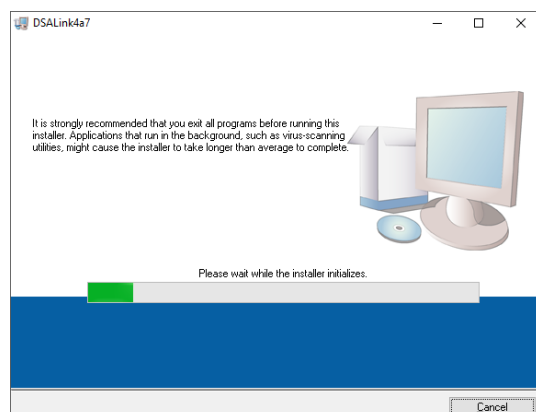


FIGURE 3.2- INSTALL WIZARD

RESTART

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

SECTION 4: OPERATION

OVERVIEW

This section explains general operation and proper use of the MPSLink 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, then MPSLink will not operate. See "Using a Static IP Address" section of the MPS4264 manual. An overview of the MPS 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.

CONFIGURING THE MPS FOR MPSLINK

Prior to running the MPSLink program, each MPS must be properly configured as defined by this section. As MPSLink expects data to be output from the MPS scanner over the binary server, some variables may need to be changed for the program to run properly. These changes only need to occur once, as the settings changes will be saved to the scanner by following this procedure. To utilize MPSLink, each MPS4264 scanner must have the SVRSEL variable in LIST M set to 2, followed by a SAVE and power cycle of the scanner.

Please note that this is not applicable to the MPS4232, which does not require any preconfiguration.

The steps for changing SVRSEL are outlined below:

1. Power on each MPS to be used with MPSLink. Allow the scanner to finish its boot sequence (approximately 2 minutes).
2. Connect to the web server of each MPS. To connect to the MPS Web Server, open Internet Explorer and in the address bar type:
`http://<IP Address of the MPS>/index.htm`
 The MPS web server should open. See the MPS User Manual "Web Server: Connecting" section for more details.
3. Once connected to the Web Server, click on the Terminal tab.
4. The Terminal tab offers a command line interface to the MPS scanner. In the Terminal window, type:
`LIST M<ENTER>`
 The LIST M variables will be displayed.
5. The SVRSEL variable in LIST M must be set to 2. If it

is already set to 2 on start up of the scanner, then you can close the Web Server and proceed to use MPSLink. If SVRSEL is not set to 2, in the Web Server Terminal window, type:

`SET SVRSEL 2<ENTER>`

6. Verify that SVRSEL has been set to the appropriate value of 2 by sending the LIST M command in the Terminal window. Type:
`LIST M<ENTER>`
7. If SVRSEL is not set to 2, repeat step 5 and step 6 of this procedure.
8. Once SVRSEL is set to 2, issue a SAVE to the MPS scanner. To do this, in the Terminal window, type:
`SAVE<ENTER>`
 Allow the save to complete before disconnecting from the Web Server.
9. Issue a STATUS command in the Terminal window. Type:
`STATUS<ENTER>`
 The MPS should reply STATUS: READY when the SAVE is complete.
10. When the SAVE is complete and the MPS returns STATUS: Ready, power down the MPS scanner.
11. The process is complete. This procedure does not need to be repeated unless the value of SVRSEL is changed. The MPS is now configured for use with MPSLink.

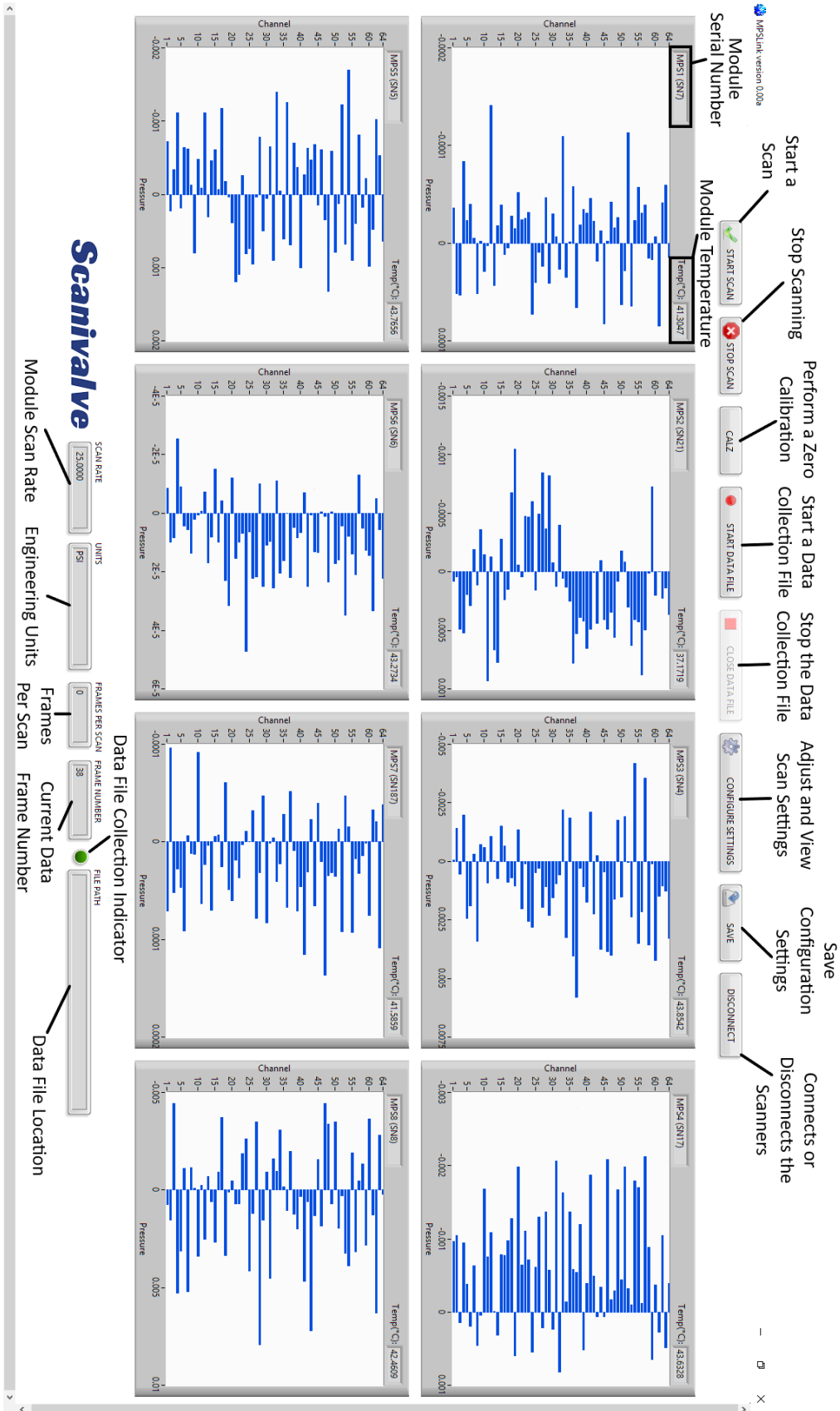


FIGURE 4.1- MPSLINK OVERVIEW

CONNECTING

To connect a MPS to MPSLink, the MPS must be powered on and allowed to finish booting up which can take up to two minutes. Once the MPS has finished the boot sequence, the IP Address of the MPS can be input into MPSLink and the connect button clicked. If you do not input a correct or compatible IP Address, MPSLink will not run. If the value of SVRSEL is not set to 2, MPSLink will not run. The connect screen can be seen in Figure 4.2.

The host computer and MPS must have a compatible IP Address in order to successfully connect. The MPS 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

MPS module: 191.30.90.125

Example of matching the first two octets:

Host computer: 191.30.1.100

MPS module: 191.30.90.125

The IP address of a Windows host computer can be changed under:

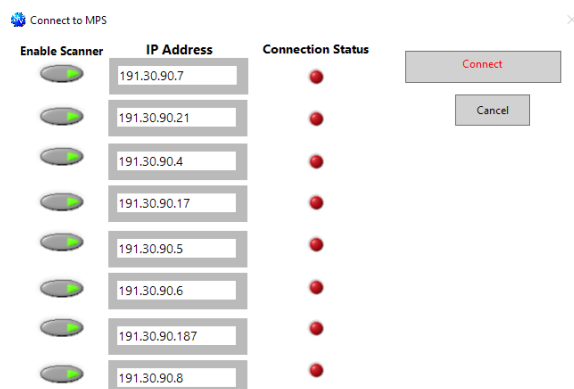
Control Panel -> Network Connections -> Local Area Network -> Properties -> Internet Protocol (TCP/IP) -> Properties.

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

If the application fails to leave the Connect screen, then there is likely an issue with one of the following:

Host and MPS IP Address compatibility, a scanner is enabled that is not on the network, SVRSEL is not set to 2, the MPS is not powered on or booted up, the IP Address input in MPSLink is incorrect, the network cable is unplugged, or 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.

The front panel will only display a chart for each scanner that is connected.



**FIGURE 4.2- CONNECT TO MPS
(8 ENABLED SCANNERS)**

CONFIGURE SETTINGS

The Configure Settings button will open the Scan Settings window as shown in Figure 4.3. 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 button when the settings change is complete. All other buttons are disabled on the home screen when the Configure Settings tab is active.

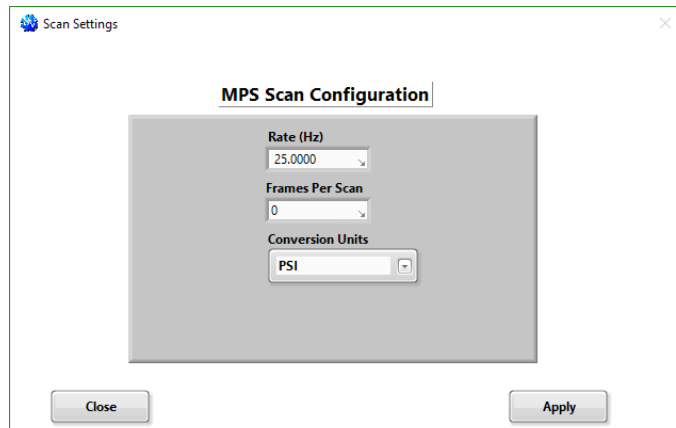


FIGURE 4.3- SCAN SETTINGS

CALZ- ZERO CALIBRATION

The CALZ button allows a user to perform a zero calibration of their MPS scanner(s). It is recommended that the user place the MPS in calibrate mode prior to pressing the CALZ button, but it is not required. For more information on the MPS calibration valve, see the appropriate MPS user manual. Upon pressing the CALZ button, the MPS will execute a CALZ command. This command takes approximately fifteen seconds to execute. A status window will appear when the button is pressed as shown in Figure 4.4, and disappear when the CALZ is complete.



FIGURE 4.4- CALZ WINDOW

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.

NOTE: Users who intend to collect data at the maximum scan rate (850Hz) from multiple MPS scanners should be aware of the file size limitations associated with using Microsoft Excel for data analysis. A ten minute scan at 850Hz while using eight MPS scanners can create a file that is too large for Excel to open.

START SCAN

To scan pressure data from the MPS, simply press the Scan button. Upon pressing the Scan button, the MPS will begin scanning at a rate and duration specified by the Scan Settings. The MPS will scan data and/or write to a data file at the rate defined by the scan settings, but MPSLink will only display sample data to the bar graph at a rate of approximately 2Hz as shown in Figure 4.5. The bar graph will autoscale to the largest pressure value currently seen by each MPS. The Stop button is the only button which is not disabled while scanning.

Three connected scanners are shown scanning below.



FIGURE 4.5- SCANNING

STOP SCAN

The scan will Stop when the Stop button is pressed. A window will appear as shown in Figure 4.6 notifying the user that the scan has stopped, then disappear. All buttons are disabled while the scan stops.

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 MPSLink ignores the press of this button. It is recommended to close the data file once you have collected your desired data set.

SAVE

The Save Settings button will save the current configuration settings to the MPS. Upon pressing the save button, a warning will appear while the MPS executes the save as shown in Figure 4.6. The warning will disappear upon completion of the save, and normal operations can resume.

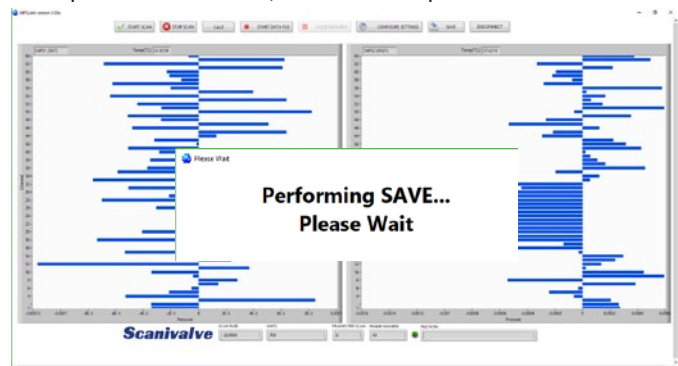


FIGURE 4.6- SAVE WINDOW

DISCONNECT

The Disconnect button is available on the home screen when all other tabs have been closed and the MPS 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 MPS before closing the MPSLink application. Pressing the Disconnect button will enable the Connect button should a user wish to reconnect with a different, or multiple MPS scanners.

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APPENDIX

APPENDIX A: VI DESCRIPTIONS

MPSLINK.VI (MAIN VI)

This VI is the main VI and can be used as an example to create a custom interface using the provided SubVIs or as a stand alone application. This VI is capable of collecting data and displaying sample data from 1 to 8 MPS scanners at rates up to 850Hz. An executable version independent from LabVIEW® that is compatible with Windows 7 and newer is also available. The main VI utilizes all of the VIs listed in this document.

CALZWAIT.VI

A popup window controlled by the CheckStatus.vi Boolean value letting the user know that the device is performing a CALZ. Create a Boolean Refnum from the "Ready?" terminal of CheckStatus.vi to control this VI. 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 CheckStatus.vi.

CHECKSTATUS.VI

Sends the STATUS command to Multiple MPS scanners using CommandMultipleMPS.vi. Reads the result of the STATUS command using ReadMultipleMPS.vi. Returns a True or False "Ready?" Boolean. Inputs are Connection Array In, Number of Scanners, and Error In. Output is Connection Array Out, Data Out Array, Number of Scanners Out, Ready?, and Error Out.

COMMANDMPS.VI

Sends a command to a single MPS. This VI is structured to be used in conjunction with CommandMultipleMPS.vi or as a stand-alone VI. Inputs are Connection ID, Error In, Command to MPS and Timeout. Output is Connection ID and Error Out.

COMMANDMULTIPLEMPS.VI

Sends a command to multiple connected MPS scanners. This VI scales based upon the number of connected scanners. A single command is input into this VI and is distributed to multiple MPS scanners using the CommandMPS.vi. Inputs are Number of Scanners, Error In, Connection Array In, Command to MPS and Timeout. Output is Number of Scanners, Error Out, and Connection Array out.

CONFIGURECONNECTMPS.VI

Configures the multiple MPS connections. Allows a user to connect from 1 to 8 MPS scanners by enabling them before connection. Does not connect if IP Address is incorrect or invalid. Does not connect if "Enable Scanner" is enabled but IP Address is blank or invalid. Counts how many scanners are connected. Remembers previously input IP Addresses and Enabled Scanners. Input is Error In. Output is Error Out, Number of Scanners Connected, and Connection ID Array and Binary Connection ID Array.

CONNECTIONCHECK.VI

Checks whether the Binary and Telnet connections were successful. Checks the value of enable scanner. This is a SubVI for ConfigureConnectMPS and is intended specifically for use with ConfigureConnectMPS. Inputs are Enable Scanner Button, Telnet Connection ID, and Binary Connection Error in. Outputs are Connections Accepted?, Valid Connection?, and Error out.

CONNECTMPS.VI

Opens a TCP connection to the TelNet port (port 23) or Binary port (port 503) of an MPS scanner. The binary port is not user configurable. Input is IP Address, Port, Error In, and Timeout. Output is Connection ID and Error Out.

DATASTRINGTOARRAY.VI

Converts the data string to an array and ultimately outputs a cluster from each data stream. The cluster can then be used to display sample data from all the connected scanners using local variables to pass data from each scanner's read loop to a common display loop that executes at a limited rate. It is recommended to run this VI in a timed loop that executes at a rate no greater than 5 Hz. Inputs are Channel Array in (an array of numbers 1-64), Data In (typically a local variable(s) to pass data from ScanMultipleMPSRead), Number of Scanners and Error In. Outputs are Graph 1 through Graph 8 clusters and Error Out.

DISCONNECTMPS.VI

Closes a TCP connection to the MPS. This connection can either be the TelNet or Binary connection. Input is Connection ID and Error In. Output is Error Out.

DISCONNECTALLMPS.VI

Closes a TCP connection to all MPS scanners in the Connection ID array using DisconnectMPS.vi. Provides error handling if not all 8 scanners are used. Inputs are Connection ID and Error In. Output is Error Out.

GETSCANSETTINGS.VI

Queries the FPS, UNITS, and RATE values from the MPS. Returns information from scanner 1. Commonly used after the MatchSettings.vi to update the scan settings on the front panel. Inputs are Connection ID Array In, Number of Scanners In, and Error In. Outputs are Connection ID Array Out, Number of Scanners Out, Error Out, Frames Per Scan, Rate, and Units.

LOAD AND SAVE CONTROLS LV2009.LLB-

This VI was acquired from the National Instruments LabVIEW® Discussion Forum. This VI enables you to write or read previous control values to a config file that is loaded when called. This enables the ability to retain previous IP Addresses and control values.

MATCH SETTINGS.VI

This VI will match all the scan settings of the connected scanners to scanner 1. This establishes a baseline for changing scanner settings to all be uniform. Changing the settings of 1 scanner using MPS Link will change the settings for all scanners. Inputs are Telnet Connection ID Array, Number of Connected Scanners and Error in. Outputs are Telnet Connection ID Array, Number of Scanners Out, and Error out.

PRECONFIGMPS.VI

Preconfigures MPS variables for use with MPS Link. MPS variables that must be modified include: SET FORMAT B L, SET ENFTP 0, SET ENUDP 0, SET OPTIONS 0 0 16, SET ECHO 0, SET PTPEN 0. In version 1.01, SET SIM 64 was added to support MPS4232's, which causes the MPS4232 to output a simulated 64 channel Binary LabVIEW. This VI is also utilized after scanner settings have changed to prohibit users from changing certain settings. Utilizes CommandMultipleMPS.vi to deliver the configuration variables, ReadMultipleMPS.vi to read responses back from the scanners, and MatchSettings.vi to ensure all scanners have the same settings as Scanner 1. Inputs are Error In, Connection ID Array, and Number of Scanners. Outputs are Error Out, Connection ID Array, and Number of Scanners.

READ AND WRITE CONTROLS TO AUTOMATIC CONFIG FILE.VI

This VI was acquired from the National Instruments LabVIEW® Discussion Forum. This VI enables you to write or read previous control values to a config file that is loaded when called. This enables the ability to retain previous IP Addresses and control values.

READMPS.VI

Reads response from MPS scanner after a command is sent. This VI is not intended to read scan data from the scanner. It is only intended to read LIST and GET responses and the prompt from the scanner. This VI also deletes the prompt from showing up in the program. Inputs are Connection ID, Timeout, and Error In. Outputs are Data Out, Connection ID, and Error Out.

READMULTIPLEMPS.VI

Reads the response from Multiple MPS scanner and assigns them to an array. Uses ReadMPS.vi as SubVI. Inputs are Connection ID Array In, Number of Scanners, Error In, and Timeout. Outputs are Number of Scanners, Connection Array Out, Data Out Array, and Error Out.

SAVEWAIT.VI

A popup window controlled by the CheckStatus.vi Boolean value letting the user know that the device is performing a SAVE. Create a Boolean Refnum from the "Ready?" terminal of CheckStatus.vi to control this VI. 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 CheckStatus.vi.

SCANSETTINGSMPS.VI

Configures the RATE, FPS, UNITS and USER UNITS variables for all connected scanners. This VI utilizes GetScanSettings.vi, CommandMultipleMPS.vi, ReadMultipleMPS.vi, and CheckStatus.vi. Inputs are Connection ID Array, Number of Scanners and Error In. Outputs are Connection ID Array, Number of Scanners, and Error Out.

SNPARSE.VI

Used with CommandMultipleMPS.vi and ReadMultipleMPS.vi. Uses the string array output from ReadMultipleMPS.vi when a GET SN command has been sent to the scanners using CommandMultipleMPS.vi. The string array is parsed and formatted to values of "SNXXX" rather than "SET SN XXX". This VI is typically used to update front panel indicators and to create a header for a .CSV file. Inputs are Data Array and Error In. Outputs are SN Array and Error Out.

STOPSCANWAIT.VI

Used as a popup to indicate to users that a scan has been stopped. This popup will close after approximately 4.5 seconds. Input is Error In. Output is Error Out.

TEMPDATADISPLAY.VI

Used to display temperature data from MPS scanners on the front panel. Removes the Frame Number and pressure data from the array and returns a single value for each MPS Temperature in °C. Inputs are Error In, Number of Scanners, and Data Array. Outputs are Temps 1 through 8 and Error Out.

APPENDIX B: SOFTWARE CHANGE LOG

Version 1.00 - Initial Release (8-1-19)

Version 1.01 - Added support for MPS4232 scanners (4-5-22)

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