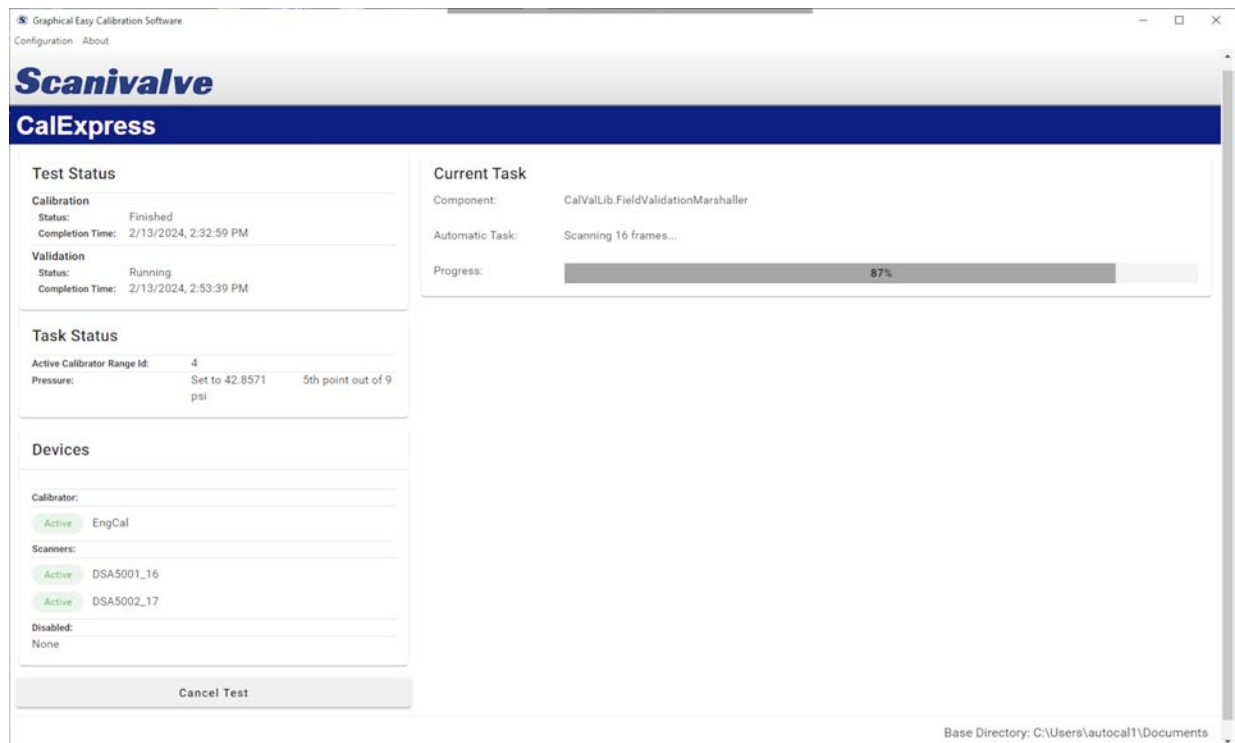


CALEXPRESS

INSTALLATION AND OPERATION MANUAL

VERSION 1.00



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.

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, 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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Microsoft® Excel® is a registered trademark of the Microsoft Corporation.

All other brand and product names are trademarks or registered trademarks of their respective companies.

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 ISO 9001:2015 certified company.

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SECTION 1: INTRODUCTION

OVERVIEW

Scanivalve's CalExpress is a Windows based program that provides a means to perform Calibrations and Validations on Scanivalve scanners in order to maintain accuracy standards. Scanivalve's recommendation for most scanners includes performing a validation every six (6) months, and calibrating when required.

This software enables a user to create configuration files, which includes scanner and calibrator information, run automatic or manual calibrations and validations, generate validation reports, and create and store files for archival purposes.

This software can be installed and run in many applications or settings, including metrology labs and calibration facilities, for regular interval maintenance, in-test areas for on-condition validation reports, and more.

The following test processes are supported:

- Automatic Field Calibration
- Automatic Field Validation
- Manual Field Calibration
- Manual Field Validation

The following sections will explain Calibrations and Validations, and define terms used throughout this manual.

SUPPORTED TESTS

CalExpress Tests include Calibration and Validation. Each of these tests are a series of steps that are carried out by CalExpress.

Calibration

A calibration is the process of applying a series of known pressures from a high-accuracy pressure standard or calibrator to a scanner to generate coefficients for each sensor in the scanner. This process characterizes the sensor and generates the needed conversion information to convert the raw Analog-to-Digital readings to an Engineering Unit. This coefficient table is stored in each scanner's memory.

Validation

A validation is the process of applying a series of known pressures from a high-accuracy pressure standard or calibrator to a scanner with already installed coefficients. The pressure readings from the calibrator at each known pressure are compared against the Engineering Unit reading from each sensor in the scanner. This information is then stored in a report that is automatically generated at the

end of the test to show the applied pressure, the read pressures, the delta, and the full-scale error of each particular reading.

The validation can be used as a quick way to find the current condition of the sensors and their coefficients (known as an "As Received Validation"), or as a way to validate any calibration that has been recently performed.

TEST PROCESSES

Calibration and Validations have different processes that can be run within the software.

Field Process

A field process is the recommended maintenance method for checking and maintaining a scanner's coefficients in the field. Field calibrations and validations are performed at a single temperature and do not require a specific temperature or controlled temperature.

During a field calibration, a secondary set of correction values are generated and stored in a scanner's memory. These correction values are generated by comparing the current values of the field calibration, and the current full coefficients that were generated at the factory during the last full calibration.

While the field calibration is only performed at a single temperature, the field calibration coefficients generated are used to correct across the full compensated temperature range of the scanner.

PROCESS TYPES

Each process has a type; Automatic or Manual. While CalExpress software will always communicate and control the scanner under test (Scanivalve scanner), it can control other devices required for the calibration and validation to make the process automated, which includes a Scanivalve calibrator for pressure application.

Automatic type processes require a Scanivalve SPC4000 series calibrator (equipped with an SPCPLU) in order to perform automated calibrations and validations. CalExpress will communicate with the SPC4000 during the process to apply pressures in the correct manner to the scanner(s) under test. No input from the user is required during and automatic test.

Manual type processes will only communicate with the scanner under test. This requires a user to manually apply pressures to the scanner, verify the pressure is stable, and

enter in the read pressure from the pressure standard or calibrator. A series of prompts are provided to instruct the user on when to apply pressure, what pressures to apply, and the ability to type in the actual applied pressures.

NOTE: A user should have good working knowledge of the hardware of the device used with this software. Please refer to the applicable hardware and software manuals for more information.

OPERATION

The tests in CalExpress are determined by a configuration file that can be created, edited, or loaded in CalExpress. This single configuration file contains all information needed to successfully run any of the tests and options. This includes scanner(s) under test, calibrator information, and more.

Once a configuration file is created and loaded in CalExpress, any of the supported tests can be run using the configuration file. CalExpress will step through many steps to complete the test, whether manually or automatically.

All files that are created, such as calibration files, logs, or validation reports, are automatically created and stored every time a test is run.

Details on full operation can be found throughout this manual.

REQUIREMENTS

Equipment

Calibrator (Full or Field):

Automatic:

SPC4000/SPC4050 with SPCPLU
Applicable Transducer Range (varies)

Manual:

Any calibrator or pressure standard with a full-scale accuracy three (3) times better than the full-scale accuracy of the scanner(s) under test

Scanner Under Test

Pressure Scanner:

DSA5000 with Firmware Version 1.05 and up

Computer

Operating System:

Windows 10
Windows 11

Minimum Hardware:

1 GHz or faster processor
1 GB of RAM
1 GB of available hard disk space
Network Interface (Ethernet)
Monitor Resolution 1600x800 (recommended minimum)

Additional Software:

Microsoft® Excel® or similar
NET Core 6 (free downloaded from Microsoft)

SECTION 2: INSTALLATION

OVERVIEW

To use CalExpress, the software must be obtained from Scanivalve or downloaded from the Scanivalve website. This section covers the installation process in detail. If you encounter unexpected difficulties, contact your IT department or Scanivalve Technical Support.

DOWNLOAD

CalExpress can be downloaded from the Scanivalve website at no charge. Please visit:

www.scanivalve.com/support/software-downloads

Please use the link shown in Figure 2.1 to download CalExpress. Depending on the internet browser used, the browser should prompt to save or open the CalExpress folder. Save the folder in a known location that can be easily accessed. The download should begin automatically.

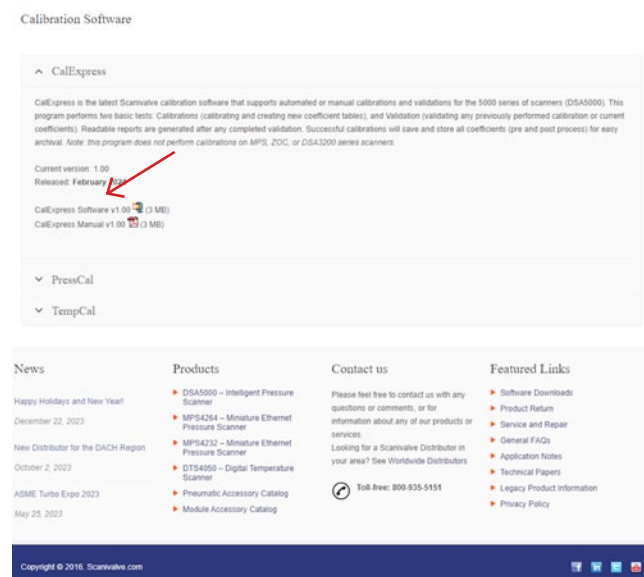


FIGURE 2.1 - SOFTWARE DOWNLOADS

If you are unable to download the installation files from the website, please contact Scanivalve Technical Support for an alternate method or a physical copy of the installation programs.

The installation files are contained in a compressed (.zip) folder that is titled CalExpressXXX.zip (where XXX is the software version). Unzip this folder to a temporary folder. The installation file will be titled as follows:

CalExpress Setup <firmwareversion>.exe

INSTALL

Once the files are unzipped, run the CalExpress Setup application. Follow the instructions as outlined by the setup wizard as shown in Figure 2.2.



FIGURE 2.2 - CALEXPRESS INSTALL WIZARD

During the install, a prompt with an installation type will be shown. For most users, the standard installation is the recommended installer.

Custom installations are not required unless specified by a Scanivalve representative.

Once the installation is successful, a shortcut will appear on the desktop and CalExpress will be ready for use. Click on the desktop shortcut to open CalExpress.

SECTION 3: OVERVIEW

CALEXPRESS HOME SCREEN

This section will provide a general overview of the CalExpress software interface. The CalExpress home screen is the first window that will appear when the application is started. This window is shown in Figure 3.1.

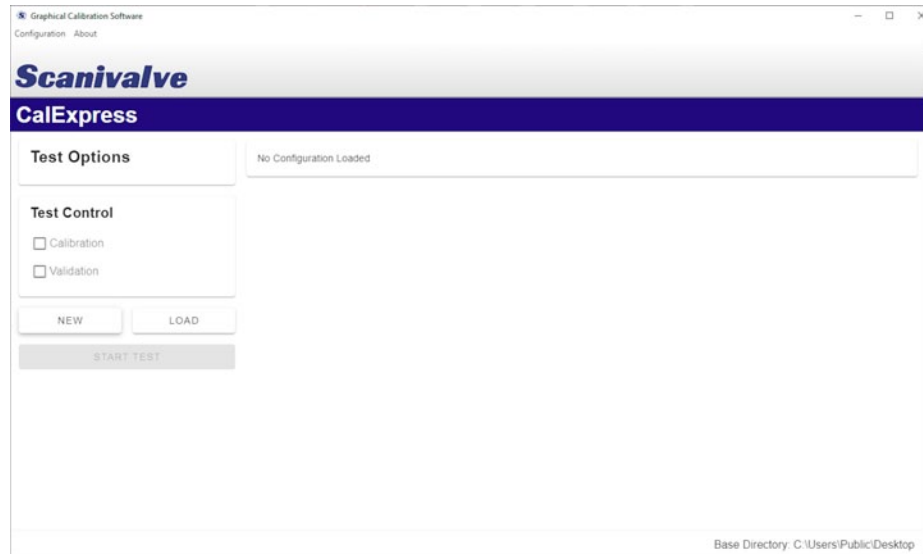


FIGURE 3.1 - CALEXPRESS HOME SCREEN

MENU BAR

Across the top of the window, the CalExpress home screen has two dialog menus in the menu bar.

The first is “Configuration.” The options in this dialog menu include:

New

This will open a new CalExpress configuration editor window. See information about the CalExpress configuration editor in the next sections.

Load Existing...

This will open a Windows Directory window to allow an existing CalExpress configuration file to be loaded into the program.

Set Base Directory

Click this to set the default directory folder that will create and store all reports, logs, and backup files. The Base Directory set in CalExpress will always be displayed in the bottom right corner of the home screen.

Note: The base directory should be set to a location that the user has read/write access. Windows commonly restricts programs from writing to some directories, such as the C:\ root. It is recommended that this directory is set to a folder on the desktop, or in the user’s local documents.

The second is “About.” There are currently no drop down options for About as this will open a new window to show information about the CalExpress software. This includes the current software version of the program.

MAIN WINDOW SECTIONS

There are four sections in the main area of the home screen.

Test Options

This section provides Process and Type options when a configuration file is loaded. When options are selected and a test is started, the program will use these selections to carry out the tests. The available options for the test will be determined based on the loaded configuration file. For example: If no configuration file is loaded, no options will be displayed. For example: if a configuration file does not contain calibrator, the only options provided will be Type > Manual and Process > Field.

Test Control

This section provides the option to choose which tests will run when a configuration file is loaded, the options are selected, and the test is started. The two options are Calibration and Validation. If a box is checked, this test is selected to be run the next time the test starts. If Calibration and Validation are both selected, Calibration will always run first, automatically followed by a validation.

Function Buttons

This section provides buttons to perform different duties.

New

This will open a new CalExpress configuration editor window. See information about the CalExpress configuration editor in the next sections.

Load

This will open a Windows Directory window to allow an existing CalExpress configuration file to be loaded into the program.

Edit

This button will only be shown when a configuration file is loaded into the program. When clicked, it will open the CalExpress configuration editor and populate with the current configuration file information. This allows the current configuration to be edited, saved, or applied.

Start Test

This will start all tests selected under the Test Control section. The following must be met in order to start a test:

- A configuration file is loaded
- At least one option is selected in Test Control
- An option for Type and Process have been selected in Test Options

Once a test has been started, the home screen will change to the running view until the test is completed.

Current Configuration Information

The larger of the area in the main window is the configuration information area. This area will display information about the current CalExpress configuration file that is loaded in the program. When no configuration file is loaded, it will be empty with the message that says “No Configuration Loaded”. When a configuration file is loaded, the area will be split into multiple tables to display configuration information. Each table will expand based on the amount of information for each section.

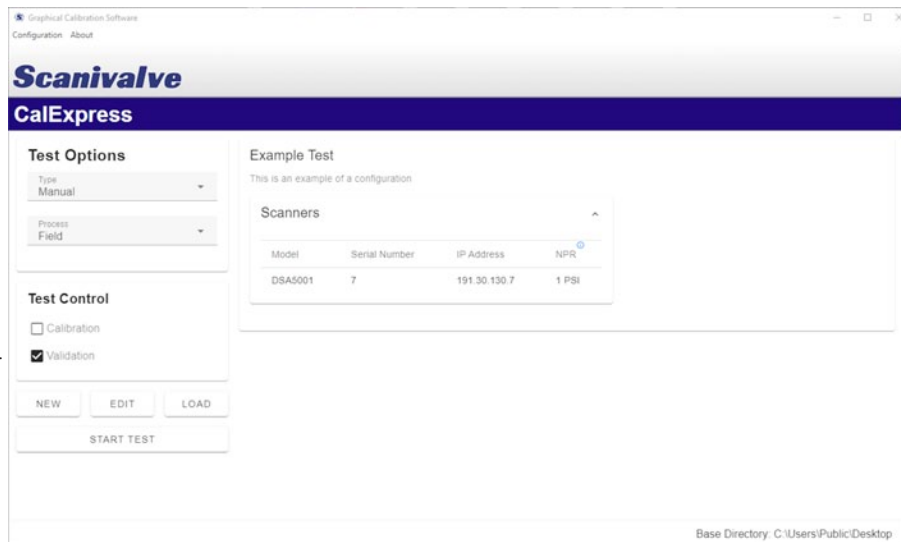


FIGURE 3.2 - CALEXPRESS MAIN WINDOW (POPULATED)

CALEXPRESS CONFIGURATION EDITOR

This section explains the Configuration Editor window that appears when “New” is selected from the CalExpress home screen (Menu Bar or Function button), as well as the “Edit” button (when applicable). The main configuration editor window is shown in figure 3.3.

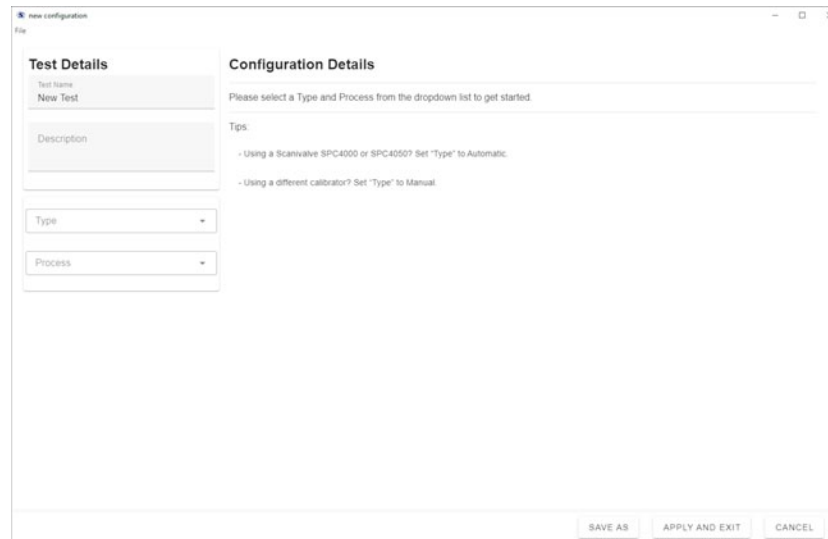


FIGURE 3.3 - CALEXPRESS MAIN CONFIGURATION EDITOR WINDOW

TEST DETAILS

Any time the editor is opened, the left side of the window will always display the Test Details column. This column includes:

Test Name

This field allows the configuration file to be named. This field is limited to 32 characters.

Test Description

This field allows for test description information about the configuration file. This information is not used anywhere in the tests, so it can be used for reference information. This field is limited to 2,000 characters.

Type Filter

A drop down box for test “Type” is available as a configuration filter. Manual and Automatic are the supported options.

Process Filter

A drop down box for test “Process” is available as a configuration filter. Field is the only supported option with CalExpress.

Type

Automatic

Process

Field

Calibrator

The following drop down lists will be displayed conditionally, based on the filters selected. Options available in these lists are dependent on user configured profiles (explained in the next section). If no configurations have been saved, no options will be provided.

Calibrator

Filter: Automatic Type Only

Vacuum

Filter: Automatic Type and Absolute Scanners

CONFIGURATION TABS

When the CalExpress Configuration Editor window is opened from a “New” selection, the configuration file will be blank. Because the editor is designed to create configuration files for a number of different tests, processes, and types, the Type and Process filters should be selected to bring up the applicable tabs to complete a configuration file.

Configuration Details

SCANNERS

CALIBRATORS

FIGURE 3.4 - CALEXPRESS CONFIGURATION TABS

After selecting a Type and Process filter, the following configuration tabs will be available across the top of the window, under “Configuration Details”. The following tabs may be available:

Scanners

When any test filter is applied, the Scanners configuration tab will be displayed. This section allows for the automatic or manual addition and configuration of any scanner(s) under test. This includes the IP address of scanner, number of points for a calibration or validation, nominal pressure range, and additional options. Scanner configurations are only saved in the configuration file created, if saved.

Calibrators

When the test filter for Type is set to Automatic, the calibrators configuration tab will be displayed. This section allows the entry of any Scanivalve SPC4000 series calibrators to be stored and used in any configuration file or test.

Vacuum (Optional Configuration)

This section allows for the entry of an Ethernet controllable vacuum pump used with absolute pressure scanners. The vacuum configuration tab will only be shown when an Absolute Scanner is configured in the Scanners tab. Vacuum pumps are typically used in conjunction with intelligent calibrators to moderate the use of the vacuum to apply sub-atmospheric pressures.

STORED CONFIGURATIONS

For all device configurations except Scanners:

Calibrator and Vacuum configurations can be added, removed, and stored persistently in CalExpress. This allows for all device information to be created and saved once. Once saved in CalExpress, any of these objects can easily be added to test configuration files as needed.

Adding, editing, or removing any configurations within these tabs will be explained in the next section.

LOADING DEVICE CONFIGURATIONS

When a configuration file is loaded, and elements of the configuration file are not currently stored in the CalExpress program (excluding Scanners), they can be populated and saved in the program by Editing the configuration file. When first entering the Configuration Window, CalExpress will display a prompt if any devices are found that are not currently saved in the program. The option to add the device will be presented.

Devices do not have to be saved or added into the program in order to run a configuration, as long as the device is saved in the configuration file.

CONFIGURATION SAVE AND APPLY

The bottom of the configuration window will provide four options: Save, Save As, Apply and Exit, and Cancel. Any time a change has been made, the option to save will be available (will save over a previous configuration or save a new file). Save As can be used to save the current configuration to a new or different file. If a configuration is created, Apply and Exit will apply or load the configuration into the main window to run. If the file has not been saved, a prompt will appear to ask if the configuration must be saved. Saving configurations is encouraged, but can be applied and run without saving.

SCANNER CONFIGURATION

When the “Scanners” configuration tab is selected, fields and options will be provided to add, edit, or remove scanners under test to the configuration file. Scanners can be added manually or automatically. Adding scanners automatically is recommended. The Scanners tab has two main sections: Add a New Scanner, and Added Scanners.

The screenshot shows the 'Configuration Details' window with the 'SCANNERS' tab selected. Below the tab header, there is a section titled 'Add a New Scanner:' containing a text input field labeled 'Scanner IP Address'. At the bottom of this section are two buttons: 'CONNECT AND ADD SCANNER' and 'ADD SCANNER MANUALLY'. The 'CALIBRATORS' tab is also visible but not selected.

FIGURE 3.5 - CALEXPRESS CONFIGURATION TABS

Add a New Scanner

This section presents an IP address field, and two buttons to add the scanner - automatically or manually. To use either of the functions, enter a valid IP address into the Scanner IP Address field. While adding scanners automatically is the recommendation, the manual process can be used to create configuration files if the scanner is not available. Once an IP address is entered in the field, both functions will be available:

Connect and Add Scanner

When this button is pressed, CalExpress will automatically attempt an Ethernet connection to the IP address entered. If successful, it will return details from the scanner to automatically populate fields and present a new dialog box to confirm the scanner information.

If type “Automatic” is selected, an additional field will be presented that must be filled in: Calibrator Range Id. This is the calibrator’s address ID that is used to identify the different transducers that can be installed in the SPC4000 series calibrators.

If the scanner is found to be an absolute scanner, an additional field will be presented that must be filled in: Minimum Pressure. This is the lowest possible, stable absolute pressure (in PSIA) that can be maintained during the test. Scanivalve typically uses 2PSIA as it is the lowest, stable pressure that can be maintained during tests. If no vacuum pressure is available, use the current barometric pressure.

The screenshot shows a 'Connected' dialog box. It contains a table of 'Scanner Details' with the following information: Model: DSA5001, Serial Number: 7, IP Address: 191.30.130.7, and Nominal Pressure(s): 1 psi. Below the table is a prompt: 'Please Select the Calibrator Range Id(s) for this scanner'. A dropdown menu shows the value '1'. At the bottom right are 'SAVE' and 'CANCEL' buttons.

Add Scanner Manually

When this button is pressed, new fields will be presented to complete the addition of the scanner into the configuration file. These fields are:

Model - This is the exact model of the scanner. This can be found on an identifying label on the scanner itself, or by connecting to the scanner and issuing the MODEL command. For Example: DSA5001

Note: the generic ‘DSA5000’ cannot be used. It may not create the correct options for your scanner.

Serial Number - This is the serial number for the scanner. This can be found on an identifying label on the scanner itself, or by connecting to the scanner and issuing the SN command. For Example: 1234

IP Address - This the IP address of the scanner.

NPR - This is the nominal pressure range of the scanner, or the calibrated full-scale range. This can be found on an identifying label on the scanner itself, or by connecting to the scanner and issuing the NPR command. Only the positive NPR value is needed. If entered manually, this must match the range of the scanner and it cannot be adjusted or changed to achieved a different calibrated range.

For dual-range units, two NPR fields are provided; first NPR field for channels 1-8, and second NPR field for channels 9-16. Typically, the first 8 channels are the lower pressure.

Min Pressure (Absolute Scanners Only) - When an absolute scanner model number is detected, this field will be shown. This is used to define the lowest possible, stable pressure (in PSIA) that can be maintained during the test.

Generally with SPC4000 calibrators and vacuum pumps, 2PSIA is the lowest stable pressure achievable, and is acceptable for most tests. In the event that no vacuum pressure is possible, use the current barometric pressure.

Calibrator Range Id (Automatic Only) - this is the calibrator's address ID that is used to identify the different transducers that can be installed in the SPC4000 series calibrators. Two fields will be presented for dual-range scanners (one for each range). Two different pressure ranges cannot share the same transducer address.

Added Scanners

This section displays a table of all added scanners in the configuration file. It will show the basic information (Model, Serial Number, IP address, NPR, and Calibrator Range Id if Automatic type). It will also provide a edit button and a delete button for each scanner that is in the table.

Added Scanners:



Model	Serial Number	IP Address	NPR ^①	Calibrator Range Id		
DSA5001	7	191.30.130.7	1 PSI	1		

FIGURE 3.6 - ADDED SCANNERS TABLE

Edit (pencil icon)

When this button is pressed, a dialog box will appear to allow the edit of the scanner information such as Model, Serial Number and IP address.

An additional "Port Range" drop down will be provided. This includes the ability to edit port information for the range of the scanner, including NPR (nominal pressure range), Minimum Pressure (Absolute Scanners only) and the Calibrator Range ID (for automatic type only). Additional configuration options are also included for:

- Positive Points Only - This option configures the test to only use points that are between zero and positive full-scale range for differential scanners. No negative values will be included in the test processes.
- Number of Calibration Pressure Points - This is how many points will be used during a calibration test. The points are evenly distributed between minimum full-scale pressure and maximum full-scale pressure*, plus 10%, and including a zero point. 9 is the default value and recommendation. 5 is the minimum number of recommended points, and it should not exceed 9.
- Number of Validation Pressure Points - This is how many points will be used during a validation test. The points are evenly distributed between minimum and maximum full-scale pressure*, and including a zero point. 9 is the default value and recommendation. 5 is the minimum number of recommended points, and it should not exceed 15.

Edit Scanner

Connection Settings

Model

Serial Number

IP Address

Port Range

☐ Only use positive points

Nominal Pressure

100

psi

Calibrator Range Id

4

Number of Calibration Pressure Points

9

Number of Validation Pressure Points

9

ADD

CANCEL

* Nominal full-scale range for all Differential scanners (PSID) will be ±NPR up to 15PSI. All scanners with an NPR greater than 15PSI will be negative 15PSI to positive NPR. For all absolute scanners (PSIA), a prompt will be provided for the lowest calibrated pressure (in PSIA). The DSA5000 will extrapolate in order to measure down to OPSIA.

Delete (trash bin icon)

This button is used to remove an added scanner from the configuration.

OTHER CONFIGURATIONS

Configurations for Calibrators and Vacuums will be dynamically exposed depending on the filters selected. Each device type will have a configuration tab shown at the top of the Configuration Details area. All configured devices in these tabs will be stored permanently in the program and can be edited or deleted at any time.

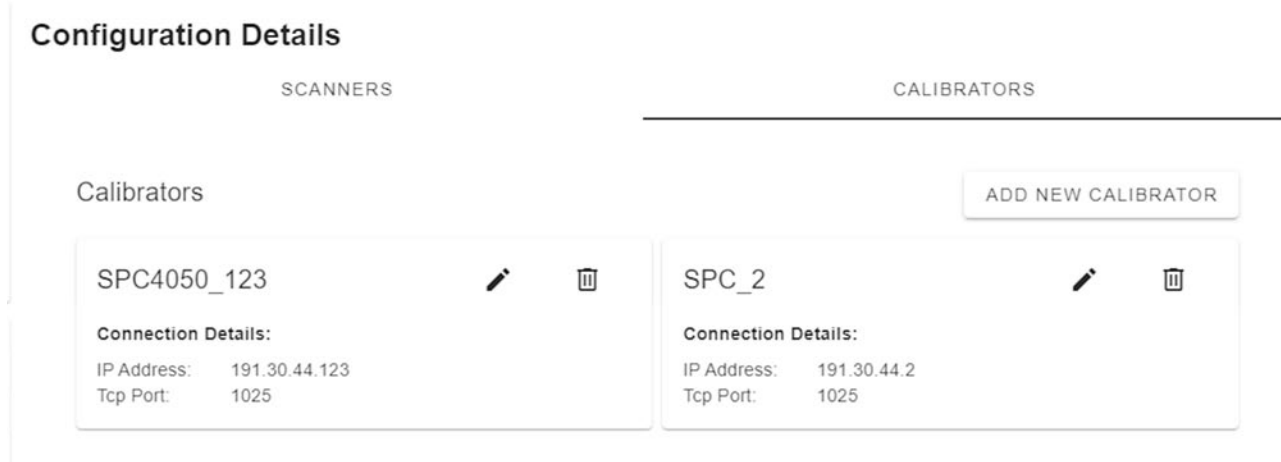


FIGURE 3.7 - CONFIGURATION TABS AND CARDS

When a tab is selected, the device type configuration area will appear. This area includes a section for pre-configured devices, as well as a button to add a new device. Pre-configured devices will show up as “cards” with most details about the device. Each configured device’s card will also provide an edit and delete button. Each device type will have different required fields. The “Add New” button and the edit button will both generate a new dialog box with all required fields for the specific device type.

Calibrator Device Fields

Filter: Automatic Type Only

Calibrators can be added by clicking “Add New Calibrator” on the Calibrators Tab, and entering in the fields provided in the new dialog window. Calibrators stored here must meet the Equipment Requirements for Automatic Types in Section 1.

Name - This is a user definable name for the calibrator. It is best to keep this short, but unique as it is used to reference the calibrator during the test.

IP Address - This is the IP address of the calibrator. Typically, SPC4000 series calibrators use a static IP address in the subnet of 191.30.44.xxx, where xxx is the last three digits of the serial number. However, SPC4000 series calibrators can have their IP address changed in the field. Please refer to the IP address in the SPC.

Tcp Port - This is the Tcp port of the calibrator. Typically, SPC4000 series calibrators used 1025 as the port, however this can be changed in the field. Please refer to the Tcp port set in the SPC.

Vacuum Device Fields

Filter: Automatic Type and Absolute Scanners

Vacuums can be added by clicking “Add New Vacuum” on the Vacuums tab, and entering in the fields provided in the new dialog window.

Name - This is a user definable name for the vacuum. It is best to keep this short, but unique, as it is used to reference the temperature profile.

Dwell Time - This is the dwell time, in seconds, that CalExpress waits after turning on or off the vacuum pump to allow time for the pump to start.

Connection Details - This section provides the TCP/IP Ethernet information to communicate with the vacuum pump, or device used to turn the pump on and off. Enter the IP address and the TCP port of the device.

Vacuum Commands - This section provides fields to enter the Start (ON) and Stop (OFF) for the vacuum pump or controller device. Start must be used to turn the vacuum pump on, while Stop must be used to turn the vacuum pump off. All commands are terminated with a carriage return (<CR> or \r)

Note: The vacuum profiles for automatic use are optional.

CALEXPRESS RUNNING VIEW WINDOW

This section explains the layout and information provided in the CalExpress Running View window. The running view window is only displayed when a test is actively being performed. The only user input required in this window is if a Manual Type test is running.

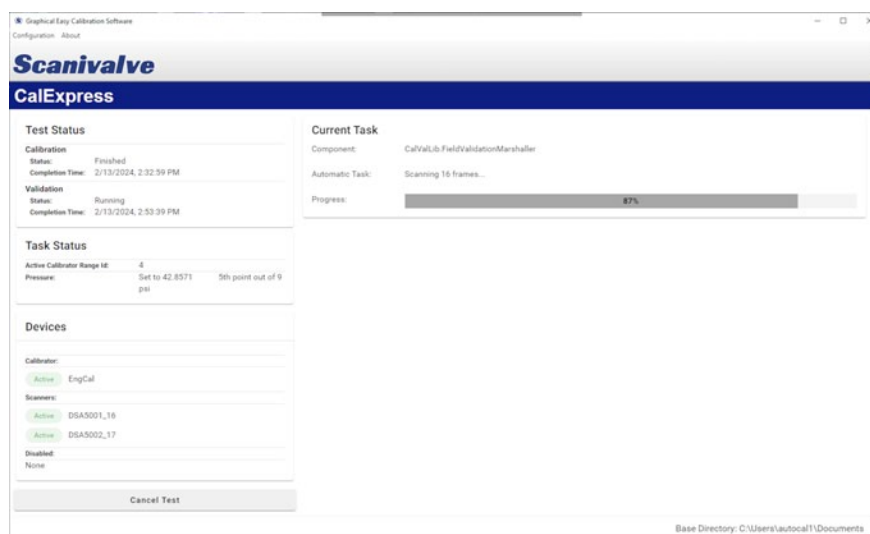


FIGURE 3.8 - RUNNING WINDOW - AUTOMATIC VIEW

There are four sections in the running view window, each with individual components to provide information on the test that is currently running.

Test Status

This section provides information on the current tests. Each test that was selected will appear in this area and provide the current status (Running, Not Running, or Finished) as well as the anticipated time of completion. Note that the estimated time of completion is only available for Automatic types.

Task Status

This section provides information on the current step in the process. This section will provide the current active calibrator range (for Automatic types only), as well as the current pressure point, as well as which point the current i.e., 5 out of 9 points.

Note: Task Status and Test Status will combined for any Manual test. Not all details will be available.

Devices

This section provides status information on all devices configured for the test. This includes scanners, calibrators, and thermal chambers.

When the device has a green “Active” label, CalExpress is currently connected to the device and the device is in use or is currently part of the current task.

When the device has a grey “Inactive” label, CalExpress is not connected to the device, but the device is ready and waiting.

The bottom part of the device section is for “Disabled” devices. Devices will enter the disabled section only if there is a communication error, the devices does not respond to CalExpress requests, or some other unknown error. This will allow CalExpress to continue, if possible, and ignore this device.

Current Task

This section provides information on the current task being run. It will provide the current component (used primarily for information or debug), the current automated task (if the test is Automatic), and a progress bar. Figure 3.8 shows an example of an automated test being performed. No user input is required.

If a Manual test is being performed, all prompts to continue through the test will be displayed here with instructions, fields, and buttons. This includes what pressures to apply, to what scanners the pressure should be applied to, when the vent pressure, and when to continue to the next step. Figure 3.9 shows an example of a manual running view.

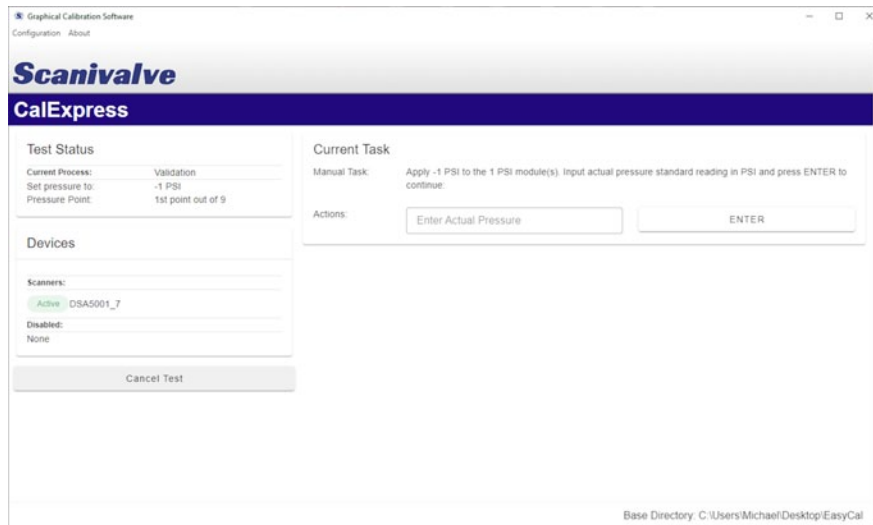


FIGURE 3.9 - RUNNING WINDOW - MANUAL VIEW

SECTION 4: OPERATION

This section explains general operation and proper use of the CalExpress software. Automatic and Manual Field Tests will be used as examples, as well as first time setup.

FIRST TIME SETUP

This procedure will provide steps to setting up CalExpress for the first time.

1. Open CalExpress, click "Configuration" in the menu bar, followed by "Set Base Directory."

Select a folder for CalExpress folders and files to be created and stored.

If you do not own a SPC4000 calibrator or the full version of CalExpress, skip the rest of this procedure and proceed to Manual Field Test Configuration.

2. If utilizing a SPC4000 calibrator, and/or are using the Full version of CalExpress, Click "New" to open a new configuration editor.

3. Depending on the installation version of CalExpress, select the filters that apply to the calibration setup.

If utilizing a SPC4000 series calibrator, set Type to Automatic.

If using the Full version of CalExpress, set Process to Full. Otherwise, select Field.

4. Select the Calibrators tab at the top of the configuration window. Click the "Add a Calibrator" button to open the configuration dialog box.

Enter the required fields for the SPC4000 series calibrator and then click add. This can be repeated for each SPC4000 that may be in use. Please refer to "Calibrator Device Fields" in Section 3 for more information.

Continue to Automatic Field Test Configuration for next steps.

AUTOMATIC FIELD TEST CONFIGURATION

This procedure will provide an example for configuring an Automatic Field Test. All equipment and scanners under test must meet the requirements in Section 1 prior to this procedure, in accordance with the Automatic process and Field type selections. It is required that the First Time Setup procedure was performed prior to this procedure.

1. Ensure that all scanners that will be used under test are powered on and ready, physically connected to the same network as the host computer, and are not connected to the Telnet connection (ScanTel, puTTY, etc).
2. With the CalExpress program open, click “New” to open a new configuration editor.
3. Enter the name of the test configuration and the description into the fields under Test Details.
4. Select “Automatic” under the Type drop-down, and “Field” under the Process drop-down. The Scanners and Calibrators tabs will be available.
5. The Scanners tab will be selected by default. Enter in the IP address of the scanner under test (i.e., DSA5000) into the “Scanner IP Address” field and then click the “Connect and Add Scanner” button.

CalExpress will attempt a connection to the entered IP address. If successful, a new dialog box will appear to confirm the details of the scanner entered. It will also prompt to select the Calibrator Range ID for this scanner. Select the SPC Calibrator Address that has the applicable transducer installed for the pressure range.

Repeat this step for all scanners under test. If multiple pressure ranges are under test, the Calibrator Address ID must be different for each pressure range (but scanners with the same range may use the same address).

6. Under Test Details, use the Calibrator drop-down to select the Calibrator that will be used in the test. If no calibrators appear, one must be configured in the Calibrators tab.
7. Once completed, click the “Save As” button at the bottom of the configuration window. This will prompt a Windows dialog box to save the configuration file. Name and save the file for future use.
8. Click “Apply and Exit” button at the bottom of the configuration window. The configuration created will now be loaded into the main program and details shown in the

Current Configuration area.

9. Under Test Options, ensure that “Automatic” is set under the Type drop-down, and “Field” under the Process drop-down. If this is not correct, please set these options.

10. Under Test Control, select the tests that must be performed. If a calibration is to be performed, Calibration and Validation should be selected. If only a validation is needed, only select Validation.

For first time users, running a validation only will validate the test setup and configuration. You should get believable results without program errors, issues, or poor scanner response.

11. Review all settings and configurations and confirm that all details are correct. Once verified, click the Start Test button.

CalExpress will now carry out the selected test(s). Because this is an automatic type, no user interaction is required until the end of the process. Details about the test will be displayed in the running window.

12. Any time a Validation is performed, the process will end with a Validation Summary window to show the results of the validation. This is a quick overview of the validation, and not the complete report.

If a calibration was performed, the option to save the calibration coefficients will be given. A check box is provided for each configured Scanner. Select the scanners to save the results and then click the button to Save and Exit.

This save will only save the coefficients into permanent memory in the scanner. All data from the test is automatically saved and stored in the base directory.

13. Navigate to the Set Base Directory (displayed in the bottom right corner of the Main Window), and locate the time-stamped folder created for the previous process.

Open the folder to find validation reports, the coefficients for each scanner, backup files and logs for the test(s).

These files can be archived if needed.

MANUAL FIELD TEST CONFIGURATION

This procedure will provide an example for configuring a Manual Field Test. All equipment and scanners under test must meet the requirements in Section 1 prior to this procedure, in accordance with the Field type selections. It is required that the First Time Setup procedure was performed prior to this procedure.

1. Ensure that all scanners that will be used under test are powered on and ready, physically connected to the same network as the host computer, and are not connected to the Telnet connection (ScanTel, puTTY, etc).
2. With the CalExpress program open, click "New" to open a new configuration editor.
3. Enter the name of the test configuration and the description into the fields under Test Details.
4. Select "Manual" under the Type drop-down, and "Field" under the Process drop-down. The Scanners tab will be available.
5. The Scanners tab will be selected by default. Enter in the IP address of the scanner under test (i.e., DSA5000) into the "Scanner IP Address" field and then click the "Connect and Add Scanner" button.

CalExpress will attempt a connection to the entered IP address. If successful, a new dialog box will appear to confirm the details of the scanner entered. Repeat this step for all scanners under test.

6. Once completed, click the "Save As" button at the bottom of the configuration window. This will prompt a Windows dialog box to save the configuration file. Name and save the file for future use.
7. Click "Apply and Exit" button at the bottom of the configuration window. The configuration created will now be loaded into the main program and details shown in the Current Configuration area.
8. Under Test Options, ensure that "Manual" is set under the Type drop-down, and "Field" under the Process drop-down. If this is not correct, please set these options.
9. Under Test Control, select the tests that must be performed. If a calibration is to be performed, Calibration and Validation should be selected. If only a validation is needed, select Validation only.

For first time users, running a validation only will validate

the test setup and configuration. You should get believable results without program errors, issues, or poor scanner response.

10. Review all settings and configurations and confirm that all details are correct. Once verified, click the Start Test button.

CalExpress will now carry out the selected test(s) and the running window will now be displayed with information about the test.

11. Many parts of the tests in a Manual type will be automatic, however the application of pressure and entry of the applied pressure must be performed manually.

CalExpress will prompt the user with all required steps.

12. The first step in any process will be to vent all pressures that may be applied to the scanner(s). This does not include control pressure. CalExpress must ensure that the scanner(s) at the start of any test are vented to atmosphere and at a "zero" pressure.

13. As CalExpress progresses, prompts to apply pressure will be provided. CalExpress will always start with the lowest pressure point (typically negative for differential, sub-atmospheric for absolute, or zero for positive points only) and work up to the highest positive point.

The prompts will instruct on what pressure to apply, whether that pressure should be negative or positive, a field to enter in the applied pressure reading, and a button to submit. The pressure application prompt will also instruct on which pressure range scanners to apply the known pressure to.

Apply the pressure instructed to the scanner(s) that are provided.

Important: CalExpress assumes that when there are multiple scanners of the same pressure range, pressure will be applied to all similar scanners at the same time. If this is not true, tests should be configured to run each scanner separately.

Helpful tips:

When instructed to apply negative pressure on differential pressure scanners, it is typical to apply a positive pressure to the REF port on differential scanners. A positive pressure applied to the REF port will register as a negative pressure. This does not require a vacuum pump.

Enter all pressure values in PSI with the most resolution possible (max 6 decimals). This will ensure the best results.

If using an absolute calibrator to calibrate differential modules, calculate the pressure as PSID before entering values in the field. For example; if asked to apply -2PSI and barometric pressure is 13.7PSIA, command the calibrator to apply 11.7PSIA (connected to the CAL port) and wait for stable. Once stable, enter in the difference between barometric pressure and the read stable pressure (approximately -2PSI).

These steps will be repeated for each scanner range, and for each test.

14. Any time a Validation is performed, the process will end with a Validation Summary window to show the results of the validation. This is a quick overview of the validation, and not the complete report.

If a calibration was performed, the option to save the calibration coefficients will be given. A check box is provided for each configured Scanner. Select the scanners to save the results and then click the button to Save and Exit.

This save will only save the coefficients into permanent memory in the scanner. All data from the test is automatically saved and stored in the base directory.

13. Navigate to the Set Base Directory (displayed in the bottom right corner of the Main Window), and locate the time-stamped folder created for the previous process.

Open the folder to find validation reports, the coefficients for each scanner, backup files and logs for the test(s).

These files can be archived if needed.

APPENDIX

APPENDIX A: OUTPUT FILE DESCRIPTIONS

Any time a test process is started, CalExpress will generate a new folder in the base directory. This name of the folder will be a time stamp, correlated to the date and time the process was started. This folder houses all files that are generated automatically by CalExpress.

The time stamped folder will auto-create two sub folders: **As Received** and **Log**.

The **As Received** folder will contain the original files from any scanners that were configured in the test. These files are the means for CalExpress, or for the user, to restore settings in the scanners to the pre-test settings, if required.

The **Log** folder will contain log files that CalExpress uses to store information about the test. These files may include a running log of the program's output, the configuration file used in the process, and/or complex validation information used to generate reports. These files can be reviewed in the event that a test or process was unsuccessful.

Any time a Calibration is performed, the following files may be generated (one for each scanner in the process):

Cal_<serialnumber>.cfg

The 'Cal' file generated is the full coefficient table for the scanner. The filename will contain the unique serial number of the scanner. The file is formatted so that it could be uploaded to the scanner without any modification. It is recommended that this file is archived for backup and tracking purposes.

Fc_<serialnumber>.cfg

The 'Fc' file generated is the field calibration coefficients for the scanner. The filename will contain the unique serial number of the scanner. The file is formatted so that it could be uploaded to the scanner without any modification. It is recommended that this file is archived for backup and tracking purposes.

Any time a Validation is performed, the following files may be generated (one for each scanner in the process):

Val_<serialnumber>.csv

The 'Val' file generated is the validation report. The filename will contain the unique serial number of the scanner. It is formatted in CSV, or Comma-Separated Values, for the file to be opened by any table processing software such as Microsoft® Excel®. The file will contain date and time information, scanner information, along with all applied pressures, read pressures, errors, and pass/fail information for each channel/pressure applied.

In the event that a test generates unexpected or failing results and technical support is needed, please compress the full time-stamped folder with all included files, along with the configuration file used, into a compressed folder (.zip or similar) and provide this to a Scanivalve technical support representative.

APPENDIX B: SOFTWARE CHANGE LOG

Version 1.00 - Initial Release - February 2024

Scanivalve

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**CALEXPRESS MANUAL
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