INSTRON®

Bluehill Universal Test Method Development Training

Training Manual M18-17146-EN Revision C

The difference is measurable®

Electromagnetic Compatibility

Where applicable, this equipment is designed to comply with International Electromagnetic Compatibility (EMC) standards. To ensure reproduction of this EMC performance, connect this equipment to a low impedance ground connection. Typical suitable connections are a ground spike or the steel frame of a building

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Trademarks

Original Instructions

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General Safety Precautions

Materials testing systems are potentially hazardous.

Materials testing involves inherent hazards from high forces, rapid motions, and stored energy. You must be aware of all moving and operating components that are potentially hazardous, particularly force actuators or a moving crosshead.

Before operating the system, ensure you gain a thorough understanding of the equipment by:

- receiving training on the safe operation of the system.
- reading and understanding the general hazards associated with materials testing systems as detailed on the following pages.
- carefully reading all relevant manuals and observing all Warnings and Cautions. The term Warning is used where a hazard may lead to injury or death. The term Caution is used where a hazard may lead to damage to equipment or to loss of data.
- carrying out your own safety risk assessment on the use of the test system, test methods employed, specimen loading and specimen behavior at failure.

Instron products, to the best of its knowledge, comply with various national and international safety standards, in as much as they apply to materials and structural testing. We certify that our products comply with all relevant EU directives (CE mark).

Because of the wide range of applications with which our instruments are used, and over which we have no control, additional protection devices and operating procedures may be necessary due to specific accident prevention regulations, safety regulations, further EEA directives or locally valid regulations. The extent of our delivery regarding protective devices is defined in your initial sales quotation. We are thus free of liability in this respect.

At your request, we will gladly provide advice and quotations for additional safety devices such as protective shielding, warning signs or methods of restricting access to the equipment.

Warnings

Crush Hazard - Allow only one person to handle or operate the system at all times.

Operator injury may result if more than one person operates the system. Before working inside the hazard area between the grips or fixtures, ensure that no other personnel can operate the computer or any of the system controls.

Crush Hazard - Take care when installing or removing a specimen, assembly, structure, or load string component.

Installation or removal of a specimen, assembly, structure, or load string component involves working inside the hazard area between the grips or fixtures. Keep clear of the jaws of a grip or fixture at all times. Keep clear of the hazard area between the grips or fixtures during actuator or crosshead movement. Ensure that all actuator or crosshead movements necessary for installation or removal are slow and, where possible, at a low force setting.

Hazard - Press the Emergency Stop button whenever you consider that an unsafe condition exists.

The Emergency Stop button removes hydraulic power or electrical drive from the testing system and brings the hazardous elements of the system to a stop as quickly as possible. It does not isolate the system from electrical power, other means are provided to disconnect the electrical supply. Whenever you consider that safety may be compromised, stop the test using the Emergency Stop button. Investigate and resolve the situation that caused the use of the Emergency Stop button before you reset it.

Flying Debris Hazard - Wear eye protection and use protective shields or screens whenever any possibility exists of a hazard from the failure of a specimen, assembly or structure under test.

Wear eye protection and use protective shields or screens whenever a risk of injury to operators and observers exists from the failure of a test specimen, assembly or structure, particularly where explosive disintegration may occur. Due to the wide range of specimen materials, assemblies or structures that may be tested, any hazard resulting from the failure of a test specimen, assembly or structure is entirely the responsibility of the owner and the user of the equipment.

Hazard - Set appropriate limits before running waveforms, tests or loop tuning.

Operational limits are included within your testing system to suspend motion or shut off the system when upper and/or lower bounds of actuator or crosshead travel, or force or strain, are reached during testing. Correct setting of operational limits by the operator, prior to testing, will reduce the risk of damage to test article and system and associated hazard to the operator.

Warnings

Flying Debris Hazard - Make sure that test specimens are installed correctly in grips or fixtures in order to eliminate stresses that can cause breakage of grip jaws or fixture components.

Incorrect installation of test specimens creates stresses in grip jaws or fixture components that can result in breakage of these components. The high energies involved can cause the broken parts to be projected forcefully some distance from the test area. Install specimens in the center of the grip jaws in line with the load path. Insert specimens into the jaws by at least the amount recommended in your grip documentation. This amount can vary between 66% to 100% insertion depths; refer to supplied instructions for your specific grips. Use any centering and alignment devices provided.

Hazard - Protect electrical cables from damage and inadvertent disconnection.

The loss of controlling and feedback signals that can result from a disconnected or damaged cable causes an open loop condition that may drive the actuator or crosshead rapidly to its extremes of motion. Protect all electrical cables, particularly transducer cables, from damage. Never route cables across the floor without protection, nor suspend cables overhead under excessive strain. Use padding to avoid chafing where cables are routed around corners or through wall openings.

High/Low Temperature Hazard - Wear protective clothing when handling equipment at extremes of temperature.

Materials testing is often carried out at non-ambient temperatures using ovens, furnaces or cryogenic chambers. Extreme temperature means an operating temperature exceeding 60 °C (140 °F) or below 0 °C (32 °F). You must use protective clothing, such as gloves, when handling equipment at these temperatures. Display a warning notice concerning low or high temperature operation whenever temperature control equipment is in use. You should note that the hazard from extreme temperature can extend beyond the immediate area of the test.

Hazard - Do not place a testing system off-line from computer control without first ensuring that no actuator or crosshead movement will occur upon transfer to manual control.

The actuator or crosshead will immediately respond to manual control settings when the system is placed off-line from computer control. Before transferring to manual control, make sure that the control settings are such that unexpected actuator or crosshead movement cannot occur.

Warnings

Electrical Hazard - Disconnect the electrical power supply before removing the covers to electrical equipment.

Disconnect equipment from the electrical power supply before removing any electrical safety covers or replacing fuses. Do not reconnect the power source while the covers are removed. Refit covers as soon as possible. Ensure any fluids used during testing are suitably contained.

Rotating Machinery Hazard - Disconnect power supplies before removing the covers to rotating machinery.

Disconnect equipment from all power supplies before removing any cover which gives access to rotating machinery. Do not reconnect any power supply while the covers are removed unless you are specifically instructed to do so in the manual. If the equipment needs to be operated to perform maintenance tasks with the covers removed, ensure that all loose clothing, long hair, etc. is tied back. Refit covers as soon as possible.

Hazard - Shut off the supply of compressed gas and discharge residual gas pressure before you disconnect any compressed gas coupling.

Do not release gas connections without first disconnecting the gas supply and discharging any residual pressure to zero.

Hazard - Shut down the hydraulic power supply and discharge hydraulic pressure before disconnection of any hydraulic fluid coupling.

Do not disconnect any hydraulic coupling without first shutting down the hydraulic power supply and discharging stored pressure to zero. Tie down or otherwise secure all pressurized hoses to prevent movement during system operation and to prevent the hose from whipping about in the event of a rupture.

Hazard - Ensure components of the load string are correctly pre-loaded to minimize the risk of fatigue failure.

Dynamic systems, especially where force reverses through zero are occurring, are at risk of fatigue cracks developing if components of the load string are not correctly pre-loaded to one another. Apply the specified torque to all load string fasteners and the correct setting to wedge washers or spiral washers. Visually inspect highly stressed components such as grips and threaded adapters prior to every fatigue test for signs of wear or fatigue damage.

Table of Contents

Chapter 1
Introduction

Purpose

This manual provides an introduction to developing test methods for use with any Bluehill Universal based system. It is an overview and guide for building test methods for typical applications. It does not cover every available system feature; however, this manual covers the essentials necessary to run tests and generate results. Each chapter points out actions that should be completed or at least considered when building test methods for material testing needs.

This manual is intended as an initial learning tool that shows examples of how Test Methods are created and tests are run on Bluehill Universal systems. In many cases, there are different ways to obtain the required test results using an Instron system. Additional training is generally required to gain a deeper understanding of, and use all of the features and options of the system in an efficient manner or to be aware of other procedures that can meet the specific needs of the user.

To be fully trained to operate Instron systems, including all Bluehill Universal features, it is highly recommended that all users attend formal customer training classes. Formal customer classes are scheduled at Instron Training Centers, at local events, and online. Bluehill Universal courses can also be conducted On-Site. For scheduling and more information on formal customer training, contact:

Instron Training Center
825 University Avenue
Norwood, MA. 02062
Tel 800.473.7838 or www.instron.com

On-Site Test Method Development Training for Bluehill Universal

This manual focuses on Bluehill Universal software familiarization training and supports the development of test methods for user applications.

Objective: Provide training to develop up to 5 test methods in support of user applications. Up to three personnel shall be trained in the development of these test methods within Bluehill Universal software. This service shall be delivered over an approximate 8 hour period.

Software Usage

Instron's Bluehill Universal software was developed to run on an array of Instron testing instruments. These systems can perform a variety of Tensile (pull), Compression (push), Flex (bend), Cyclic, Creep, and Relaxation type test. Each system requires a computer and uses the software to control and monitor tests, collect data, analyze, and calculate results, produce graphs, and generate reports required by the user. The following is a list of some of the frames the software will run on:

- 6800 Series Electromechanical (EM) Test Instruments
- 3400 Series Electromechanical (EM) Test Instruments
- 5900 Series Electromechanical (EM) Test Instruments
- 3300/EMIC 2300 Series Electromechanical (EM) Test Instruments
- 5500 Series Electromechanical (EM) Test Instruments
- 5500A Series Electromechanical (EM) Test Instruments
- 8800 Series Servo-hydraulic Test Instruments
- ElectroPuls Series Electrical Dynamic Test Instruments
- IPG Series Static Hydraulic Test Instruments:
    - LX
    - DX
    - HDX
    - KPX

These systems operate by executing user defined Test Methods to perform a variety of testing applications. Generally, any Bluehill Universal test method can run on any Bluehill Universal controlled test instrument, provided the required options are installed and the method does not contain any parameters that exceed the restrictions and capabilities of the specific test instrument being used.

Outline for Customer Application Development

Suggested times are approximate and should be used as a guide only. Training should last 8 hours.

1. Test Instrument Overview

- ☐ – Load Frame
- ☐ – System Documentation
- ☐ – Software Control Console
- ☐ – Bluehill Universal Software Application Packages

2. Instron Connect Overview

- ☐ – Submit request/Upload files/Request verifications
- ☐ – Message center
- ☐ – Remote access
- ☐ – Software update download

3. Defining Customer Applications (up to 5 applications) [1.0 hr.]

- ☐ – Review Test Method Types required to perform tasks
- ☐ – Required Hardware Considerations
- ☐ – Required Software Considerations
- ☐ – Identify Measurements or Results required by customer
- ☐ – Determine Information Customer Wants on Reports

4. Setting the Console for Application Needs [0.5 hr.]

- ☐ – Bluehill Screen Overview
- ☐ – Units Selections
- ☐ – Calibration of Transducers for Application
- ☐ – Setting Software Limits
- ☐ – Setting Gauge Length

5. Creating Test Method for the 1st Application [1.5 hr.]

☐ – Select New Method Type (Tensile, Compression, Flex etc.) necessary for Application or select approximate ISO or ASTM method.

- Determine method of control required for test
- Ensure expected results calculation are available in the method

☐ – Setting General Parameters

- Method- Units and Description

☐ – Setting Sample Parameters

- Notes
- Number Inputs
- Text Inputs
- Choice Inputs
- Date Inputs

☐ – Setting Specimen Parameters

- Properties-
- Geometry
- Notes
- Number Inputs
- Text Inputs
- Choice Inputs

☐ – Setting Measurements

- Physical
- Virtual
- Corrected Position

☐ – Setting Calculations and Rules

- Calculation Setup
- Rounding

☐ – Setting Test Control Parameters

- Start - Start Method
- Strain - Extensometer Removal Criteria
- Pre Test - Preload, Autobalance and Precycling
- Test - Defining Ramp(s) and Rate(s)
- End of Test - Criteria and Action
- Data - Data Acquisition Scheme

☐ – Setting the Console Parameters

- Live Displays - Number and Measurements/Results
- Soft Keys - Assigning Functions
- Frame - Setting the Test Area and Specimen Protect
- Grips - Control Parameters

☐ – Setting the Workspace Parameters

- Operator Inputs- Input Data
- Results 1/2 - Column/Statistics/Format
- Graph 1/2 - Type/X & Y Data/ Advanced
- Raw Data - Columns/Format
- Pass/Fail

☐ – Setting the Export Parameters

- File Settings - Defining Location
- Reports - Additional Files to Create/E-mail
- Export Results - Creating CSV Files
- Exporting Raw Data - Creating CSV Files
- Method Parameters Table - Creating a Custom Table for Reports

☐ – Setting Test Prompt Parameters

☐ Prompt Sequence - Applicable to Prompted Test

6.Testing the 1st Method [.5 hr.]

☐ – Calibrate Systems

☐ – Set Limits

☐ – Install Specimens

☐ – Run Test

- Review Results
- Troubleshoot Problems

7.Convert Method to a Prompted Method [0.5 hr.]

☐ – If desired, edit method and make it a Prompted Test

8.Create up to 4 Additional Test Methods [2.0 hr.]

☐ – Repeat sections 3-7 as required

9.Review All Applications with the User [1.5 hr.]

☐ – Revise Method as Required

☐ – For each application, demonstrate test method using one sample and then observe each operator running test method.

☐ – Point out any accessories or other equipment that would make applications easier or faster.

☐ – If time available review with user's basic method modification and creating new test methods.

Components of Bluehill Universal

Bluehill Universal is a Touch-optimized software platform used primarily with Instron's Electromechanical testing frames. The software features a graphical user interface fully implemented in Microsoft Windows®. It provides numerous displays of test data as well as two graphs, two results tables and custom reports. Simple, memorable icons represent system functions for rapid learning and quick test setups. Software features include test setup, test control, data collection, result generation and report generation

Application packages and/or optional modules can be added as the specific application requires. Each application package contains specific test control parameters, results, and calculations required by the related application.

Test Method Types:

- Tension
- Tension Relaxation/Creep
- Compression
- Compression Relaxation/Creep
- Flexure
- Flexure Relaxation/Creep
- Peel, Tear, Friction
- Metals
- Tension TestProfiler
- Compression TestProfiler
- Tension/Torsion TestProfiler (with Torsion Add-On ONLY)
- Compression/Torsion TestProfiler (with Torsion Add-On ONLY)

Optional Modules:

- **Analysis –** Allows user to replay, modify, and analyze previously tested samples
- **TrendTracker –** Database that allows user to analyze information across multiple samples
- **Traceability –** Creates an audit trail of actions made to test methods and sample files

Test Method Type	Test Control	Calculations
Tension	Preload, Precycle, up to 2 speeds (same direction)	Absolute Peak, Local Peaks, Preset Points, User Calculations, Modulus (9 types), Yield (5 types), Break (6 types), Slack/Compliance Correction, Poisson's Ratio, Area Reduction, Break Location, Seam Slippage
Compression		
Creep/Relax	Preload, Holds: displacement, force, or strain	Same as Tension plus Total and Delta Creep or Relaxation, Hold Preset Points
Flexure	Preload, Tensile/Compressive	Same as Tension but modified for applicable Flexural fixture
Peel/Tear/Friction	Preload, Tensile	Same as Tension plus 1st Peak, Average values, Average peaks, Coefficient of Friction
Tension TestProfiler	Follows user created tensile waveform (Profile). Up to 96 segments of cycles, ramps or holds	Same as Tension and PTF applications but calculations can be applied to each segment or the complete test.
Compression TestProfiler		
Metals	Preload, Precycle, up to three speeds, (Hysteresis reversal per EN1002)	Same as Tension plus r values, n values, Non-Proportional Elongation, Yield Point Elongation, Tension calculations
Tension/Torsion TestProfiler	Follows user-created axial (tensile) profile with simultaneous or independent rotational axis (clockwise, counterclockwise, or both) profile. Up to 96 segments of cycles, ramps, holds, or rate changes.	Same as Tension TestProfiler. Method type includes torsion- dependent controls and results (torque and rotation).
Compression/Torsion TestProfiler		

Bluehill Universal Home Screen

The Bluehill Universal home screen is the user's starting point when testing, creating methods,, conducting analysis, and setting up the system.

Software Live Displays and Frame Options

Configurable Live Displays located at the top of the Bluehill Universal home screen, and in all test methods. Live Display settings will vary from the home screen to a test method, as well as method to method.

Soft Keys

The Bluehill Universal soft keys reside at the bottom of the home screen. Depending on the system the software is configured for, these keys may match soft key settings on the machine's Productivity Panel.

Like the live displays, soft keys may differ between the home screen and a test method; as well as from method to method.

Software Status bar

The status bar appears at the bottom of every screen and provides information about the status of the testing system.

The list below identifies various status messages that can appear and their meanings:

- **Security**
  - **Security off –** Security is disabled
  - **No user –** Security is enabled but no user is logged on
  - **User name –** Security is enabled and displays the name of the user currently logged on

- **Machine Status**
  - **Live machine –** Bluehill Universal is connected to a test machine
  - **No machine –** Bluehill is not connected to a testing machine and demonstration mode is not enabled. In this state you can do everything in the software except perform tests on specimens
  - **Demo –** Demonstration mode is enabled. In the demo state the system uses data files to simulate testing specimens

- **Sample**
  - **Sample: Closed –** No sample is open
  - **Sample name –** Indicates the name of the sample that is open

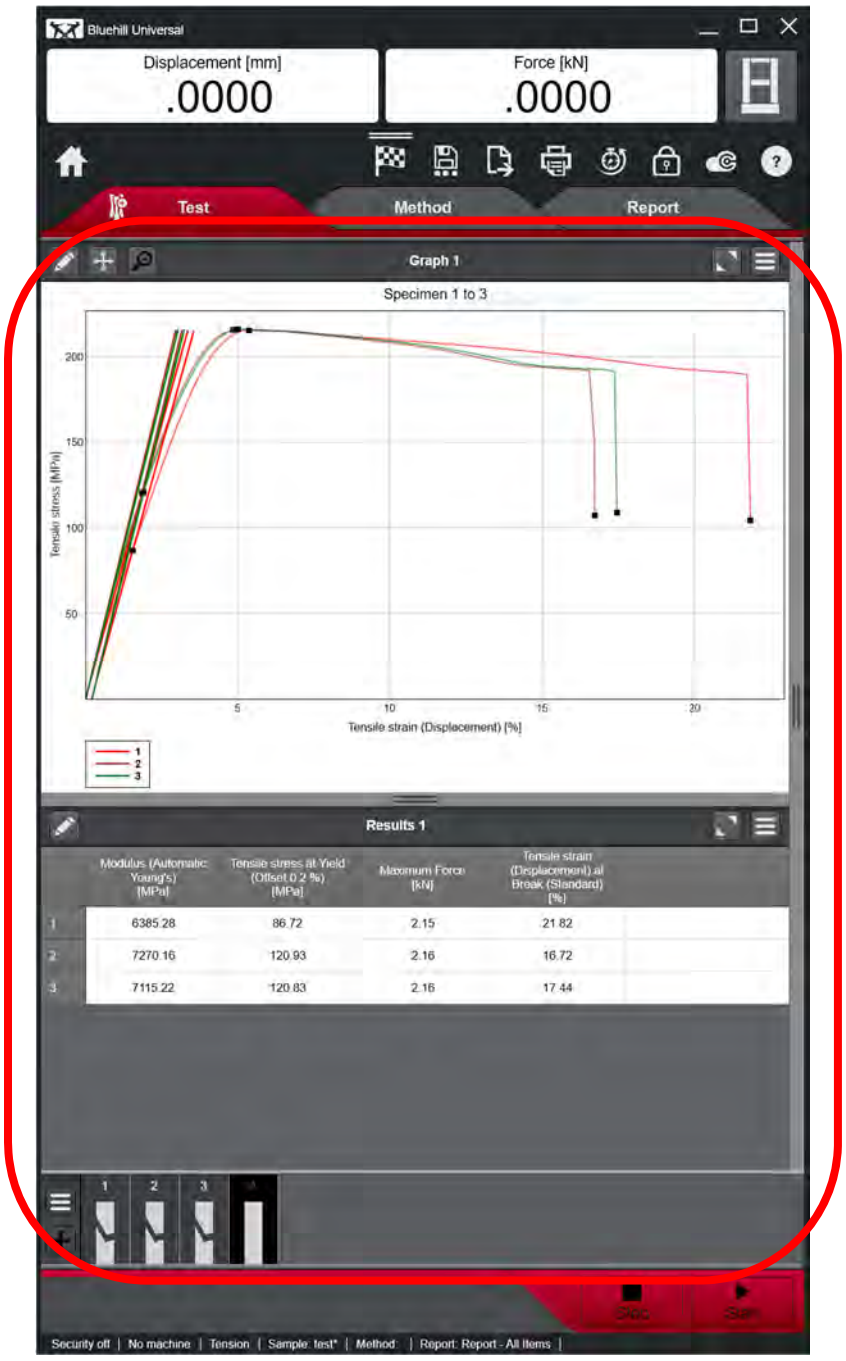
- **Method**
    - **Method: Closed –** No method file is open
    - **Method: -** The system saves the test parameters with the sample so there is no link to the test method. The status bar indicates that no test method is open
    - **Method name –** Indicates the method file that is open. An asterisk after the name indicates there are unsaved changes to the method

- **Report**
    - **Report: Closed –** No report template file is open
    - **Report: -** A new report template is open but is not named yet
    - **Report name –** Indicates the report template that is open. An asterisk after the name indicates there are unsaved changes to report

When the system performs a task that involves a sample, method or report template file, a progress message appears in the appropriate status bar area. Typical messages include "Opening" and "Saving". The message "Generating" appears in the Report area when the system is generating a report.

Bluehill Universal Workspace

The Bluehill Universal workspace references the area within the Test tab where users can view and manipulate software components such as graphs and results tables.



Chapter 2

Defining the Application

This chapter helps the user sort out the things that should be considered before building a test method and running it on a Bluehill Universal controlled testing instrument. Bluehill Universal is designed for universal testing systems, so the more information about the application that is identified and addressed before actual testing, the easier and faster it is to build the test method. This also contributes to running the test correctly the first time. It is recommended that you review this chapter before going to Chapter 3 which discusses how to build a test method.

Testing Applications

Applications in one industry that uses material testing instruments often use different terminology to describe the same or a similar term in another industry. For example: modulus is a measurement of the stiffness of a material used to describe the relationship between the stress being applied to it, and the resulting deformation, or strain, of the material along the axis the stress is being applied to, expressed mathematically as Stress/Strain. Since there are many ways to characterize stress, (shear stress, compressive stress, and tensile stress, to name a few), and many different grips and fixtures that can be used to test these types of stress and their resulting impact on the material, one industry may use the term “shear modulus” to describe the resulting value, while another may use the term “modulus of rigidity” to describe the resulting value, even though both are ultimately measured and reported as Stress/Strain.

The equipment used and the shape and size of the specimen can affect the application in different ways as well, such as a bend test, which requires the use of a flexural test method and the associated 3-point or 4-point bending fixtures. Other types of tests may call for different fixtures like pneumatic cord and yarn grips, compression platens, and many others (see the Instron Sales Catalog for a complete list).

The more you understand about the test, the easier it is to design an application to run on the Bluehill Universal system. Understanding what the test is to do, (pull, push, break the material, etc.) the equipment needed, and what information is to be reported during and after the test should be considered when building a test method. The user should address the following items before building a Bluehill test method:

- Is this a single ramp or multi-ramp test?
- Will the specimen break during the test?
- What direction will testing occur in? (up, down, or both)
- What starts and stops the test?
- What control mode will be used
- What speed or speeds should the test run at?
- What is the shape and dimensions of the test specimen?
- What data is neededand at what rate should it be captured?
- What output (graphs, reports) are required?
- What answers from the test do you require?
- What information is going to be supplied by the operator?

One of the best sources for learning about application are the testing standards written and reviewed by experts in the field. In many cases there are standards already written for tests you may want to perform. You can build test methods exactly to standards or within specified parameters required for your particular testing needs. In other cases, the standards can be used as a guide to build test methods, but there are some cases where a standard for a particular test has not yet been defined. In all cases the more you understand about the testing in question, the easier it is to build a test method for your application.

What is needed to execute the Method?

In many cases Bluehill Universal can perform the same application different ways. For example, a tensile test can be done with a tensile test method, or even a Test Profiler type test method.

Required Hardware Considerations

Capacity of the Test Instrument - Both force and speeds. If the frame does not have the force capacity, consider testing a smaller (cross sectional area) specimen made of the same material. If the frame cannot run at the required speed, determine if testing within the speed specifications of the testing instrument is acceptable. Check if there is another Instron load frame in your lab which meets the capacity needs of the test.

Load cell - Expected forces must not exceed the load cell capacity and are typically not to be used at less than 1% of capacity. If testing in a range that is less than 1% of the load cell capacity, USE A SMALLER LOAD CELL unless the load cell has been verified to read accurately below that value.

Extensometers - Determine what type, travel, and gauge length are needed. An XL extensometer would be used for high strain elastomers like rubber but is not appropriate for materials with relatively low deformation, like metals. A clip-on strain gauge type might be required for testing metals. Also, is strain control required? When using a video extensometer, the field of view must be considered, and necessary lenses must be available.

Grips and Fixtures - Capacity of the grips and grip faces can affect testing. The general rule for gripping is to grip the material tight enough to prevent slippage but not so tight that the specimen is damaged or breaks at the jaw face from the act of securing the jaw face against the specimen. Typically, if performing compressive tests, use fixed adapters. Do not use universal joint (self-aligning) type adapters or wedge-action type grips in compression.

Software Considerations

Because Bluehill Universal systems are software controlled, careful selection of what type of test method should be used when designing a test. You must consider both Test Control and the Calculations required by the applications. The test methods types available in Bluehill Universal are designed for different types of applications.

Defining the Test Method

It is always better to build a test method from the appropriate method type. For example, if building a Compression test, start with the Compression method. Also, remember the calculations may be different depending on the application.

Test Control - Determines how the crosshead moves during the test. When the test requires changing speeds during test, use a Tension or Compression method with multiple ramps, or use a TestProfiler method. Tests that require compression forces, use a Compression method. If a test specifies a hold, you must use either a Creep/Relaxation method or a TestProfiler method. If you require testing metals to EN/ISO standards which can require up to three speeds or reversing direction for a Hysteresis modulus you must use a Metals test method. Preloading or Precycling can be done with Tension, Compression, or TestProfiler method types.

TestProfiler is unique in that it allows up to 87 segments of ramps, holds, or cycles. Test profiler also allows calculations to be applied to each segment.

Ending the Test - How a test ends should also be considered when choosing a test method type. The end of test criteria may be configured to end the test when the specimen breaks or once certain pre-defined test conditions are satisfied like a time interval or crosshead displacement.

Measurements – Measurements are data collection channels available to Bluehill, such as force, time and displacement. These measurements are streams of data that are collected during a test and can be separated into two categories:

- ***Physical Measurements* -** data that is read directly from a transducer connected to the testing system. An example of a physical measurement is the force value collected from the load cell.

- ***Virtual Measurements* -** data that is calculated from a mathematical expression using data from one or more physical measurements. An example of a virtual measurement is Stress. Stress is the force read from the load cell divided by the cross-sectional area of the specimen, which is defined by the user.

The need to connect an additional transducer or to calculate a virtual measurement should be identified prior to method development, so that the hardware and software requirements of the test method can be achieved.

Calculations – Calculations are mathematical evaluations based on criteria selected in the software for specific parts of the testing curve. In Bluehill Universal, the available calculations depend on the test method type, therefore understanding the calculations available in each test type is very important.

You can always find exactly how Bluehill Universal calculates an answer by referring to the Online Help. This may be useful because, how you define calculations may differ from other systems. The Help Menu lists the available calculations per test type and explains how Bluehill Universal calculates any point of interest. The Help Menu also shows an example of the calculation along with any parameters that the user is required to specify, and it describes the exact algorithm Bluehill Universal uses to calculate the answer.

To access calculations help menu, touch the Help Button on the Home Screen (or F1 on the keyboard) and select Calculation Library from the Contents Tab. A list of calculations will be displayed and the calculation in question can be selected.

Identifying what measurements are required for the Method

If testing to a standard, the required results are usually available in Bluehill Universal. A problem sometime arises because different industries use different terminology. For example: Elongation in the rubber industry is what Bluehill Universal calculates as % Strain; while in other industries elongation is what Bluehill Universal calculates as displacement. Also, there can be different ways to calculate a specific point of interest. For example: Bluehill Universal can calculate Break six different ways, Modulus nine different ways, and Yield five different ways, depending on the application-specific needs of the user.

The calculations that are available in Bluehill depend on the selected test type. There are a unique set of calculations for each test type, but Bluehill Universal can be configured to make most calculations available in each test type.

A complete description of each calculation is available in On-line Help.

It is very important to understand exactly what information you wish to know from your test and then pick the corresponding calculations in the software. Remember, the terminology of the user may be different than Bluehill's. In general, using Bluehill's standard or automatic calculations will satisfy most but not all applications needs. If you are not sure of what is needed, review Bluehill's On-line Help on calculations, review the application, or company procedure, or ask the person that will receive the report exactly what results are needed, including their units.

Besides understanding the required calculations, consider the following items when selecting the specific results to be reported by a test method:

- **Displacement -** Acquired from Crosshead travel
- **Force -** Acquired from the Load Cell
- **Time –** An accurate representation of time passed during a test
- ***Strain 1 -** Calculated from Extensometer connected to Strain 1 board
- ***Strain 2 -** Calculated from Extensometer connected to Strain 2 board
- ***Video Strain -** Acquired from Extensometer connected to Video board
- **Tensile Strain** - Calculated from Displacement or Strain 1 or Strain2 and is configured within the measurements area of the method
- **Tensile Displacement -** calculated from Tensile Strain
- **% Strain -** Calculated as (change in Displacement reading/Gauge Length)*100; uses the extensometer Gauge Length if source comes from extensometer, uses Specimen's Gauge Length dimension if source comes from Displacement
- **Tensile/Compressive/Flexural Displacement -** Calculated from Tensile/Compressive/ Flexural Strain

Data Collection Rate

The maximum number of data points that Bluehill can capture is limited by the amount of free disk space that is available on the computer. When the system captures a data point, it stores data for each measurement specified within the method at that data point.

Data can be collected using the Default data capture scheme, or by creating a Custom data capture scheme. The Default mode is automatically selected when a new method is created and sets a data capture time interval of 20 ms. Depending on the test frame, a second default interval of 0.25% of the maximum capacity of the load cell is automatically added.

Custom data capture provides more flexibility in collecting data and is useful when specific information must be recorded. For example, if the test is more concerned with Displacement variations, a criterion for Displacement would likely produce the desired results.

The Custom data capture mode allows up to three criteria for capturing data. You can choose criteria based on any physical or virtual measurement: Force, Displacement, Strain, Time, or Stress.

Regardless of the number of measurements being taken the maximum rate is hardware dependent:

- 6800 Series Systems – 5 kHz
- 3400 Series Systems – 1 kHz
- 5900 Series Systems – 2.5 kHz
- 5500A Series Systems – 1 kHz
- 3300/5500 Series systems – 500 Hz
- IS02 Controller Series Systems – 500 pts/sec
- 8800 Controller Series Systems – 5 kHz
- 88MT Controller Series Systems – 10 kHz

Data can never be collected faster than the maximum rate of the specific hardware being used.

Information for Reports

When building a test method, the user may want more information on the report than just a table of results and test parameters. For example, perhaps the serial number, color, or any other specific information about each specimen needs to be recorded and then be reported. Or an operator's note on how the equipment was setup, what fixtures, grip faces etc. were used, might have to be recorded and be reported as a note. Bluehill Universal allows the operator to enter this type of information before or after testing and then it is available for reporting. Sample information (about the complete batch) is entered as Sample - Notes or Number/Text Inputs. Specimen information (about each piece) is entered using Specimen - Notes, Number/Test Inputs or Choice Inputs. Consider the following about these Features when building test methods:

Notes - User information concerning the sample (complete batch) or the specimen (individual specimens). Up to three separate notes for each can be entered by the operator and saved with the data. All Notes can appear on the report. Notes can be entered any time before saving data. Saved data can be continued and the notes can then be edited and resaved.

Number/Text Inputs - User information concerning each separate specimen. Up to fifty Number Inputs and fifty Text Inputs can be configured in a test method and the name (prompt) of each can be tailored to the user's need.
For example: change “Text Input 1” to “Serial No”. As each test runs the operator enters the serial number and that information is recorded with the data.

Number/Text Inputs can be customized for each specific method. These Inputs can be modified prior to running a sample and/or after the sample has been saved.

Note: Numerical information entered as Number Inputs can be defined as variables for use in User Calculations.

Chapter 3

Initial System Setup

This chapter provides a guide for setting up the software console before testing or building test methods for your applications. You should ensure all applicable transducers are calibrated and safety limits are set before operating the testing instrument.

Users must be trained before operating any Instron testing instruments. This manual only indicates what users should consider before generating tests for their application. Trained operators may also refer to the operating manuals that are supplied with your system before using your testing instrument.

System Start-up

The following procedure is necessary to ensure your system is started correctly and that it communicates with Bluehill Universal.

Power-Up Systems

Perform the following to power up your Bluehill Universal testing system:

1. Power up the load frame. Generally, the load frame power switch is located next to where the mains cable plugs into the load frame.

2. All Instron testing instruments perform power-on diagnostics. The diagnostics process displays the progress and completion status to the user. Launching the software prior to the completion of the diagnostics will cause a communication error as the frame cannot communicate until the diagnostics are complete.

3. Turn on the Touch Panel (Bluehill Operator Dashboard) or computer.

4. Double-tap on the Instron Bluehill Universal Icon.

5. After a few seconds, the software Home Screen will be displayed.

Bluehill Universal Home Screen

The Bluehill Universal Home Screen is divided into three sections, the Live Displays, the Main Menu, and the Soft Keys.

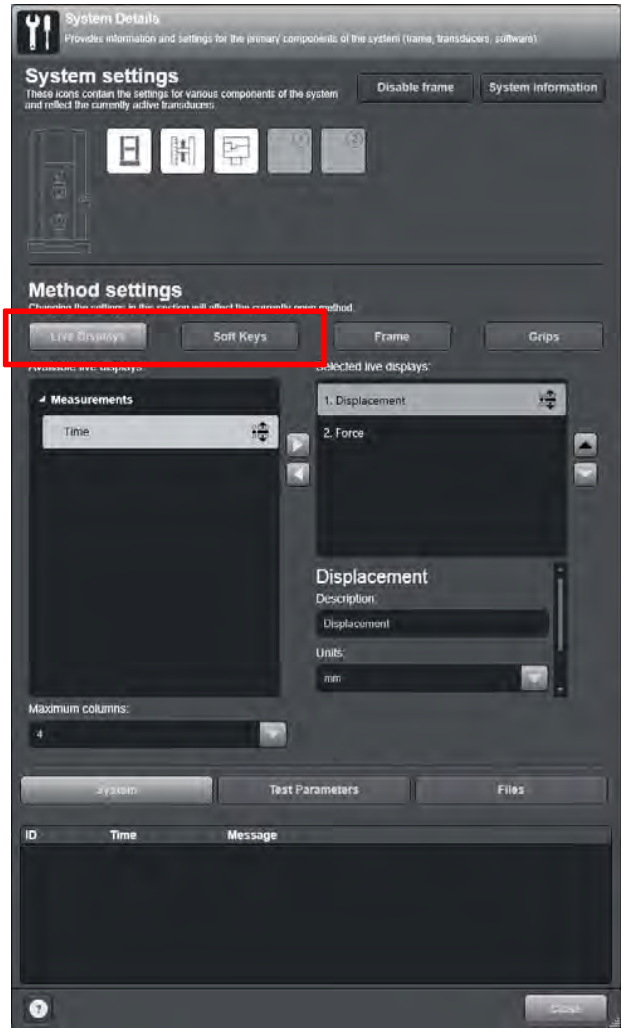
The upper section of the software contains the Live Displays and System Details menu. It is configurable and it provides important information about your testing system. This section of the software will always remain visible as you navigate through the various elements of the software.

Configuring the Live Displays and Soft Keys

Live Displays and Soft Key settings can be access by selecting the Frame icon in the upper right-hand corner of the screen.

This will open the System Details menu.

The Method settings section of this window will allow the user to select the Live Displays and Soft Key settings for the Bluehill Universal home screen.



Live Displays - When the System Details is opened from the home screen, the user will only see three selections for Measurements. These measurements are Force, Displacement, and Time. If the System Details section is opened in a test method, more measurements will be available, such as Stress and Strain. To select and configure measurement selections, use the up/down and left/right buttons.

Once measurement selections have been made, unit selections can be made, along with any changes to the measurement name.

Soft Keys - Selecting the Soft Keys icon in the Method Settings section of this window will allow the user to select which measurements will be available as soft keys at the bottom of the home screen. These selections will also be available and configurable in each test method that is created.

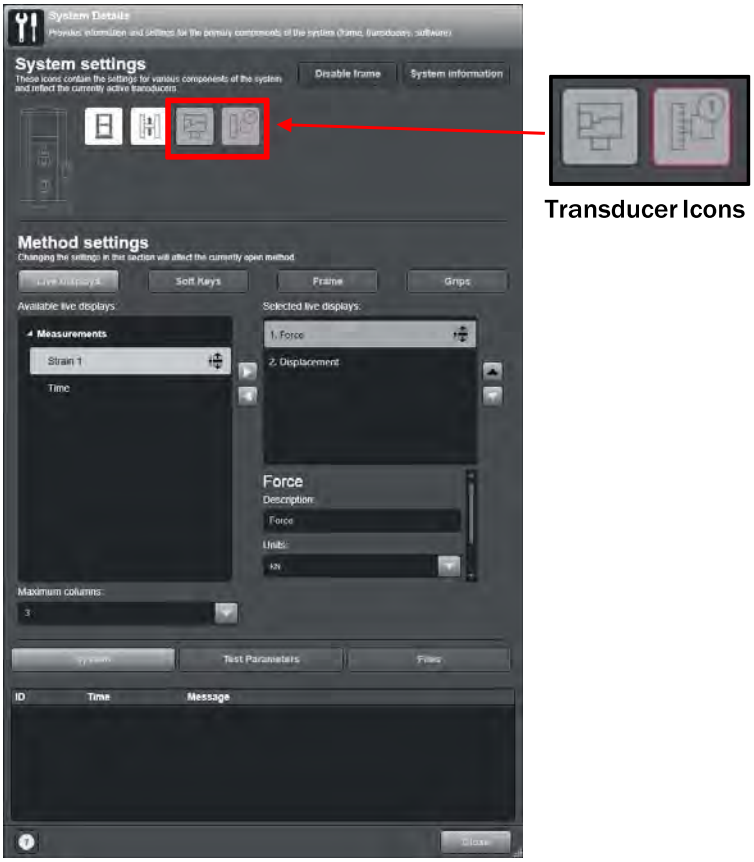
Four soft keys can be set at the home screen or in a test method. Available selections are Balance (*channel specific*), Balance all, Return, and Zero displacement.

Calibration of Transducers

You must calibrate each transducer used in the application. The software will prevent a test from starting if a required transducer is not calibrated. Calibration of transducers is done through the Console.

Automatic Calibration of Transducers

Bluehill Universal software recognizes some transducers automatically. If the transducer that is plugged into the controller was supplied by Instron and classified as self-identifying the software will recognize and identify it shortly after being plugged in. Self-identifying transducers can be calibrated automatically utilizing the electronics within the transducer's connector. If the transducer that is plugged into the controller has been calibrated previously the system will restore the calibration data to the software. If not, the transducer icon will be greyed out to indicate the transducer is uncalibrated. To perform calibration of a transducer, select the appropriate icon in the System settings section of the System Details window.

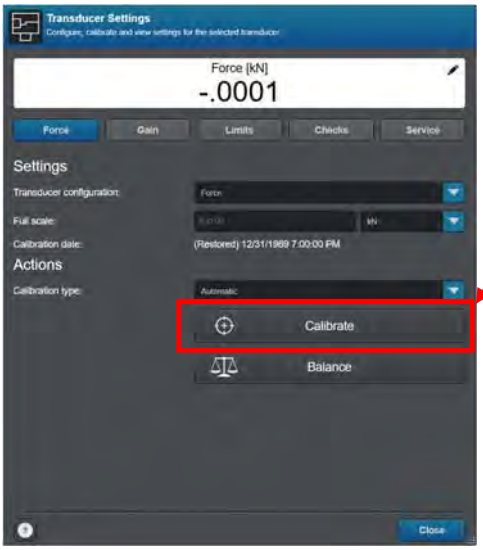


Transducer Icons

Load Cell Calibration

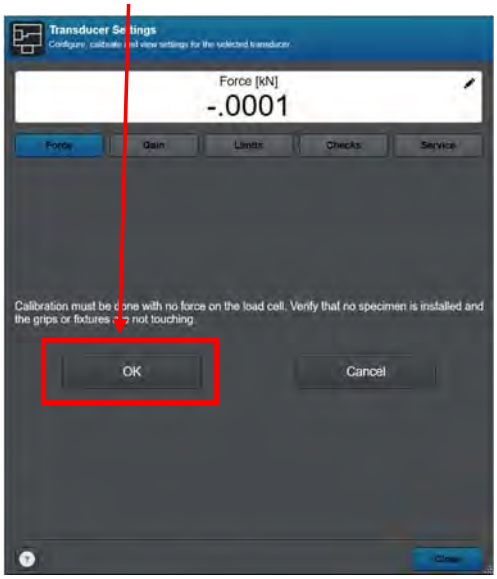
The following is the calibration procedure to calibrate a system load cell. This procedure is very similar to the calibration of other transducers with the ability to be automatically calibrated.

1. Select the Load cell icon  .

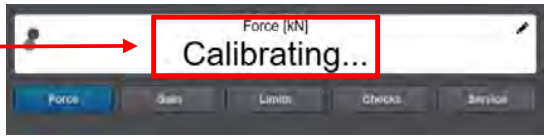


2. Touch the Calibrate button on the Transducer Settings window that opens. Notice that the Full-scale value is present and the Calibration type is set to Automatic.

3. Touch Ok once the following message has been confirmed.



4. The calibration process will proceed, and the Current state window will note the calibration date and time of the last successful calibration. Touch Close to end the calibration process.



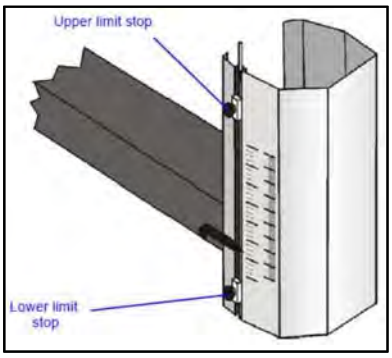
5. Note that the load cell icon is now illuminated to indicate a calibrated status.

Setting Limits

Limits restrict the operation of the Instron testing instrument to within specific boundaries. EM systems have adjustable mechanical limit stops on the frame column and additional software limits for each transducer channel.

Warning: Always set limits before operating any Instron testing instrument. Ensure appropriate limits are enabled before moving the crosshead.

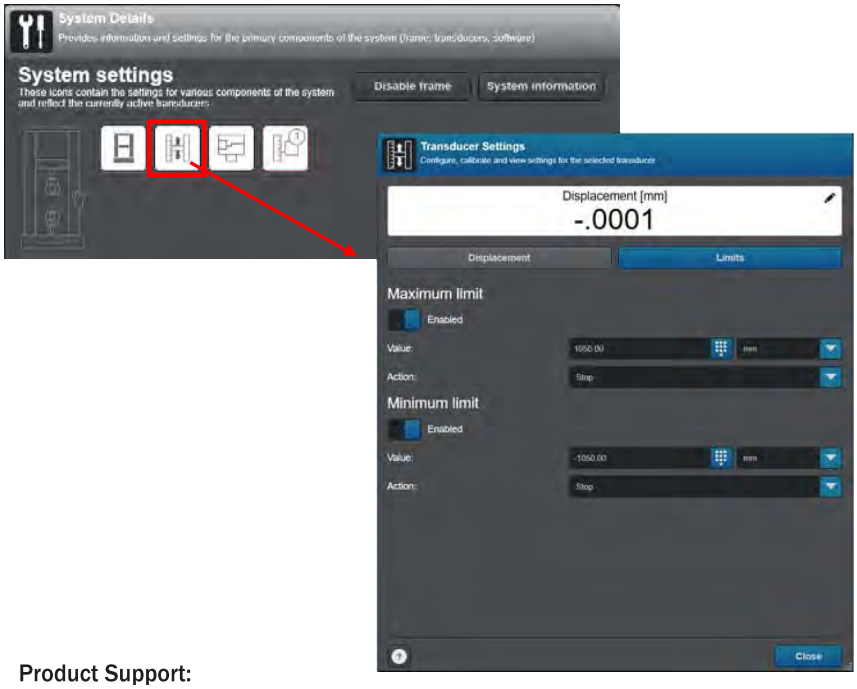
Setting Mechanical Frame Limits



EM systems have upper and lower mechanical limit stops located on the load frame. Move the slides to the desired positions and tighten the thumb screws.

Setting Software Limits

Software limits are set using the various transducer icons in the software System settings area. These limits are independent from any test method and should be considered as separate limits. Saving the method does not include saving limits. There are Maximum and Minimum software limits for each physical transducer. Limits for all transducers are set similar to the Displacement example below:

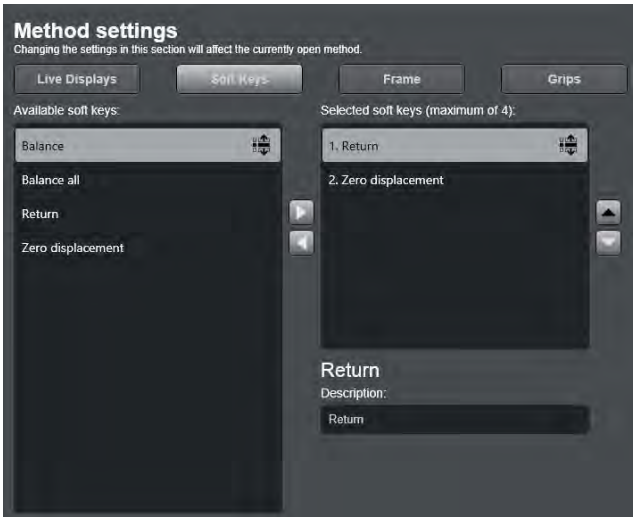


Zero Displacement

Understanding the position of the crosshead or actuator before and after a test is vital for safety and to ensue equipment is not damaged. The best way to do this is to ensure the crosshead or actuator displacement is zeroed before a test starts. It is also important to zero the displacement channel after changing grips and fixtures because the safe distance between upper and lower fixtures may change.

It is important to note that some systems that are compatible with Bluehill Universal can perform software functions on a control panel or handset. This manual focuses on software controls.

Selecting the Soft Keys menu under Method Settings will allow the user to select which Soft Keys will appear at the bottom of the Bluehill Universal interface.

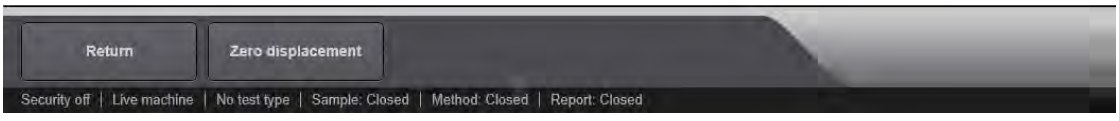


Return - The Return option will move the crosshead back to the zero displacement reading. When selecting this option, ensure that physical limits are set, a specimen is not in the test space, and it is safe for the crosshead to move.

Note: The Return Soft Key is disabled on 3400 and 6800 Series Systems.

Zero displacement - This option will zero the Displacement channel. If the Return soft key is pressed, the crosshead will move to this position

When the desired Soft Keys are selected, they will appear at the bottom of the Bluehill Universal screen as shown below.



Home Screen Options

The following section will describe the function of each of options on the Bluehill Universal home screen.

Software Lock

The Software Lock provides a safeguard against someone using the system when the system is left unattended. While the software is locked, a dialog displays stating that the software is locked and warns to keep clear of the test area. The displayed dialog can be customized by using the Edit message button.

The software can be locked at any time and disables the Start test function, Return, Zero displacement, and all other Soft Key functions. If a test is in progress when the software is locked, the test continues until completed. The software lock option can be enabled by selecting the lock icon (top right) on the home screen:

Locking with Security Enabled

When security is enabled, locking the software also safeguards against an unauthorized person from using the system. To unlock the software, you must enter valid credentials. If a person logging into the software does not have the appropriate rights to the section that was open when the software was locked, the system prevents unlocking the software and displays an “Invalid permission” warning.

Locking with Traceability

If the system includes the Traceability feature, then the following actions done in the screen lock dialog will be added to the audit log:

- Login
- Change password
- Enter invalid credentials

Instron Connect

Instron Connect is a feature in Bluehill Universal which introduces a powerful communication platform that brings our support team even closer to your organization. The Instron Connect option can be opened by selecting the Instron Connect icon (top right) on the home screen:

This icon will bring the user to the Instron Connect main page where the following will be displayed:

Message Center

The top portion of the Instron Connect page will alert the user of any important messages pertaining to software and service including:

- Status of user's transducer verifications (Up to date/Out of date)
- Alerts of newer software version available
- Ability to also download newer version as well as notify user when the download is complete
- Successful or unsuccessful connection to Instron Connect

ID	Time	Message
220	11/30/2018 10:30:42 AM	The software update has finished downloading. You must close Bluehill before installing the update.
210	11/30/2018 10:02:28 AM	A software download has been initiated. Please keep Bluehill Universal open until the download is complete.
300	11/30/2018 10:02:06 AM	Verifications are currently up to date.
205	11/30/2018 10:02:06 AM	There is a new software update available: 4.06.23671
105	11/30/2018 10:02:05 AM	Successfully connected to Instron® Connect.

Submit Request

Should a user come across issues or other instances where assistance is needed from Instron service, Submit Request provides a line a communication. The response time to the user's request depends on the regional service location.

To successfully submit a ticket for service, the user must fill out:

- First Name
- Last Name
- Phone number (Preferably a phone at or near the system)
- Email address
- Short message describing the reason for the ticket

After ticket submission, it will be sent to Instron Service and the user will also be sent a confirmation email.

Upload Files

Upload files allows the user to attach any applicable files for their ticket submission. Simply browse to the files and select. These files will be uploaded directly to a location accessible by Instron service.

Request Verifications

Request verifications is a convenient tool to use to help schedule verifications of the system. Please be sure to fill out the same information as Submit Request above. It is suggested to request in advance of your desired date as response time and scheduling is dictated by the location of the regional service group as well as schedules of the field engineers.

System Status

System status provides the user with upfront information regarding the current state of their system and software. These bits of information include:

- System ID
- Software Version
- Verifications Expire (*Expiration date of system verifications – useful for Request Verifications above*)
- Service agreement

System status also includes visual statuses such as:

- **Instron Connect**
  - Shows status of connectivity to Instron Connect
- **Verifications**
  - Shows whether verifications are up to date
- **Software –** This status will show whether the systems currently installed version of software is up to date, or if a new version is available for download via Instron Connect.
  - If the software is out of date, Instron Connect will provide user a soft key to download the current version
  - After that version is downloaded, Instron Connect will show user instructions to install update
- **Remote access –** This option provides Instron's Technical Support team to remote into the user's software for a first-hand look. This includes Technical Support gaining control of the testing software. The user must first enable the Remote Access before Technical Support may remote in.

Note: Should Technical support and the user be working with a live machine via Instron Connect, it is important for the user to remain clear of the system and its moving parts. Technical support typically does not run tests via remote access, but the user should still not be interacting with the testing frame during this time.

- **Diagnostics –** Enabling diagnostics will send frame statuses, faults, and other diagnostic information helpful to our technical support team to Instron Connect. Diagnostics will only collect information when enabled, so should the user encounter an error with the frame they should enable diagnostics to help capture as much frame happenings to detail the situation as best as possible.

Test

Touch this button to run tests on specimens. The software displays a sequence of screens where you:

- Start a New Sample
- Continue a Sample
- Run a QuickTest

Starting a New Sample enables the user to either select an existing test method or to create a method “on the fly”. Continuing a Sample allows the user to open a sample file that had been previously created and test additional specimens. This option will also allow the user to review data from a previously tested Sample.

QuickTest

QuickTest lets you run a basic test without creating a method. When using QuickTest, there is no access to the Method tab or Report tab. The only parameters and outputs that are available for editing are the parameters shown in the QuickTest setup area. There are limited results, which display in the Results table. The test workspace includes one graph and one results table with limited pre-set results.

Method

Touch on this button to create a new test method or edit an existing test method. From here, you can move through a set of screens where you can:

- Choose a method or Create a method.
- Make changes to the test parameters and either save those changes back to the original test method file (Save) or to a new test file (Save As).

You can then use the test methods that you create to run tests. The button is “Greyed” if security is enabled and you do not have Manager or Administrator rights.

Analysis (Optional

Touch this button to replay a sample with parameters from a different test method. The software displays a sequence of screens where you:

- Choose a sample to open.
- Choose a test method from which to force calculation and result parameters.
- Analyze and recalculate test data in a sample.

Admin

Touch this button to change core system settings. This may include adding or removing hardware, enabling different software options, or setting up the system security.

Instron Connect (Admin Tab)

Instron Connect is a powerful tool which allows users to contact Instron directly from Bluehill Universal. Features include:

- Support requests
- File sharing
- Software updates
- Request verification services
- Screen share for support issues

The Instron Connect option can be opened by selecting the Instron Connect icon on the home screen:

Help Menu

Touch this button to open the Help system at the Home screen topic.

Exit

Use this button to exit the software.

Administration Features

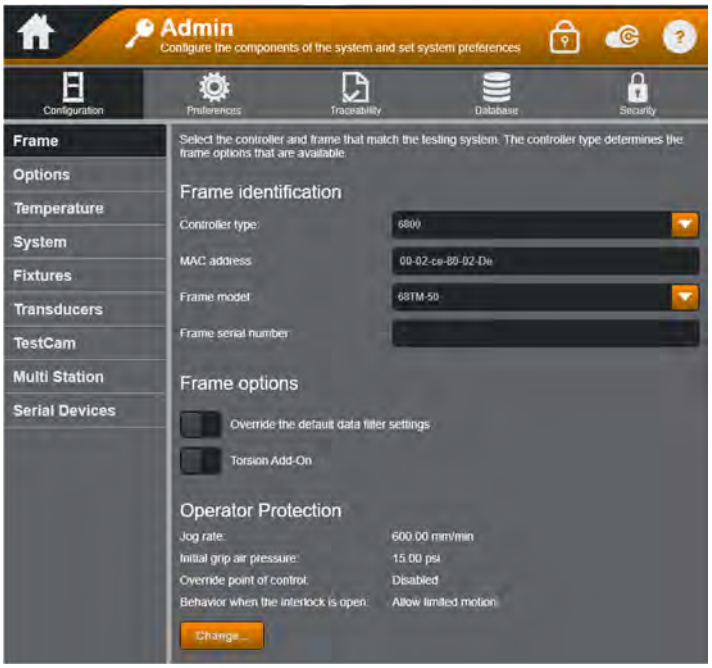
Most of the settings in the Admin area are established during the system installation. However, there are options available that users need to be aware of (e.g. Security, Preferences and Configuration Options). When the user touches the Admin button the following screen is displayed:

Admin - Configuration

Select Configuration from the Navigation Menu.

Configuration – Frame

Settings within Frame Identification and Frame options are entered during the installation of your system and are unlikely to change during the life of the system. Any changes made here can affect the system's ability to communicate.



Operator Protection

These settings restrict system movement to minimize the risk of injury while an operator may be in the test area, such as during specimen installation. These settings can only be changed if security is enabled on the system and require an Administrator level login.

Note: If using interfaced pneumatic grips on 3400 and 6800 systems, the initial closing grip pressure can also be changed from this menu. It is recommended that this value is never set higher than 15 psi (1 bar).

Configuration - Options

This section allows the user to configure Bluehill for external devices such as an Automatic Specimen Measuring Device or a Video Extensometer.

Show all calculations in all testing types – When deselected, only those calculations that are most relevant to the selected test method type are shown in the list of calculations. For example, Average Value calculations are normally shown only in the Peel, Tear and Friction test type. If the user selects this option, all calculations are made available in all of the test method types.

Configuration - Temperature

Users will configure this section to communicate with approved temperature devices such as chambers and furnaces.

Configuration – System

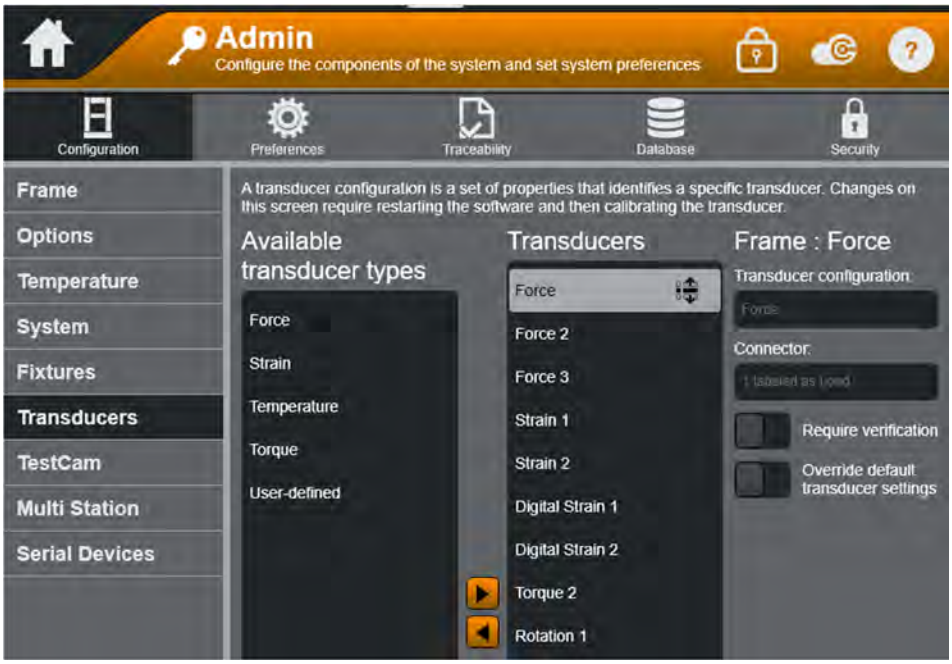
If Bluehill options are added, this section will allow the system key code to be changed to unlock those option.

Configuration - Fixtures

The fixture option is only available in 6800 Series Systems. It allows you to set up Auto Positioning of various fixture configurations. When Auto Position is enabled in a Method, the crosshead will automatically move to a pre-defined position when Auto Position Soft Key is pressed and return action is performed. This eliminates the operator from having to manually maneuver the crosshead to the appropriate test position when starting a new test. The position is dependent on the Fixture profile selected.

Configuration - Transducers

This Item lets you create a customized configuration for a transducer to identify specific requirements or set a verification due date.



Transducer configurations are system wide settings which are always available. The transducer name and channel settings for the standard connectors on the frame (Force, Strain 1, and Strain 2) are pre-defined and cannot be changed or removed from the selected transducer list. For these transducers, you only need to visit this screen if you want to set a verification reminder date or specify the transducer identification requirements.

In this screen, you can add additional transducers or create customized configurations including the transducer name, channel, and identification method. This flexibility means you can create customized transducer configurations to use in test methods.

Configuration - TestCam

This feature allow the user to configure external web camera which can be integrated into a test method to acquire images or video of a specimen under test.

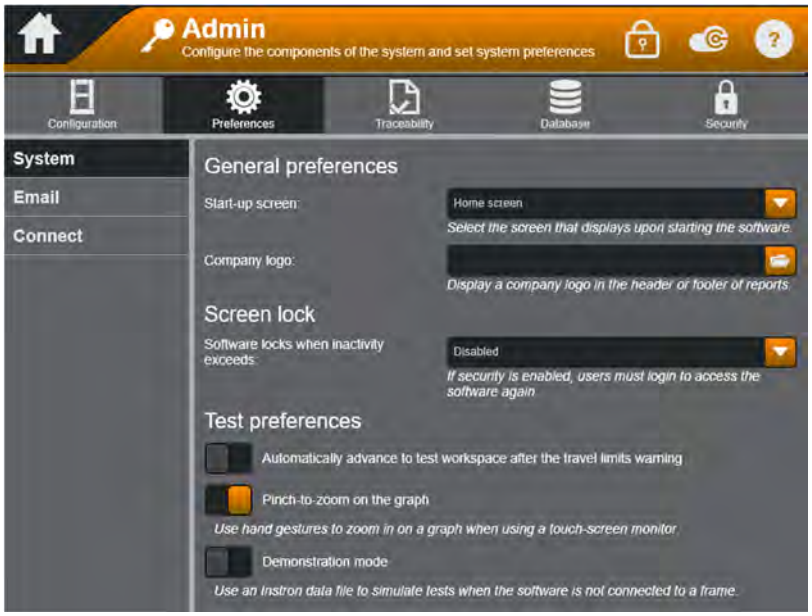
Configuration - MultiStation

This section is used to configure systems that have multiple load strings.

Admin - Preferences

Select Preferences from the Navigation Menu.

Preferences - System



Start Up Screen – This selection determines how Bluehill will open.

Home screen - This is the default choice. When the software starts, it opens at the Home screen and you must touch one of the options on that screen to proceed.

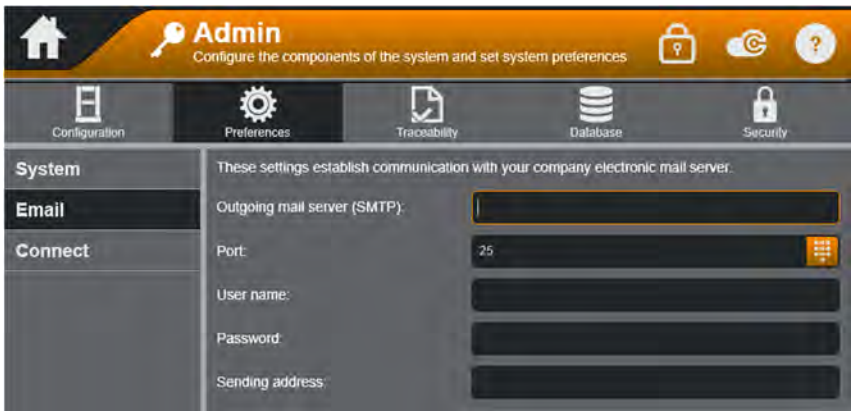
Continue testing the last-used sample - When the software starts, it opens the selected sample file and advances directly to the test workspace. Use this option if you always use Continue sample with the same sample file. Be cautious of creating large sample files as they could take a long time to open.

Create a new sample with a specific test method - When the software starts, it always opens the same test method, specified by you, and moves directly into the testing mode. When this is complete, you can start testing specimens.

Create a new sample with the last-used test method - When the software starts, it opens the last test method that was used in the previous testing session and moves directly into the testing mode. The first interaction with the user is to prompt for a filename to store test data. When this is complete, you can start testing specimens.

Company Logo - To display a logo on reports, select a graphic file from the Browse button. The report file must include Logo in the header or footer to display the logo identified in this field.

Preferences - Email



To E-mail directly from Bluehill Universal, you must have a network connection and the software requires the following information:

Outgoing mail server (SMTP) - Specify the outgoing mail server. For example, when using Microsoft Outlook, this field should contain the name of the Microsoft Exchange Server for your E-mail system.

- **Port -** The server port number for the outgoing mail server.
- **User name -** A designated user name on the mail server for the testing system.
- **Password -** A password for the Bluehill system.
- **Sending address -** An E-mail address for the Bluehill system.

Preferences - Connect

Instron Connect allows your system to stay connected to Instron to inform users of software updates, verification intervals, and will assist in faster resolutions to Technical Support requests.

This feature is configured at installation.

Admin – Traceability

Select Traceability from the Navigation Menu.

Traceability is an optional feature in the software that is only available if purchased. Traceability creates an audit trail that provides a chronological record of activity made to your test methods and sample files. Most activities completed in the software are saved to an audit trail database with a date and time stamp. Documenting the sequence of activities ensures that your testing processes remain consistent and reliable over time, thus maintaining a high level of data integrity.

The Traceability feature has two components:

- An audit trail database that maintains a history documenting the changes, actions, and reviews done on a Bluehill system.
- Signature requirements to document who has performed an action or changed a file. Signature requirements can also be used as a review process to ensure any changes to a file are reviewed and validated.

Traceability works in conjunction with the system security to provide the following advantages:

- User access is limited by security permissions.
- Track changes made to test methods and sample files by requiring the individual to acknowledge the changes with an electronic signature.
- Prevent the use of revised methods or samples until the changes have been reviewed by a secondary reviewer, and tertiary reviewer if required. Reviews are accepted or rejected with secondary and tertiary signatures.
- Maintain a history of changes, actions, and reviews done in the system, which is saved to a local database. This audit trail is fully searchable directly from the Bluehill software.

Admin - Database

Select Database from the Navigation Menu.

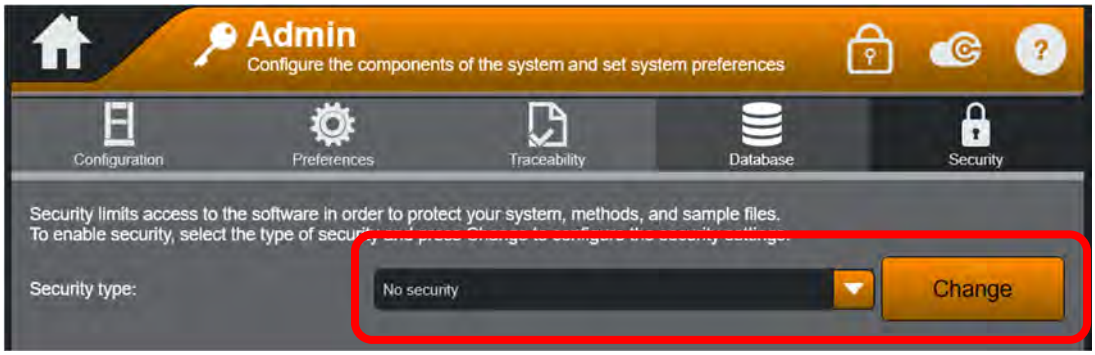
This is used for Instron's database feature; TrendTracker. For more information on this feature, contact your Sales Representative or you can read about it in the Help menu.

Admin - Security

Select Security from the Navigation Menu.

Security - Setting

When the Security item is selected, the screen displayed will be dependent upon the status of the security system. If Security is disabled, the Security - Setup screen will be displayed as follows:



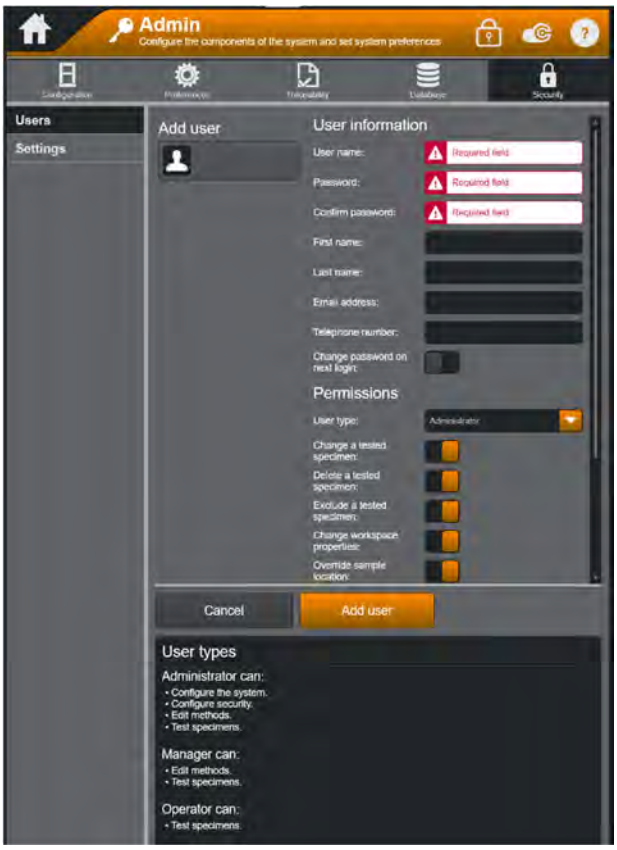
The security type selection will provide a drop down of three selections highlighted in the next section. Select which type you would like to apply and click change.

Security Types

Bluehill offers three different Security types for the user to select from. These choices are Bluehill, Active Directory, and Windows® Directory.

Bluehill Security Type

Upon enabling the Bluehill Security type the user will be prompted to create a user immediately. This user will be an Administrator User type. For following user creations, you may select what User Type you want. You will be prompted with the screen below.



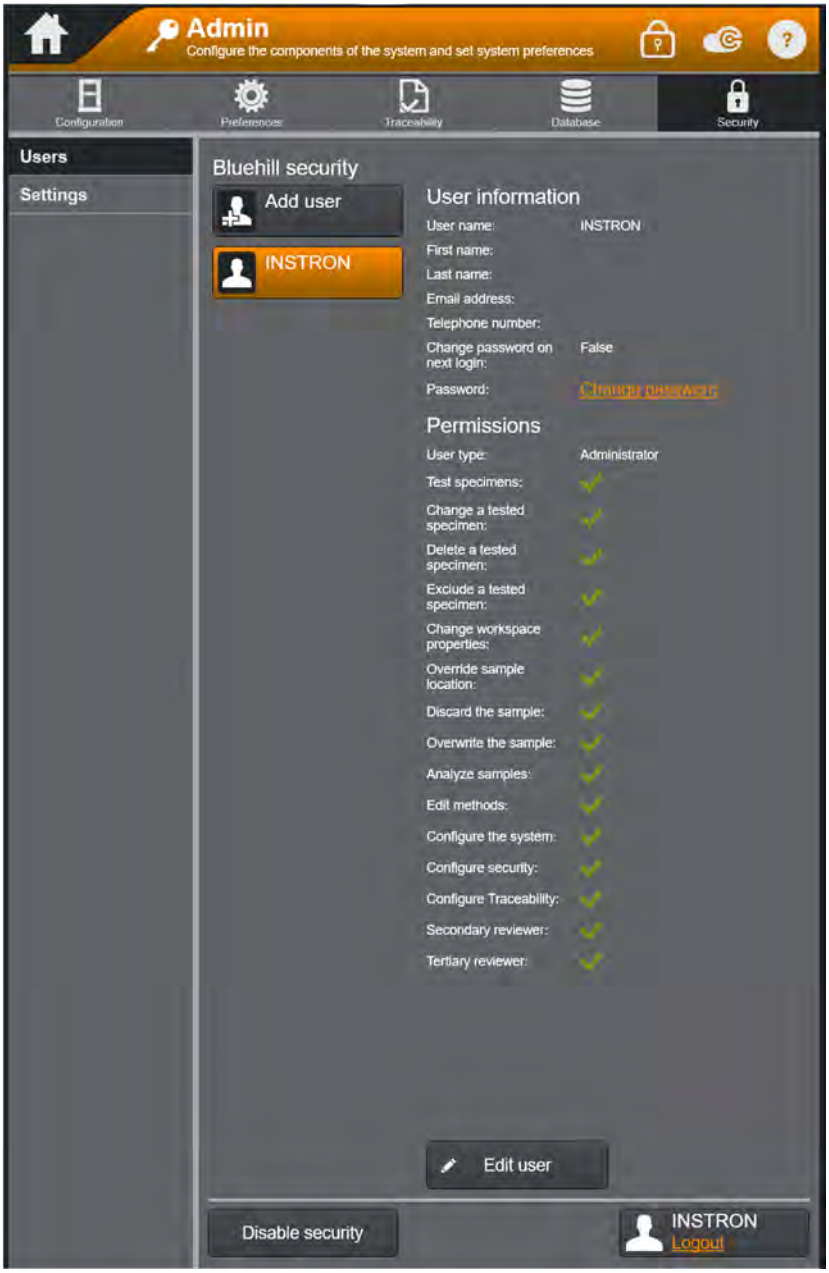
Enter a User name and provide the user a Password. A valid password must satisfy the following criteria:

- Be at least 5 characters in length
- Contain only alphanumeric characters (as determined by the Windows® locale setting). Passwords are case-sensitive.

Provide individual information including first name, last name, email address, and telephone number. There is also an option to change password upon next login should you be creating this user login for someone else. This allows them to create their own password.

Next, you can assign Permissions for each user. Please refer to the Permissions section below as these permissions and their functions are shared between all three security types (Bluehill, Active Directory, and Windows® Directory).

After the initial Administrative User is created, that user may now add other Users to the software. Simply press the “Add User” soft key and repeat the process above.

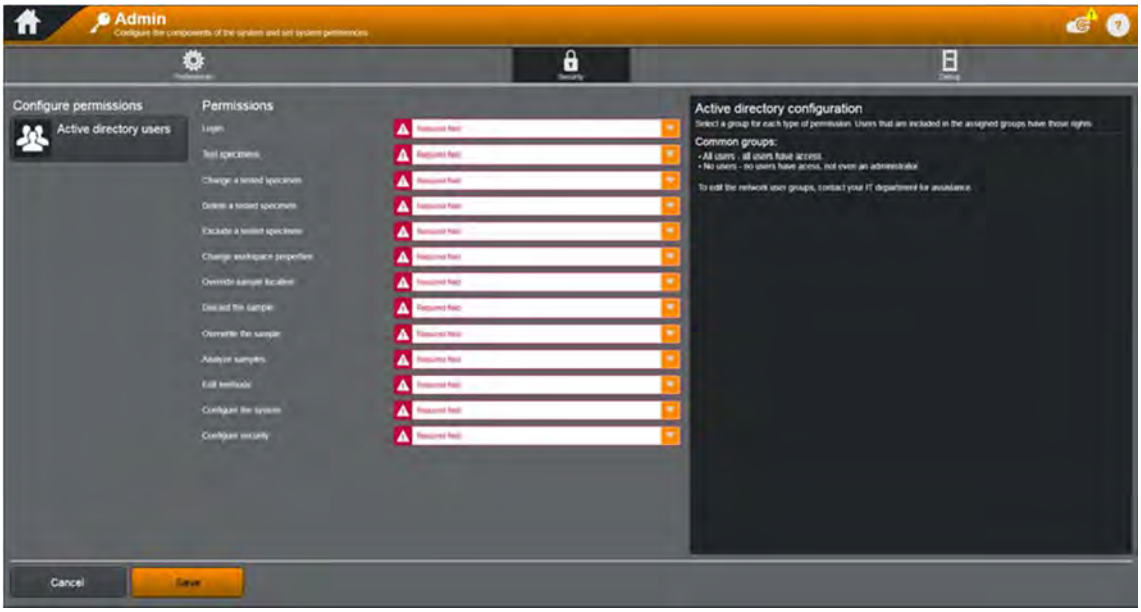


Active Directory

Bluehill software supports validating a user's credentials and permissions from the customer's Active Directory. This will require the Lab Manager to identify what user levels (permissions) are required, and coordinate with their IT department to create appropriate Active Directory Groups and assign the appropriate users to each of these groups.

Upon the enabling of Active Directory, it is required to have a network administrator log in first. The first user to log in via Active Directory will be immediately prompted to assign group permissions. Please refer to the Permissions section below as these permissions and their functions are shared between all security types (Bluehill, Active Directory, and Windows® Directory).

Once the network administrator is logged in, they will be shown the screen below to assign each group permission appropriately.



It should be noted you may only choose one group per permission. On the network side of this exchange, you could place a single user as a member of multiple groups to help satisfy the exact list of permissions each individual user may have.

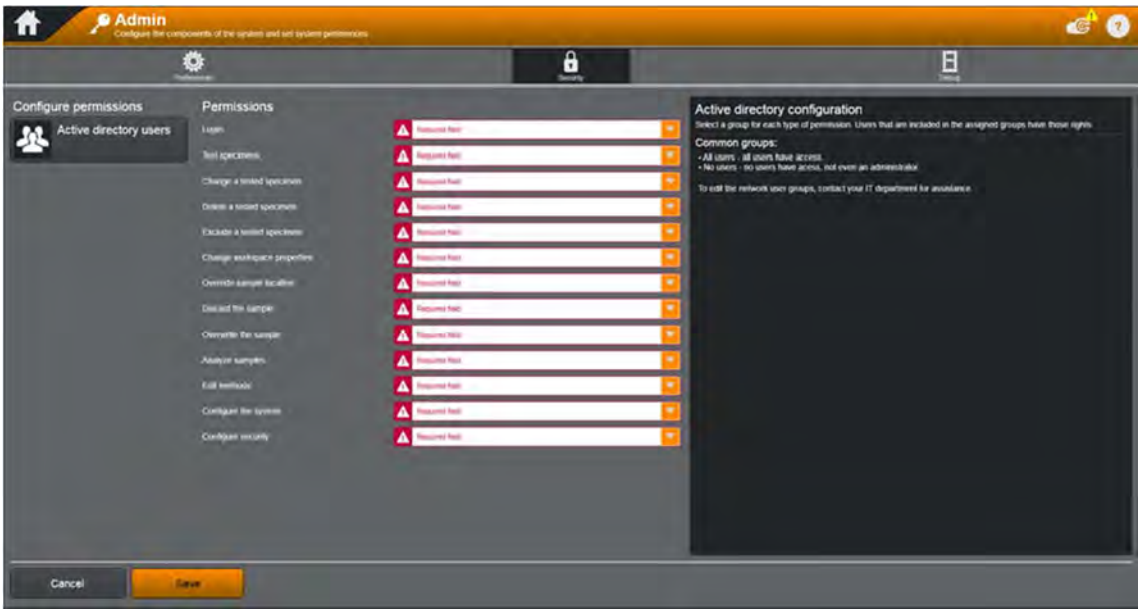
There are also two common groups for all permissions. They are "all users" which allows all users to have a certain permission, and "no users" which inhibits all users from having a certain permission.

Window® Directory

Windows® Directory is very similar to Active Directory security except it allows the software to validate security rights and permissions against the Local PC instead of a connected domain. This will require the Lab Manager to identify what user levels (permissions) are required, and coordinate with their IT department or an administrative user of the Local PC to create appropriate local groups and assign the appropriate users to each of these groups.

Upon the enabling of Windows® Directory, it is required to have a local administrator log in first. The first user to log into via Windows® Directory will be immediately prompted to assign group permissions. Please refer to the Permissions section below as these permissions and their functions are shared between all security types (Bluehill, Active Directory, and Windows® Directory).

Once the local administrator is logged in, they will be shown the screen below to assign each group permission appropriately.



It should be noted you may only choose one group per permission. On the grouping side of this exchange, you could place a single user as a member of multiple groups to help satisfy the exact list of permissions each individual user may have.

There are also two common groups for all permissions. They are “all users” which allows all users to have a certain permission, and “no users” which inhibits all users from having a certain permission.

Permissions

As noted above in each of the three security types, this section lays out each permission.

Login - The ability to log in to the software.

Test specimens - The ability to run a test.

Change a tested specimen - The ability to change values of specimen that have already been tested.

Delete a tested specimen - The ability to delete a specimen that has been tested.

Exclude a tested specimen - The ability to exclude and include specimens that have been tested.

Change workspace properties - The ability to change workspace component properties, for example, the graph settings.

Override sample location - The ability to save a sample in a location other than what is specified in the method, or the last saved location.

Discard the sample - The ability to close a sample, either by exiting the software or going to the home screen, without saving it.

Overwrite the sample - The ability to overwrite a sample that already exists.

Analyze samples - The ability to review or analyze a sample using the Analysis Module. This module may or may not be visible on your system as it requires a separate purchase.

Edit methods - The ability to create or edit an existing method.

Configure the system - The ability to change system settings, such as frame settings.

Configure security - The ability to change security settings.

Secondary reviewer - Available with Traceability only. The ability to acknowledge and signoff on changes made by a primer user.

Tertiary reviewer - Available with Traceability only. The ability to acknowledge and signoff on changes that have already been evaluated by a secondary reviewer.

Chapter 4

Creating a Test Method

A test method may be created by modifying an existing Method or defining a new one. This chapter covers creating a new test method. Selecting the Method Icon from the Home Screen will display the Method Tab with the option to create a new method from a specific test type, or choose an existing method.

If you want additional information about the various etst method types in Bluehill Universal, press F1 function key to bring up the Help menu.

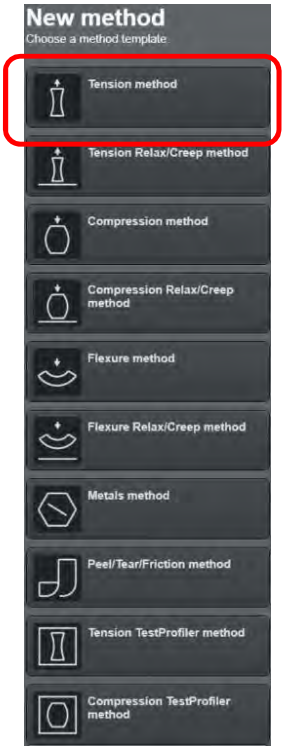
Getting Started

From the home screen, select the Method Icon

Test method types that are available to be used will be visible under the New Method section.

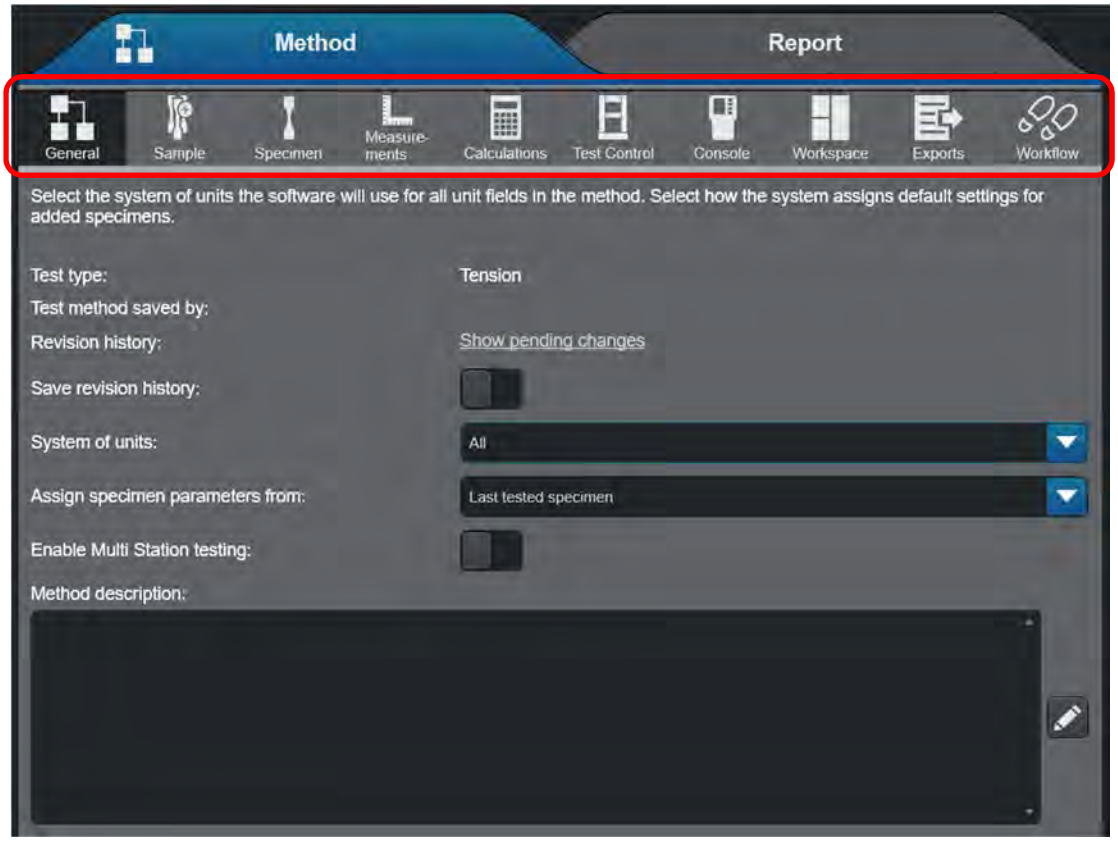
Existing methods files will be under the Edit Method section of this screen.

In this Chapter we will be focusing primarily on the Tension Method test type.



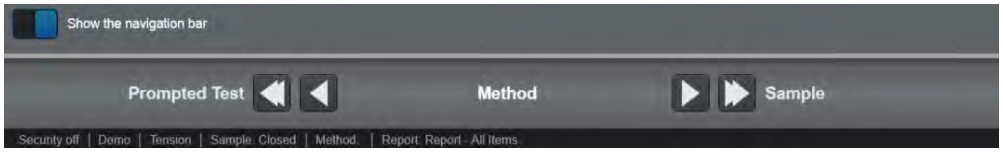
Setting General Parameters

Method parameters and features will be setup in the sequence listed, just under the Method tab as highlighted below.



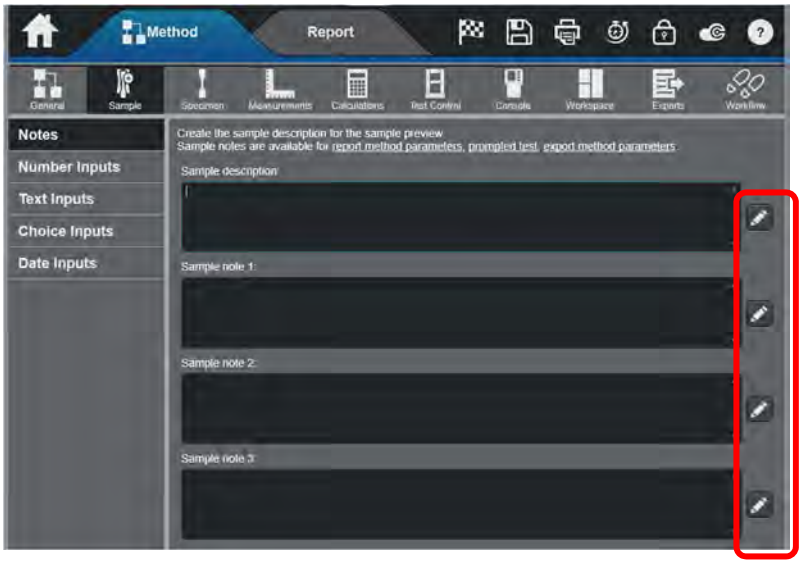
When a Method is opened it defaults to the General menu. This menu allows you to select the system of units to be used throughout the method. It also provides for a Method description which may include special hardware/software requirements, applicable standards, etc. To customize the field description, select the Properties icon to the right of the field to access the field dialog box.

The lower portion of the screen contains the Navigation Menu. This option will guide the user through specific screens in the Method tab which contain the basic selections required to define method parameters. When the Navigation bar is enabled, the navigation buttons display on the bottom of each screen in the Method tab.



Setting Sample Parameters
Sample - Notes

This screen includes the Sample description field and the Sample note fields. Field names can be modified or changed by selecting the properties icons on the right of each field as highlighted below.



The Sample notes are available for comments about the sample and are stored with all samples created with this test method. The text in the note fields are the default text that the system displays when a new sample is generated. Sample notes can be included in Workflow prompts, the report, the exported result files and the method parameters. Both the sample description and the sample notes apply to the entire sample, not to individual specimens within the sample. You cannot, therefore, add these fields to the Operator Inputs component of the test workspace. If you need to edit these fields while testing, you must go to the Method tab.

Hyperlinks are available at the top of each screen to provide a fast way to move around different method set up screens.

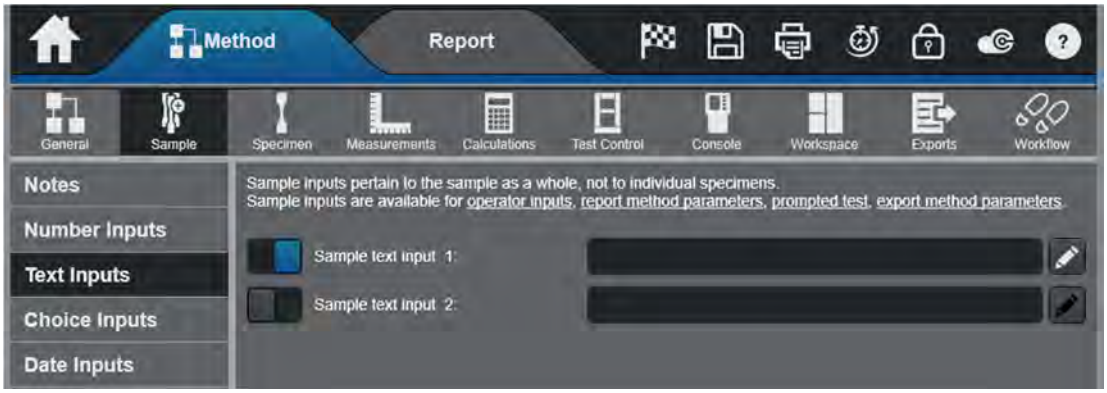
Sample – Number Inputs

The Number Inputs screen is where you can create a customized number parameter for the sample. When you create a new method, only Sample number input 1 is active. To activate additional numbered inputs, select the slider to the left of the numbered input. The software can create a total of fifty numbered inputs. The advantage of numbered inputs is that the value entered can be used with a user calculation.

The sample number inputs apply to the entire sample, not to individual specimens within the sample. To change the name of these fields, touch on the Properties icon for the associated field. A properties dialog box is displayed that is specific to a number value, including upper and lower bounds and decimal places. Use the bounds values to set a defined range for the default value. The bounds prevent an operator from entering a value outside of the defined range.

Sample – Text Inputs

The Text Inputs screen is where you can create a customized text parameter for the sample. When you create a new method, only Sample text input 1 is active. To activate additional text inputs, select the slider to the left of the text input. The software can create a total of fifty text inputs. The sample text inputs apply to the entire sample, not to individual specimens within the sample.



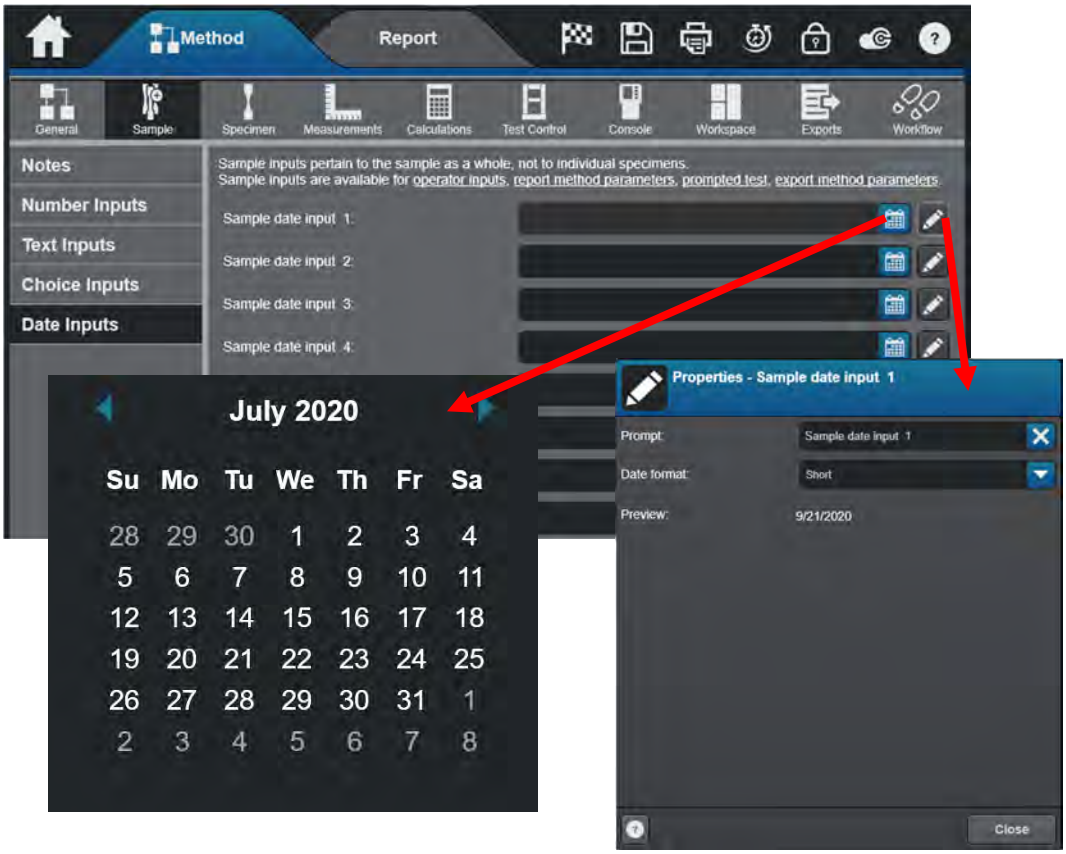
Sample – Choice Inputs

Choice inputs can be used in several ways. You can use a choice input if you have a fixed number of options for a parameter and you want the operator to be able to select one of these options from a drop-down list instead of typing the information into an input field. For example, if there are multiple operators that could run an entire sample set, you may create a drop-down list with a specific list of operators. At the beginning of the sample, this can be selected and applied to a report to represent the entire sample set.

A more complex use involves linking parameters, where making a choice automatically sets the values of test parameters that are linked to that choice. Please refer below to Specimen – Choice Inputs for more information.

Sample – Date Inputs

Date inputs can be used to customize a date parameter for the sample. When used, the operator is shown a calendar in which they can select a particular date. The date input prompt can be customized to reflect the corresponding test parameter such as date of test or date of sample conditioning. Dates can be expressed in long text form or in short numeric form.



Setting Specimen Parameters

Specimen - Properties

Select Specimen from the Navigation Menu.

The Geometry of the specimen will dictate the dimensions for each specimen. The properties button allows you to customize each applicable field and assign boundaries to each value.

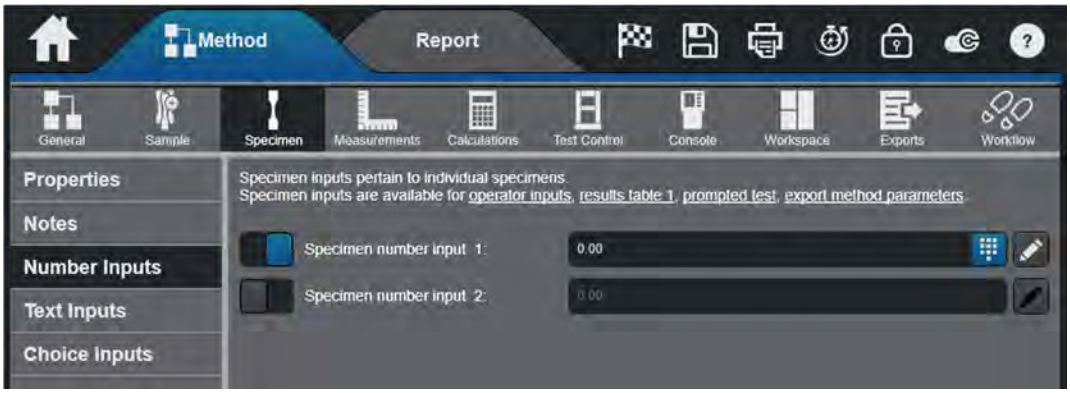
Note: The fields for Final width, Final thickness, and Final length do not need to be filled out and do not apply to area calculations. These fields are designed for users who wish to manually enter post-test specimen dimensions.

Specimen – Notes

Three note areas are available for any information specific to specimens in this Method. The Properties button provides for customizing each applicable field.

Specimen – Number inputs

Up to fifty specimen number inputs can be defined for each specimen. They may be used to input things like temperature, humidity or constants that can be used as variables in User Defined Calculations. The Properties button provides the ability to tailor the field nomenclature, assigning boundaries, default values and the resolution to each input value.



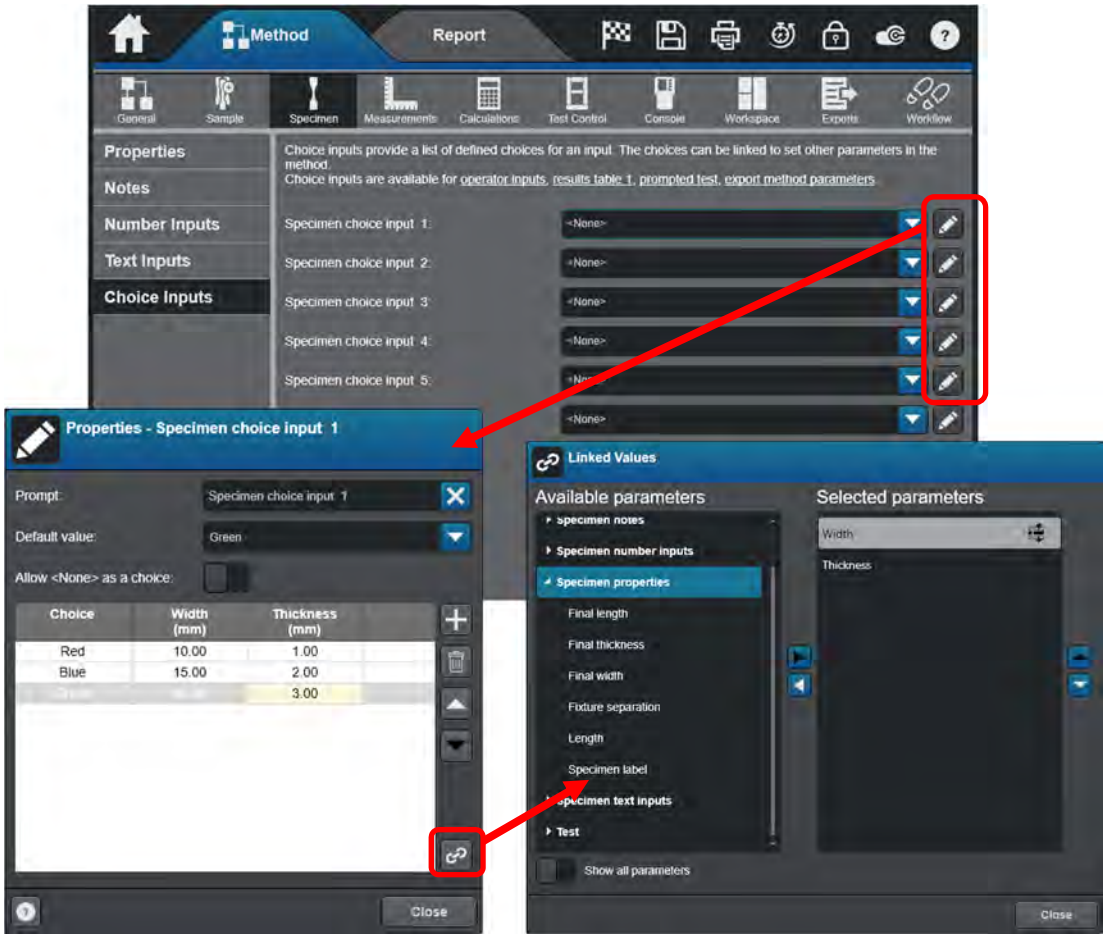
Specimen – Text Inputs

Up to fifty text inputs can be defined in a method that are applicable to each specimen. They may be used to input things like comments, color, etc. The Properties button provides for tailoring each respected field.

Specimen – Choice Inputs

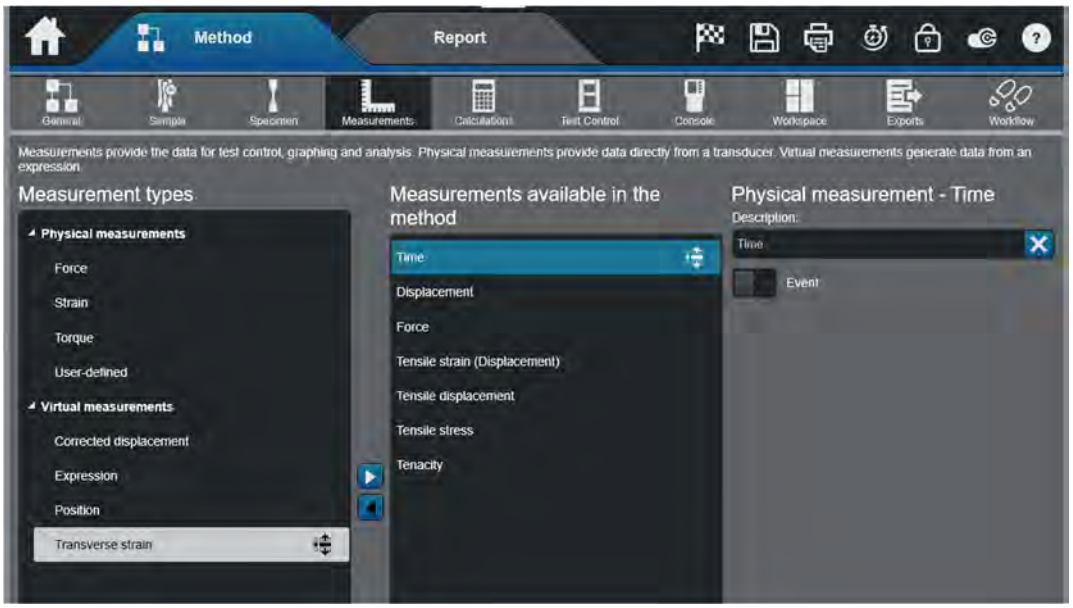
Choice inputs can be used in several ways. You can use a choice input if you have a fixed number of options for a parameter and you want the operator to be able to select one of these options from a drop-down list instead of typing the information into an input field. For example, if there are three types of specimens being tested (red, blue, and green specimens), you can create a choice input named Color that has Red, Blue and Green as selections in the drop down list. During testing, the operator only needs to select the type of specimen being tested.

A more complex use involves linking parameters, where making a choice automatically sets the values of test parameters that are linked to that choice. You can use the linked parameters to configure a choice input so that when the operator selects a choice, the values of one or more test parameters are automatically set (e.g. specimen dimensions or test speed). If you are using a prompted test, then add the choice input to the step in the sequence where you want the operator to make a selection for that input. Using a choice input rather than a number input or text input, simplifies the task for the operator and ensures that the information is consistent in spelling and format.



Setting Measurement Parameters

Measurements allow you to specify the data that is available for test control, data analysis and live displays. You can select predefined measurements or create customized measurements for specific testing requirements.



Measurements – Physical Measurements

These measurements provide data directly from a physical transducer connected to the testing instrument. The following is a list of standard physical measurements that will be available in a test method:

- Time
- Displacement
- Force
- Strain (When using an extensometer)
- Temperature

If you have connected an additional physical transducer to the testing instrument you must add the transducer to the software in the Admin section for it to be included in this listing.

Measurements – Virtual Measurements

Virtual measurements provide data about the specimen, but they are calculated from a mathematical expression using data from one or more physical measurements. Depending upon the type of test method the following is a list of standard virtual measurements that will be available:

Compressive displacement - Compressive displacement is a composite measurement calculated from compressive strain multiplied by the anvil height. Compressive displacement is reported using positive values for increasing compression.

Compressive Force - Compressive force is calculated as the standard force with the sign inverted.

Compressive strain - Compressive strain is a composite strain measurement. A composite strain measurement can change the source of its information during a test (i.e. changing measurement source from an extensometer to the crosshead).

Compressive stress - Compressive stress is calculated as compressive force divided by the cross-sectional area of the specimen.

Flexure displacement - Flexure displacement is a composite measurement calculated from flexure strain multiplied by an outer fiber strain factor. Flexure displacement is reported using positive values for increasing compression.

Flexure force - Flexure force is calculated as the standard force with the sign inverted.

Flexure strain - Flexure strain is a composite strain measurement. A composite strain measurement can change the source of its information during a test. Flexure strain is reported using positive values for increasing compression.

Flexure stress - Flexure stress is calculated as flexure force divided by an outer fiber stress factor. Flexure Stress is reported using positive values for increasing compression.

Force/Width - Force/Width is calculated by dividing the readings of the force measurement by the width of the specimen.

Peel displacement - Peel displacement is calculated as displacement divided by a peel factor. The value of the peel factor varies according to specimen geometry. For 90° peel specimens and friction specimens, the peel factor is 1. For 180° peel specimens, T-peel specimens and tear specimens, the peel factor is 2.

Position – Only available on 6800 Series Systems. It is the absolute position of the crosshead relative to the total allowable movement within the test area. This value is used by the system to establish proper fixture position when Auto Positioning is enabled.

Tenacity – Is a measurement used for fiber testing. It is calculated as force divided by linear density.

Tensile displacement - Tensile displacement is a composite measurement calculated from tensile strain multiplied by the specimen gauge length.

Tensile strain - Tensile strain is a composite strain measurement. A composite strain measurement can change the source of its information during a test.

Tensile stress - Tensile stress is calculated as force divided by the cross-sectional area of the specimen.

Virtual Measurements – Corrected Displacement Measurement

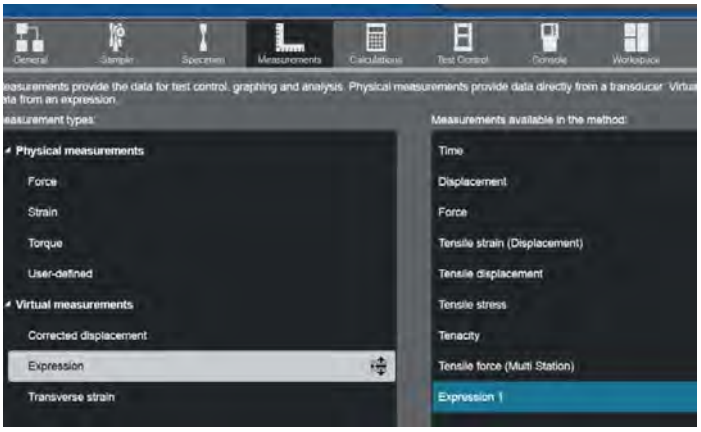
This measurement corrects values of displacement to allow for the compliance, or elastic "give", of the testing system. It is measured in mm/kN or equivalent units. The compliance is determined by performing a test using a dummy specimen that shows negligible deformation at the maximum test force. It is important to understand that compliance is a property of the entire testing system, not only the load frame. When you perform the test to create the compliance file you must use the exact same components in the testing system as you will use for testing, including the load cell, grips and couplings.

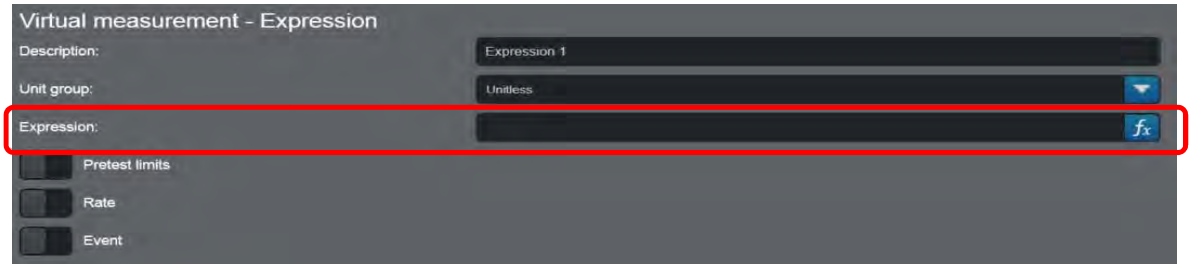
Virtual Measurements – Creating an Expression

To create a virtual measurement expression, you must select the Expression in the Measurement Types and add it to the selected measurements.

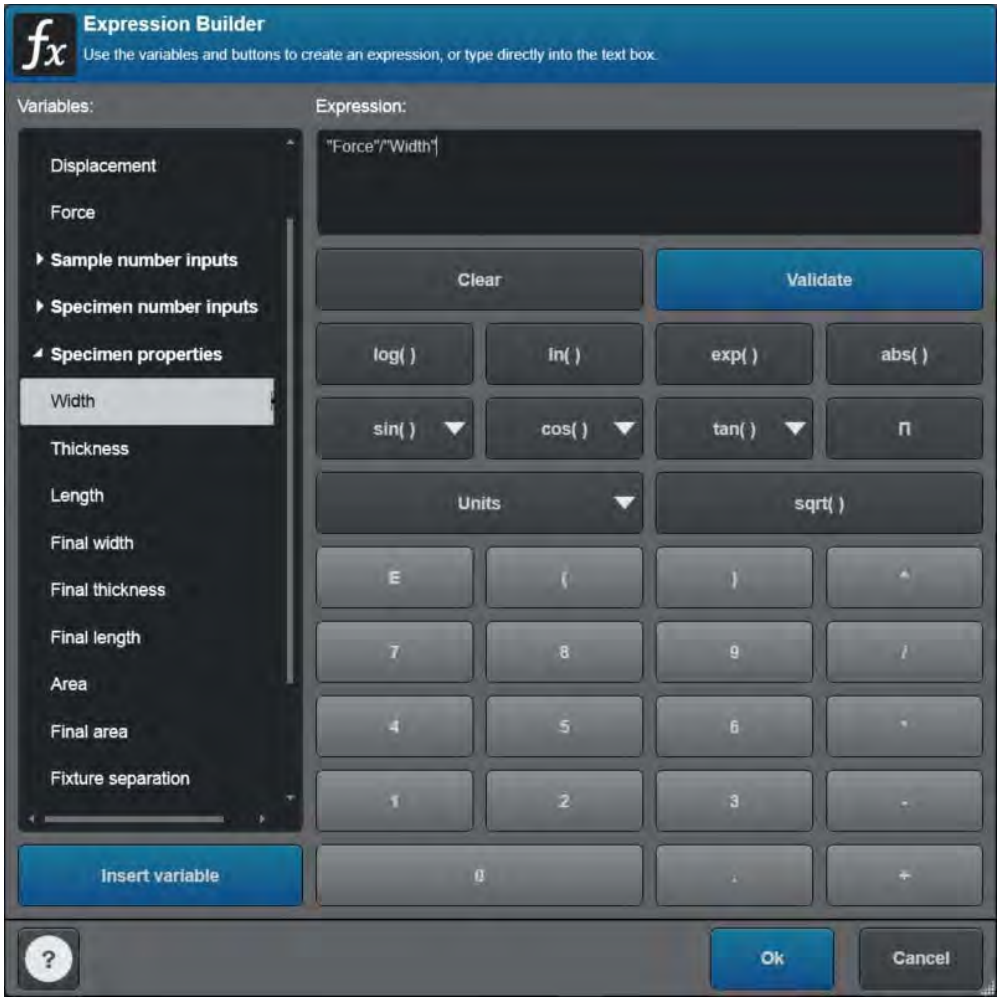
Once the Expression has been added to the list you can select it with your mouse and the properties for the measurement will be displayed. First, identify the units of the measurements.

Once you have done this you must build the formula to calculate the measurement, this is done by touching on the Expression Builder icon to the right of the Expression field.



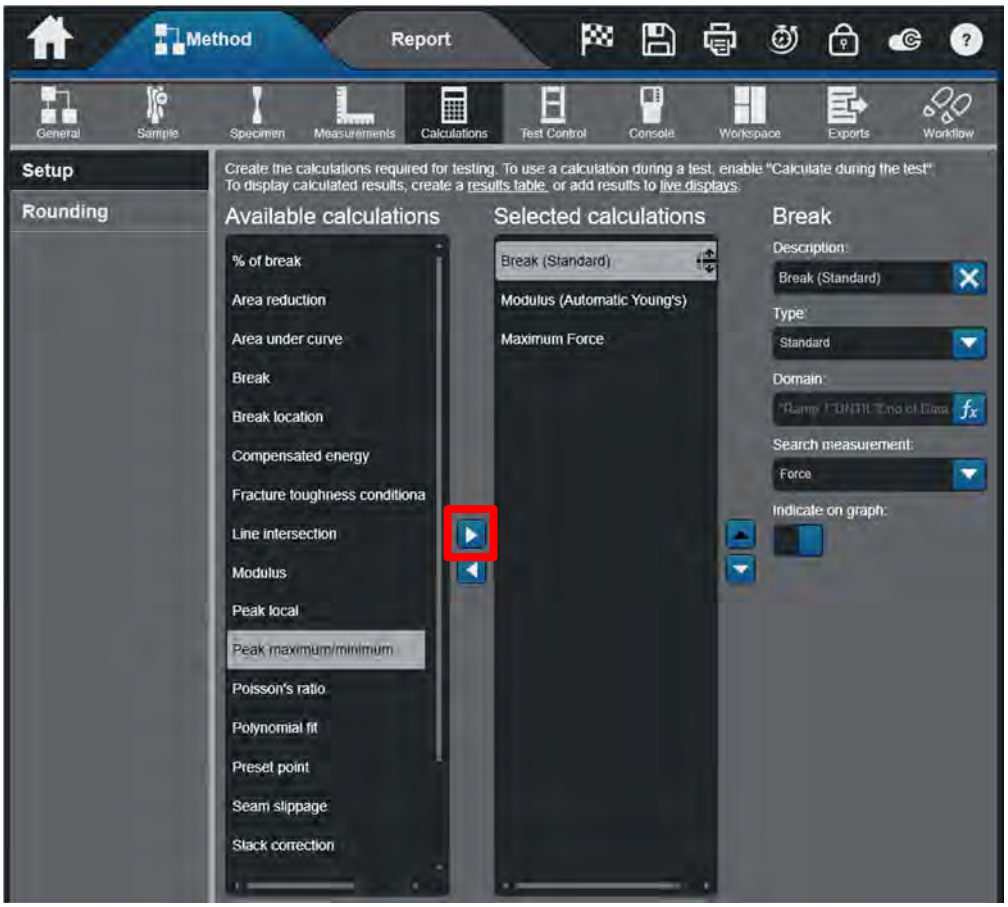


The expression builder allows you to create formulas to calculate virtual measurements, custom calculations, and logical expressions that can evaluate specific values without requiring custom software. Creating virtual measurements only requires typing the formula into the expression window or selecting values from the variables list and adding the necessary mathematical function. Once you have completed constructing the formula, Touch on the validate button and the system will check to ensure it is valid.



Identifying Calculations
Calculations – Setup

The Calculations Setup screen is used to display the purpose of calculations. Once calculations are added to the selected list, specific results can be pulled into the workspace area or used within one of the live displays.



To add a calculation, do one of the following:

- Double-click the calculation in the Available calculations list
- Select and drag it from the Available calculations list to the Selected Calculations list
- Select it and use the add button (highlighted above).

Once the calculation is in the Selected calculations list, the parameters for that calculation will be displayed in the lower section of the window. Here you can change the name of the calculation, identify the measurement data the calculation will use, and (if desired), the domain that defines the region of data the calculation will use.

Note: The term Domain refers to the portion of the data the software will analyze to calculate the results. By identifying a domain, you limit the analysis to a specific region of the test data.

To identify the domain, select the Expression Builder icon (highlighted above) to the right of the Domain field. Using the Domain operators within the expression builder, you can identify the Domain for the calculation.

Calculations – Indicate on Graph

If you select the Indicate on graph slider, a marker will appear on the graph at the point or region that the calculation was performed. The style of marker is a function of the graph setup within the Workspace item of the method.

Calculations – Calculate during the test

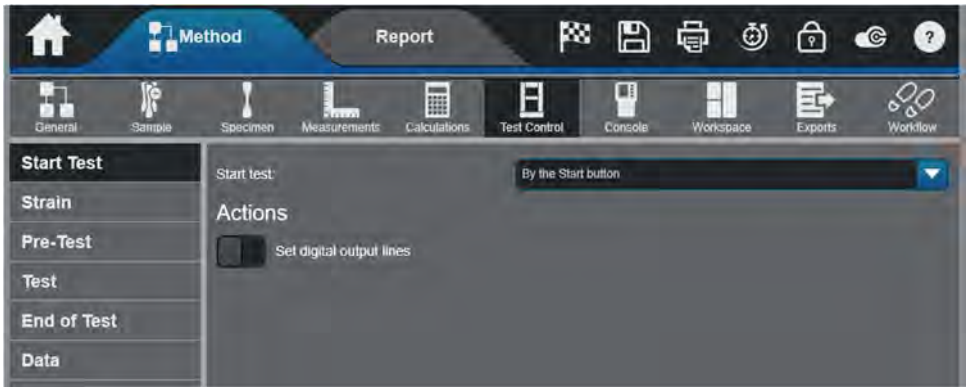
Unless otherwise indicated, all calculations are performed at the end of a test. Some calculations may be performed during the test by selecting this slider. This is necessary when a calculation is used as a test control parameter, such as a removal criterion for an extensometer.

Calculations – Rounding

The software allows you to create specific rules for rounding calculation values. Testing standards may identify specific requirements for rounding values, so this screen lets you create a customized rounding format to satisfy such requirements.

Setting Test Control Parameters

Test Control – Start Test

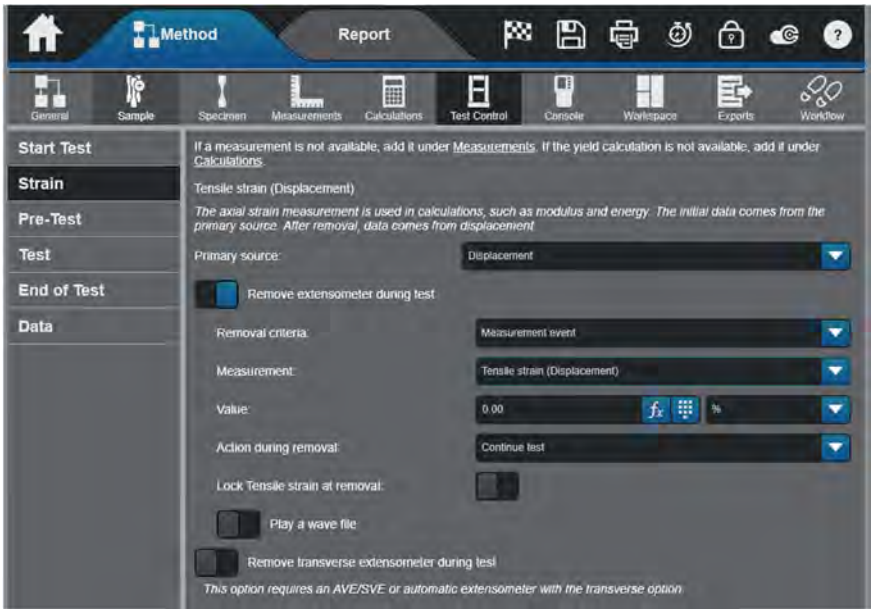


The selection made on this screen determines how the test will start.

- **By the Start button -** This is the default setting and requires you to select the Start button on the test workspace in the software or press the Start button on the frame control panel (if applicable).
- **When pneumatic grips close -** This option is only available if pneumatic grips are in use with a compatible grip control system. When you select this option, the test starts automatically after the lower grip closes on the specimen.
- **Digital input -** The test starts automatically when the system receives a signal through the specified digital input line from an external device. Set the digital input condition for the specified input line in the Load Frame Settings area of the console. (Requires the Analog-Digital I/O option).

Test Control - Strain

When you assign a channel as the primary source of data for a composite strain measurement, you have the option to remove that channel at a point during the test. Up to the point of removal, the system derives the values of tensile, compressive or flexure strain directly from the source device (i.e. crosshead or extensometer). After the extensometer is removed, the system derives its values of tensile, compressive or flexure strain from crosshead extension or actuator position. The extension readings made after the removal of the extensometer are corrected and normalized using the Extensometer Removal Correction Algorithm.



If removal of the extensometer during the test is required, identifying the point of removal can be done as follows:

% peak Force - The detector is inactive until the strain specified in the Strain Threshold field is exceeded. After that value is attained, the removal point is determined when the detector finds the specified percentage the force has dropped from the peak force.

Force Threshold - The removal point is when the force falls to the Force drops to value. The force must first attain a value 1.5 times the specified value before the detector begins searching for the Force drops to value.

Measurement event - The transition occurs when the system detects that the specified measurement criteria are satisfied. The parameters for this event require a measurement and specified value criteria.

Digital input event - The transition occurs when the system receives a signal from an external device through the specified digital input line. This event requires a specified digital input line. Set the digital input condition for the specified input line in the Load Frame Settings area of the console.

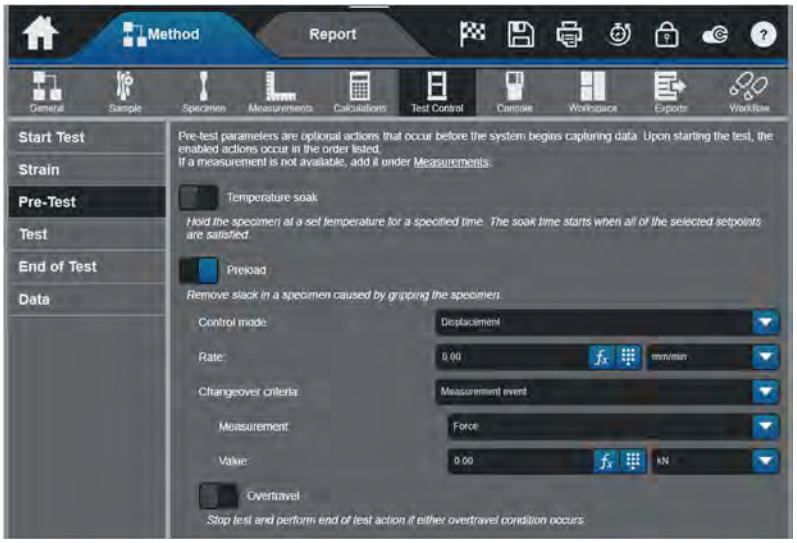
Warning: One of the parameters of extensometer removal is "Action during removal". It may be necessary to pause the test to allow the operator the ability to safely remove the Extensometer.

Test Control – Pre-Test

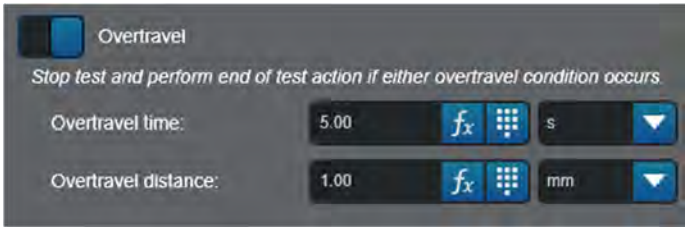
If Preload, Auto balance or Precycling are required for this test, define the parameters here.

- **Temperature Soak –** This option allows specimens to be held at a specified temperature until the soak time criteria is met.

- **Preload -** This feature is often used to remove slack from test fixtures or may be required by the test specification. If required select the control measurement, preload rate, target measurement, and the target value.



- **Overtravel –** This sub-feature of the Preload will stop the test and perform the end of test action if the overtravel conditions occur. The overtravel limits include:
  - ***Overtravel time* -** Preload must finish and the system proceed to the next zone of the test within the specified time.
  - ***Overtravel distance* -** Preload must finish and the system proceed to the next zone of the test before the crosshead/actuator travels the specified distance.



- **Auto balance -** This feature automatically balances the transducers associated with selected measurements. The system balances the transducer after pre-load and before the ramp 1 (or pre cycling if it is enabled). When you enable Auto balance, the screen expands to display two lists, Available Measurements and Selected Measurements.

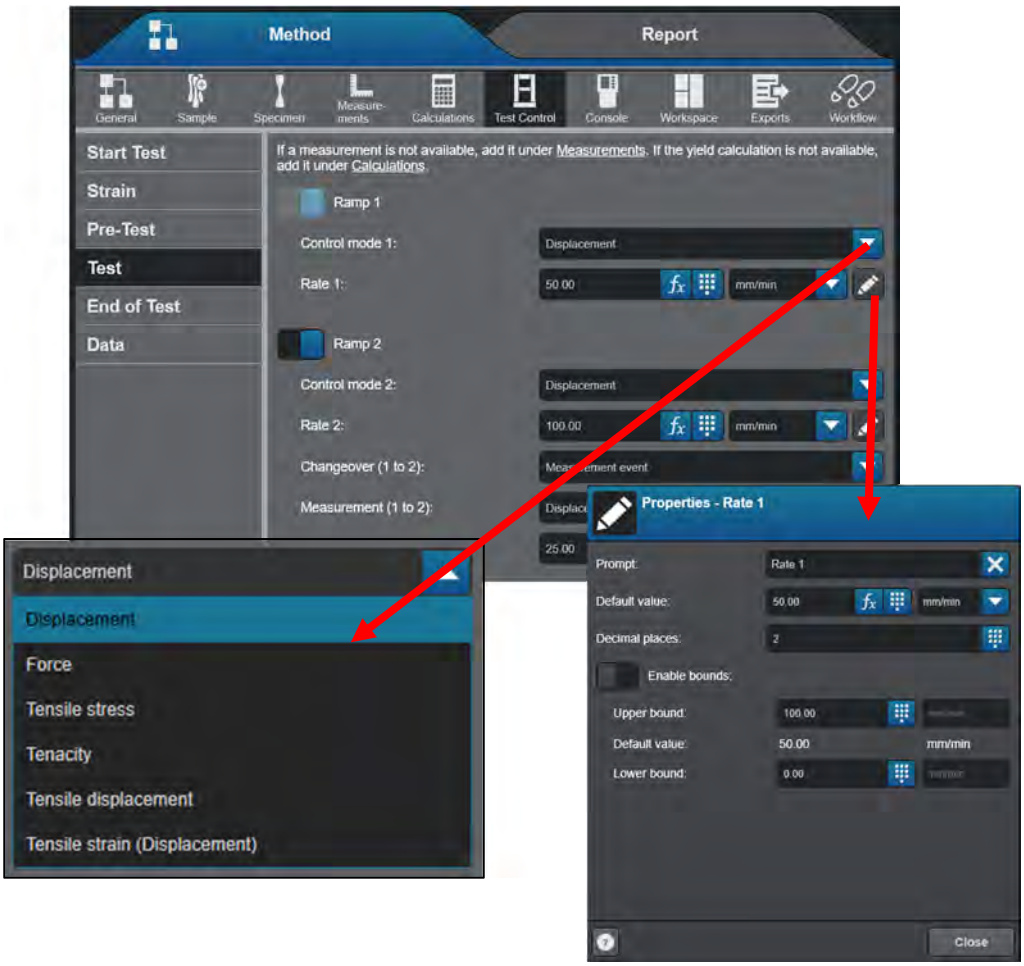
- **Precycling -** This may be required for some tests, (e.g. load cell verification). If required, set the number of cycles, control measurement and rate, the maximum and minimum target and the target values. Targets do not have to be the same measurement. Capture Precycle Data provides for saving and viewing this portion of the test.

Note: Precycling is not available in every testing type. Refer to the applicable testing type to determine the availability.

Test Control – Test

Test parameters may differ depending on the test type. Tension and Compression test types provide two-speed testing. The Metals test type provides three-speed testing. All other test types are single speed tests*. Test speeds are usually dictated by the test specification or standard

***TestProfiler will allow users to create up to 85 zones of varying speeds.**

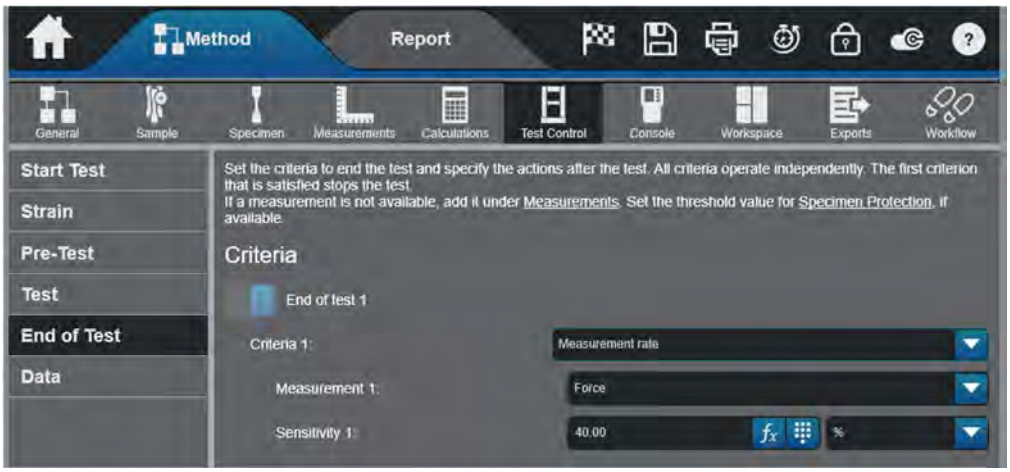


Select the control measurement and rate for each required ramp. The Properties button provides for customizing the prompt, default values, resolution and boundaries and the Expression Builder button enables you to create an expression to determine the speed of the ramp.

Test Control – End of Test

This screen allows you to set the criteria for ending the test and the actions that the system performs when one of the end of test criteria is satisfied. The system has a default setting for End of Test 1 so there is always at least one end of test action in every test method.

There are up to four separate end of test criteria available. These criteria operate independently and the first one that is satisfied stops the test.



The type of events that are available depend upon the transition type and test type. These can be generalized as follows:

Measurement level - The transition occurs when the specified measurement criteria are satisfied. The parameters require a measurement and specified value.

Digital input event - The transition occurs when the system receives a signal from an external device through the specified digital input line. This event requires a specified digital input line. Digital lines are configured in the Frame Settings area of the console.

Calculations - The transition occurs when the specified calculation criteria are satisfied.

Depending upon the option selected, additional fields may display to set the necessary criteria for the selected event.

The following table provides additional information, including the associated parameters, for the calculation events and system events.

Note: It is important to know that this action is different from the Break Calculations and if not set properly may end a test before the desired time.

Criteria for End of Test

End of Test options	Associated criteria
Measurement rate	Measurement Sensitivity The test ends when the selected measurement drops by the Sensitivity percentage within a 100ms time period. The sensitivity is measured as a percentage of the measurement at the beginning of the 100ms period. The system begins searching for the specified criteria when the measurement first attains a value equal to 1% of the full scale value for the associated transducer.
Measurement level	Measurement Value The test ends when the selected measurement reaches the specified value.
Measurement drops to value	Measurement Value Activation level The system begins searching for the specified criteria when the measurement reaches the specified Activation level point. After this point, the test ends when the measurement drops to the specified value.
Measurement drops to value after delay	Measurement Value Delay The system begins searching for the specified criteria after the delay period is complete. The test ends when the selected measurement drops to the specified value. Note that the delay period begins when the test starts acquiring data.

End of Test options	Associated criteria
Measurement drops by value	Measurement Value Activation Level The system begins searching for the specified criteria when the measurement reaches the specified Activation level point. After this point, the test ends when the measurement drops by the amount specified in Value.
Measurement % drop from peak	Measurement Value Activation Level The system begins searching for the specified criteria when the measurement reaches the specified Activation level point. After this point, the test ends when the system finds the specified percentage drop value from the peak value for the measurement.
Axial strain source becomes invalid	No associated fields. The test ends if data from the device allocated to the axial strain source becomes invalid. This might happen when using a video extensometer and the extensometer looses track of the marks on the specimen.
Digital input event	Digital input The test ends when the system receives a signal from an external device through the specified digital input line. This event requires a specified digital input line. Digital lines are configured in the I/O Settings area of System Details.
PIP count	Value The test ends when the system detects the specified number of PIP marks.

End of Test Actions

Select an End of Test action that defines the behavior of the crosshead/actuator when one of the End of test criteria is satisfied. The End of Test actions are:

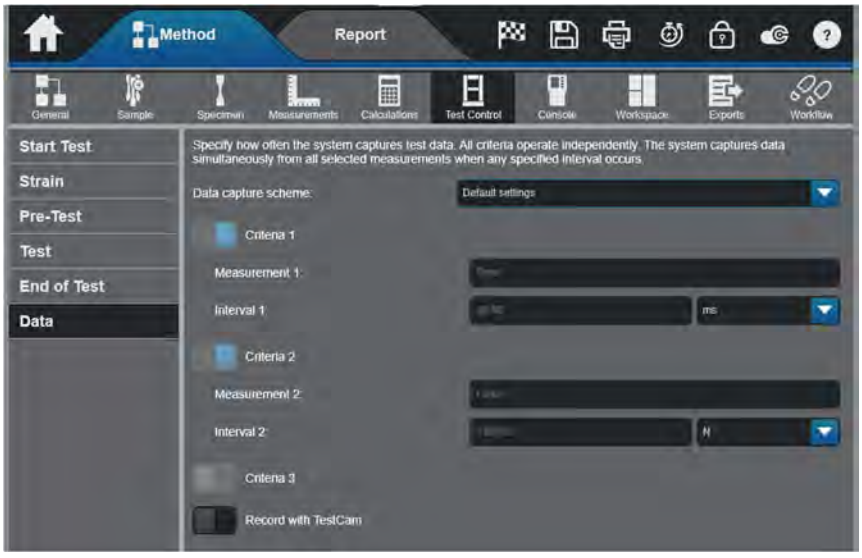
Stop	The crosshead/actuator stops.
Return	The crosshead/actuator stops and returns to the set zero displacement point.

Test Control - Data

This setting defines how frequently the system captures test data and saves it to a raw data file. The system acquires test data simultaneously from all available measurements at the specified intervals. The software provides two data capture schemes:

- **Default settings -** Standardized measurements and interval values for the method. These parameters cannot be changed.
- **Custom settings -** Up to three criteria are available so you can specify the measurements and interval values required for testing.

Note: For 3300 and EMIC 23 controllers, only the Default settings are available, with Time as the specified criteria.



The data collection controls are the same for all test types but the intervals that are available vary depending on the controller for the system and is compatible.

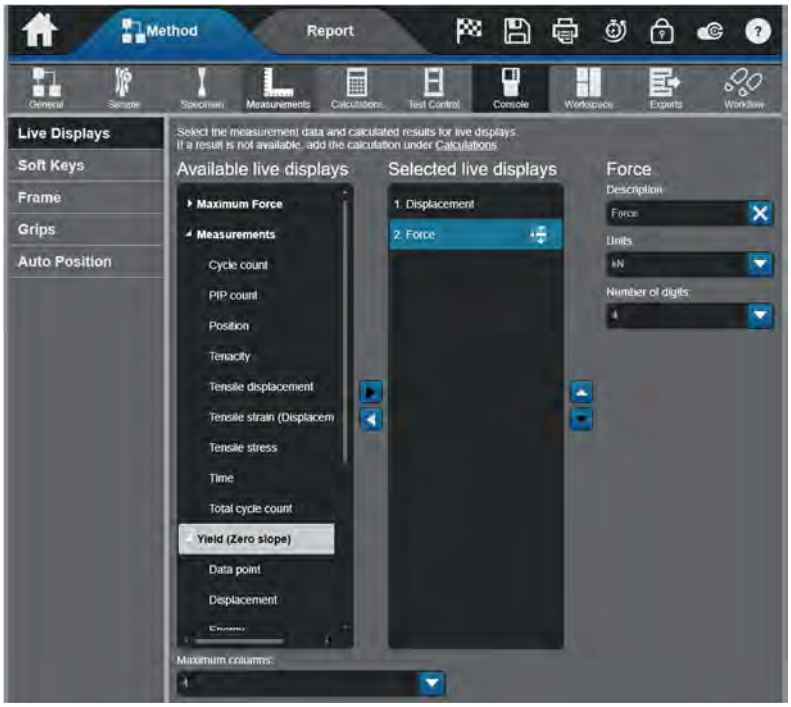
Record with TestCam

Select this option to enable the TestCam for recording. You must enable this option to record a test using a web camera that is connected to the system.

Set the video frame interval to establish the rate at which the web camera records a test. If the frame interval is set outside the limits of the camera, a warning message displays when you start a test. The message indicates the frame interval range for the connected web camera.

Defining the Console
Console – Live Displays

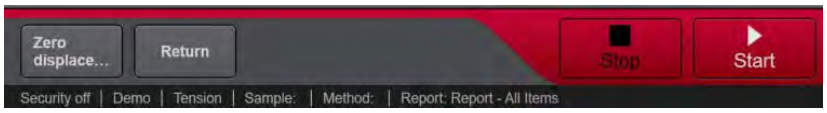
This is where you customize the live displays that appear in the console area when you have a test method open or when you are running a test with this method.



When you edit the Selected Live Display list, the system automatically updates the console to reflect the changes made. Each live display shows the value and the units of the associated measurement or result. For certain systems, these live displays also appear on the control panel.

Console – Soft Keys

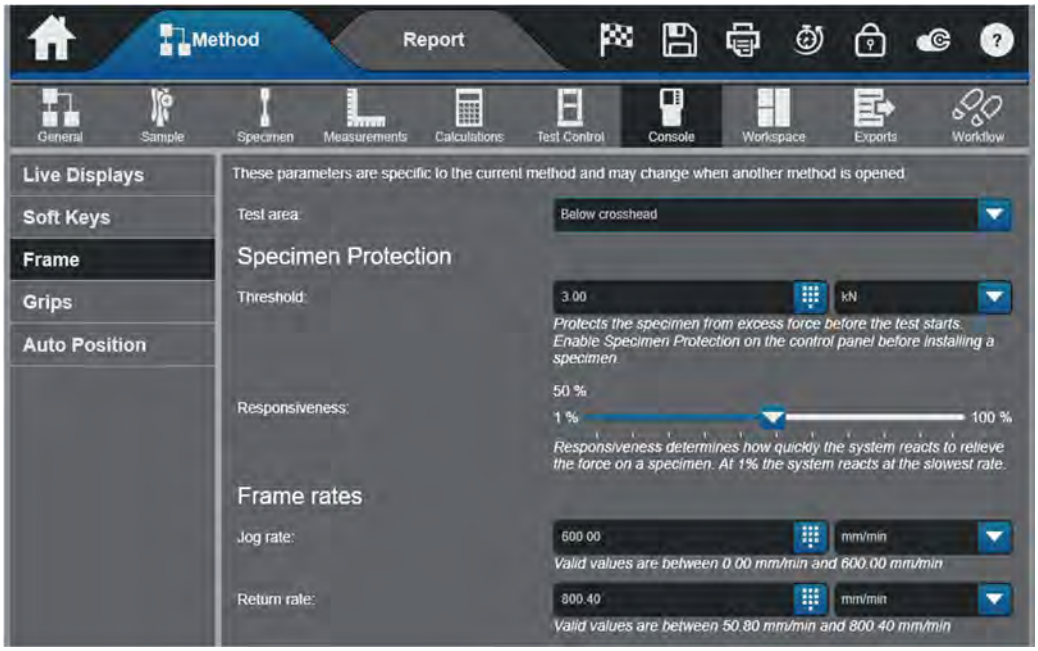
The Soft Keys enable you to selectively program functions that can be used either through the software or on the handset of the testing instrument. The Soft Keys will be visible at the bottom of the Test screen.



Soft Keys provide a quick way of performing various tasks such as balancing a measurement or zeroing the Displacement channel. By assigning a task to a soft key, you can quickly perform the task by touching the soft key in the Console area or pressing the associated button on the frame control panel.

Console – Frame

This area of the method contains the general settings for the frame that are specific to a test method. These settings include the Test Area and the Specimen Protect feature.



Test Area

The Test Area can be either above or below the crosshead on some systems. It is important to establish where testing will occur so that the test performs correctly. The system uses the Test Area setting to correctly interpret the various signals and actions for a test. For instance, the crosshead will move up for a tension test; however it will move down if the Test Area is set for Above Crosshead.

Warning: Ensure that you select the correct test area for the test. An incorrectly set test area can cause unanticipated crosshead behavior and create a safety hazard that may damage the specimen or load cell. Check the Load Frame Status indicator in the console area to verify the test area and test direction before starting a test. Press the Emergency Stop button if the frame moves in an unexpected direction.

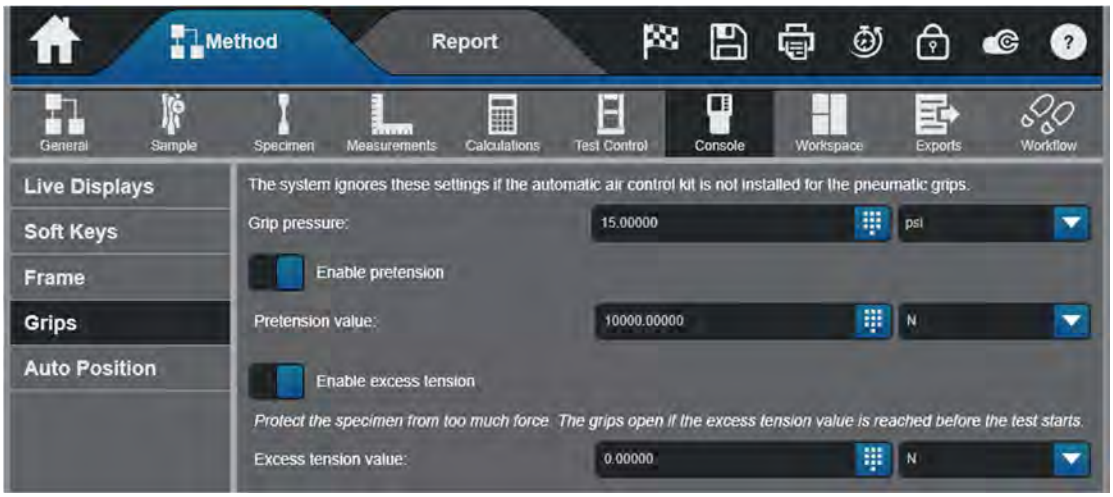
Specimen Protect

The specimen protect feature protects the specimen from too much applied force when it is installed. Set the threshold value at the maximum force that the specimen should ever experience prior to testing. If force exceeds this value, specimen protect initiates movement of the crosshead to relieve the force on the specimen.

The Responsiveness slider will set how quickly the system reacts to force applied on the load cell/specimen.

Console – Grips

The Grip area contains the pretension and excess tension settings for the optional grip control system. The optional grip control system lets you control pneumatic grips using a foot switch, leaving your hands free to handle delicate or fragile specimens.



Two Stage Gripping (3400 and 6800 Only)

3400 and 6800 systems support a two stage gripping sequence: an initial grip pressure for closing the grips and a grip pressure to secure the specimen during a test.

Initial grip air pressure is the restricted air pressure applied to the specimen when the system is in Set Up mode. The restricted air pressure lowers the force applied by the grips and the speed at which the grips close. This allows the operator to close the grips on the specimen with sufficient pressure to hold the specimen in place while reducing the risk of injury. The initial grip pressure is defined in the Operator Protection settings under the Admin > Configuration > Frame menu.

Note: Security must be enabled to change Operator Protection settings.

When the system transfers to Caution mode, the system adjusts the grips to the air pressure specified in the method before the test starts.

Console – Auto Position (6800 Only)

Automatic Positioning allows the system to automatically position the crosshead to the correct test position based on the method selected for the sample. This eliminates the operator from having to manually maneuver the crosshead to the appropriate test position when starting a new test.

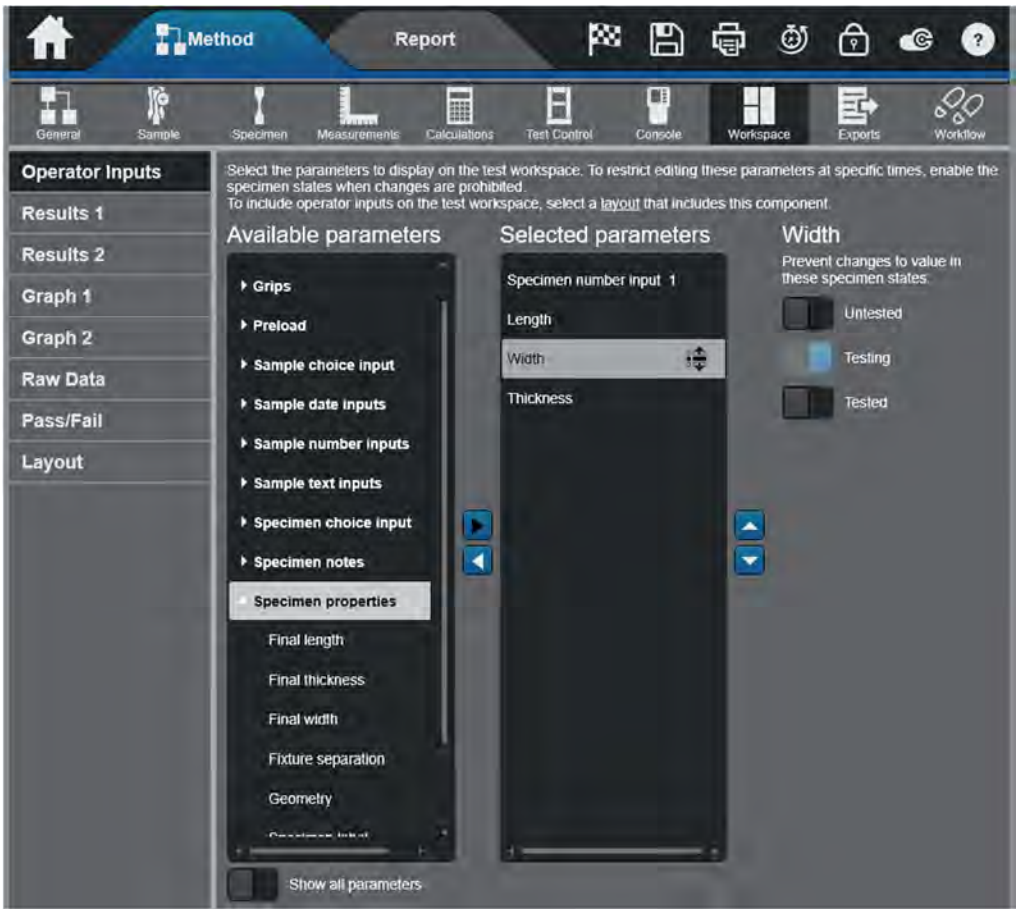
When Automatic Positioning is enabled, you must have a fixture profile that identifies the set of fixtures required for testing with this method. Fixture profiles can be created on the Admin tab under Configuration > Fixtures, or you can create a specific fixture profile in the method that is only available in the one method. To use this method on a different testing system, the fixture profile must be reconfigured on the other system.

The system must have the following information to automatically position the crosshead for testing:

- The zero position for the fixture required for testing. The zero position identifies the position of the crosshead where the upper and lower fixtures contact each other. You must create a “fixture profile” on the Configuration > Fixtures screen on the Admin tab to save this information for each fixture configuration.
- After a fixture profile is saved, it continues to be available after the frame is restarted.
- The required separation between the upper and lower fixtures at the start of the test, which is dependent upon the size of the specimen. This value is defined as the Fixture separation and is located on the Specimen > Properties screen on the Method tab.

Defining the Workspace
Workspace – Operator Inputs

The Operator Inputs page lets you select sample and specimen parameters to prompt on the test workspace. These display in the Operator Inputs screen component of the workspace.

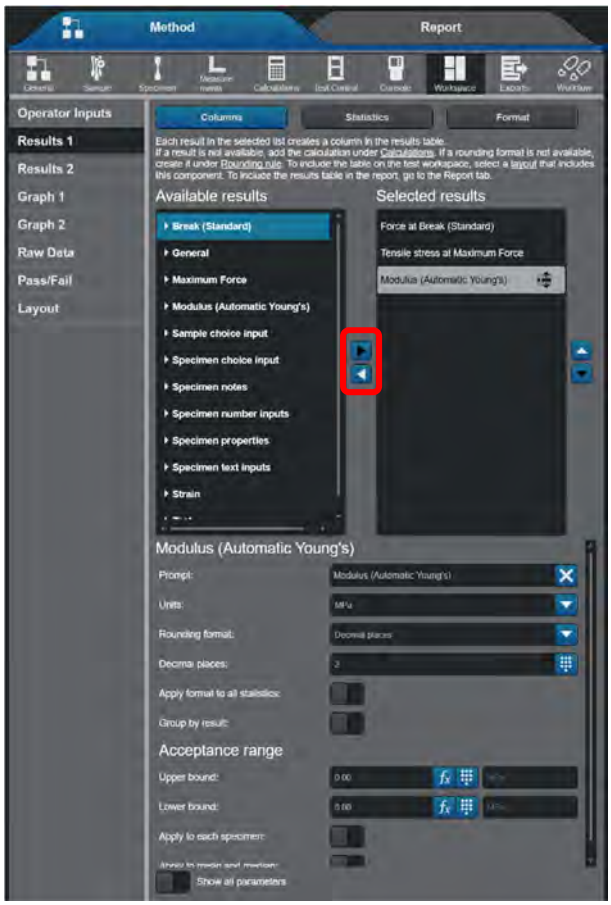


Parameters that are included on the test workspace are always available, even during a test. You can use this feature to enter specimen parameters for the upcoming specimens while the test on the first specimen is running.

Workspace – Results 1 and 2

Results Columns

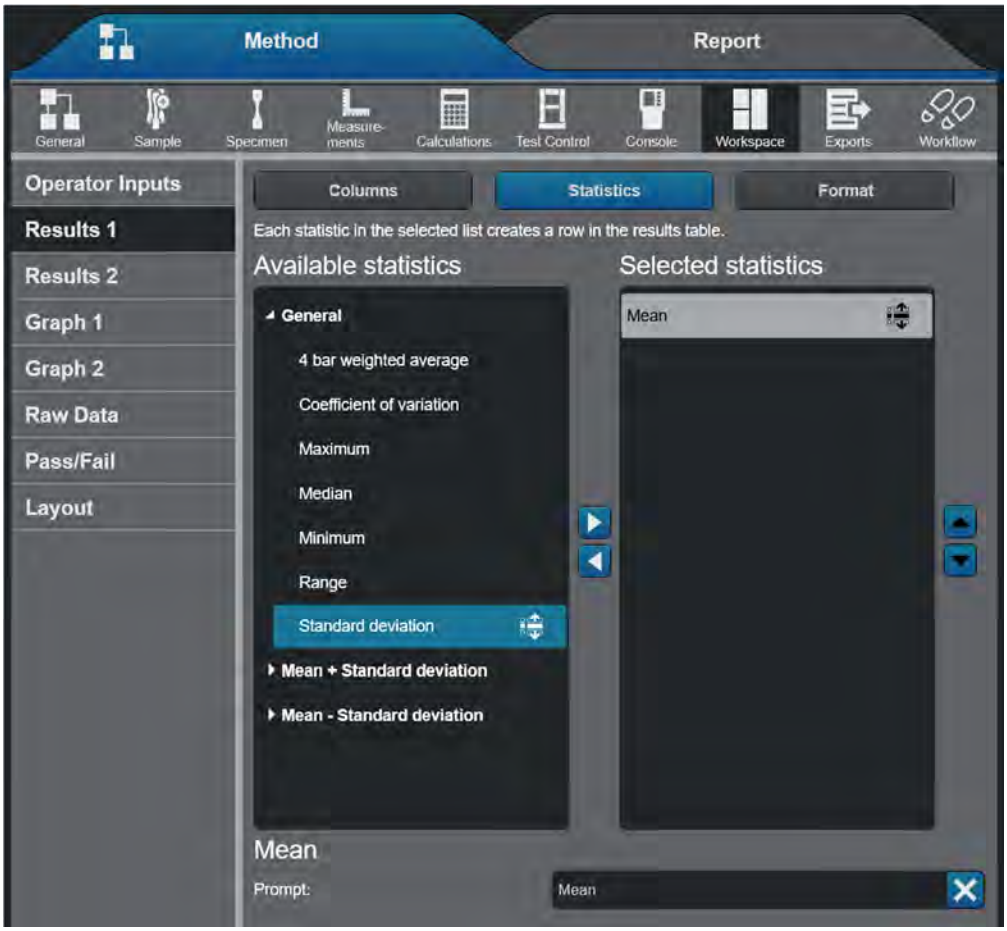
The Results tables define the test information to be displayed in the test workspace. The software provides two unique Results Tables, each containing any available calculation results and general information.



Once a calculation has been selected within the method, it will appear on this screen. Expanding the calculation will display the results associated with the calculation. To add a result to the Results Table, double tap the calculation into the Selected results field. For each selected result, a customizing window in the lower right enables the user to define the parameters associated with the result.

Results – Statistics

This area defines the statistical information to be included in the results table.



Add a statistic from the Available list to the Selected list by double tapping on it, or by touching on the right arrow in the center of the screen. Highlight a Selected statistic to customize the applicable fields that appear in the lower right corner of this screen.

Results – Format

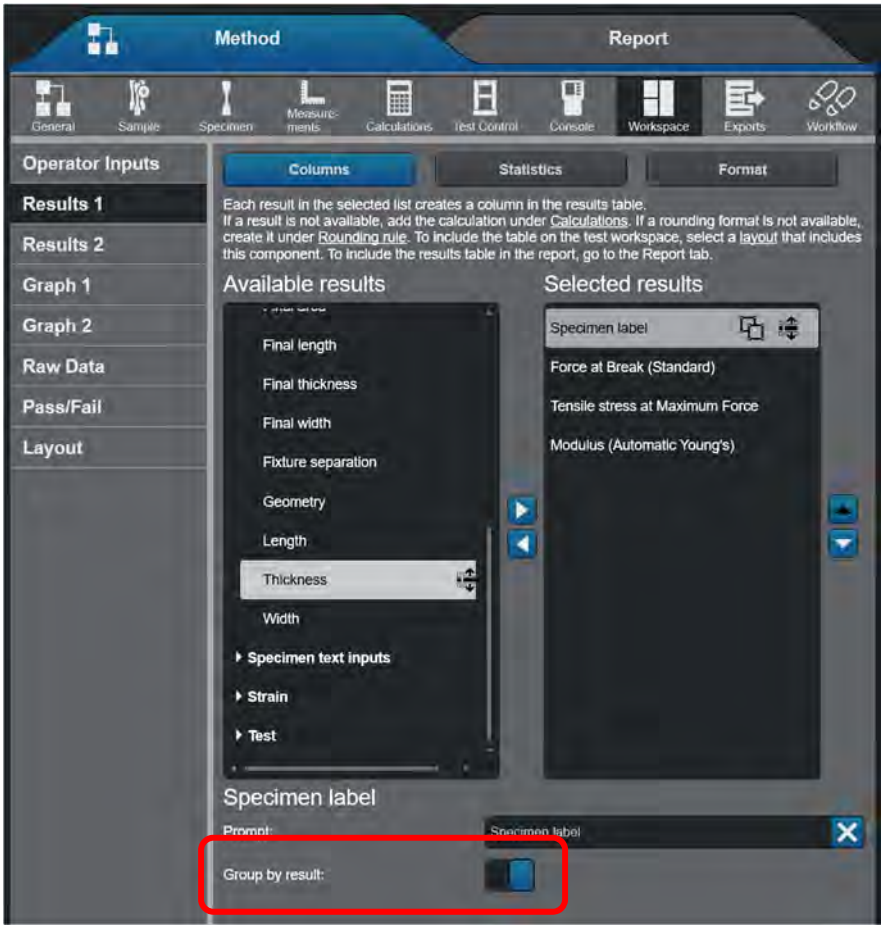
This area defines the physical appearance of the results table.

You can select a style for the Results Table and customize the Headings and Body of the table to your personal preference.

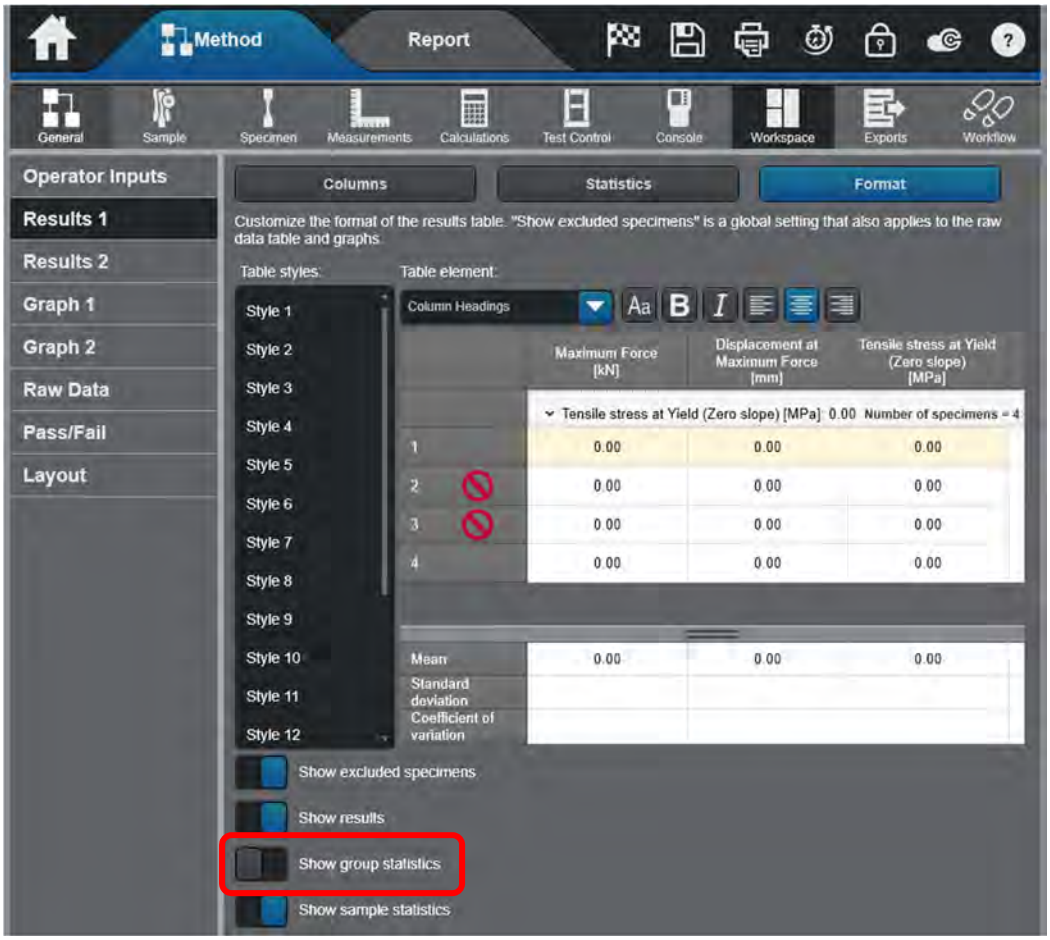
Results – Group by Results

You may also group and sort your results in the results table. The following example will show grouping the results of a sample set by the specimen label of the tested specimens.

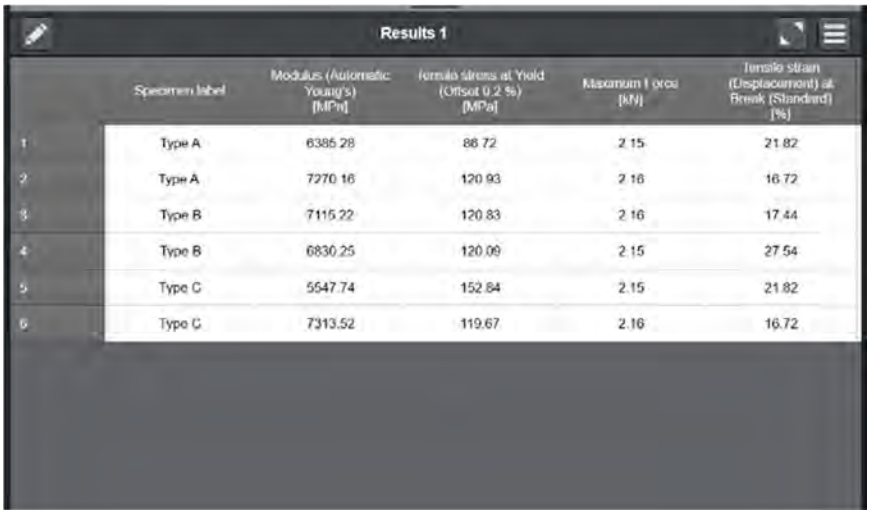
After populating your results table with the desired results, select which one you would like to group by, then toggle on Group by result.



To separate the sample set statistics by the grouped result, toggle on Show group statistics from the format menu.



Below you will see the results table before (top) and after (bottom) grouping the table by a certain result.



Results 1

	Specimen label	Modulus (Automatic: Young's) [MPa]	Tensile stress at Yield (Offset 0.2 %) [MPa]	Maximum Force [kN]	Tensile strain (Displacement) at Break (Standard) [%]
1	Type A	6385.28	86.72	2.15	21.82
2	Type A	7270.16	120.93	2.16	16.72
3	Type B	7115.22	120.83	2.16	17.44
4	Type B	6830.25	120.09	2.15	27.54
5	Type C	5547.74	152.84	2.15	21.82
6	Type C	7313.52	119.67	2.16	16.72

Results 1

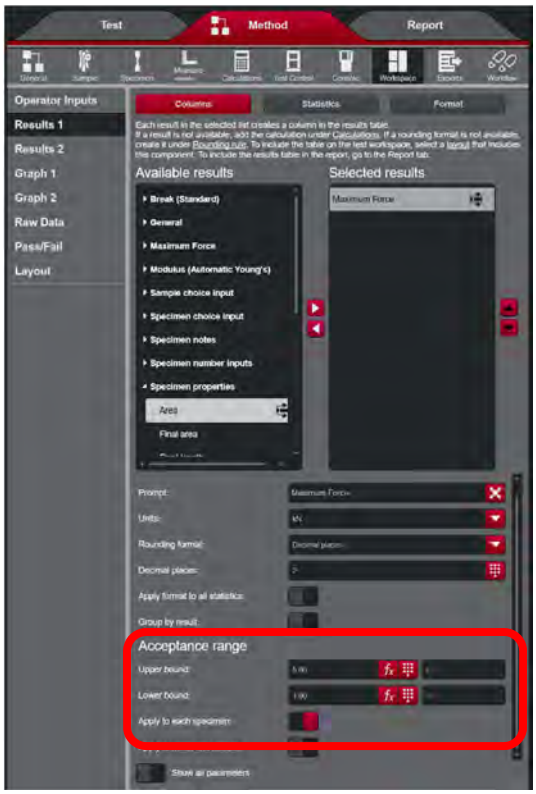
	Specimen label	Modulus (Automatic: Young's) [MPa]	Tensile stress at Yield (Offset 0.2 %) [MPa]	Maximum Force [kN]	Tensile strain (Displacement) at Break (Standard) [%]
	Specimen label: Type A				Number of specimens = 2
1	Type A	6385.28	86.72	2.15	21.82
2	Type A	7270.16	120.93	2.16	16.72
	Specimen label: Type B				Number of specimens = 2
3	Type B	7115.22	120.83	2.16	17.44
4	Type B	6830.25	120.09	2.15	27.54
	Specimen label: Type C				Number of specimens = 2
5	Type C	5547.74	152.84	2.15	21.82
6	Type C	7313.52	119.67	2.16	16.72

As the user reviews their results, there are also quick keys that can be used to help better organize the data. These keys can be utilized by simply clicking on the header of the result.

Pass/Fail

Within each individual result you can apply an acceptance range of what dictates a passing or failing result. Based on the upper and lower bounds and where the actual resulting values falls in relation, the user will be shown a visual representation of whether or not the specimen has passed or failed.

In order to apply Pass/Fail, identify which result you wish to apply this against. The user must first select Apply to each specimen under Acceptance range and provide and upper and lower bound (left). After the test is run, you will see your test workspace reflect whether or not the specimen has passed or failed (right).



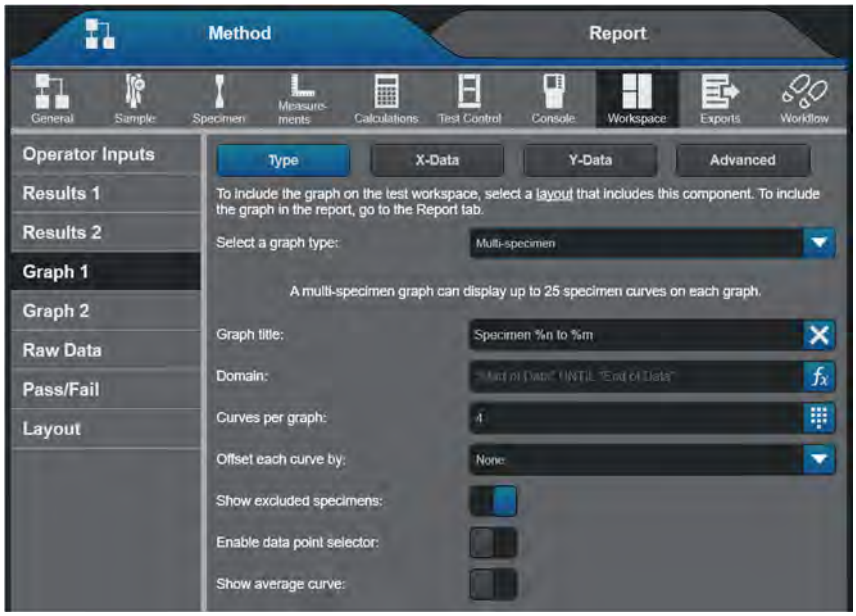
Multiple results can have an applied Acceptance range. If this is the case, each acceptance range must be satisfied for the specimen to be considered passing.

To place the Pass/Fail media in the test workspace, please refer to the Workspace – Layout section of this manual.

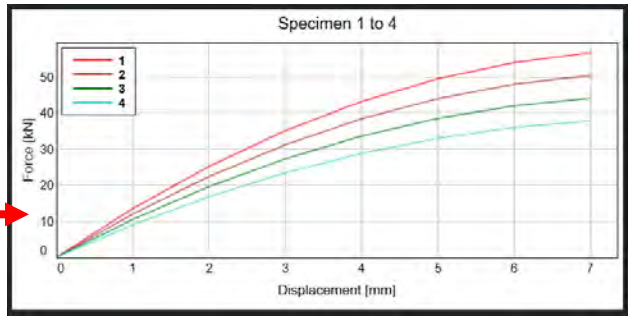
Workspace – Graph 1 and 2

This area allows you to select graphs that may be included in the test workspace and report.

Graph Type



In Graph 1 > Type, there are two sections: A setup area on top, and a graph preview at the bottom. As you make changes in the setup area, the preview updates to show the changes that you have made.



Setup for the Multi-specimen Graph Type

If you choose Multi-Specimen, several fields appear for you to set up.

Graph Title - The default title of the graph, Specimen %n of %m indicates the range of specimen numbers in each graph. %n is the first curve to be plotted in any graph and %m is the last curve to be plotted. Therefore, as each curve is drawn, %n remains constant and %m increments each time a curve is drawn until the number of curves per graph is reached. A new graph then displays with new values of %n and %m. You can enter different text for the graph title. You can use the %n and %m identifiers in your title.

Curves per Graph - This controls the number of curves that are drawn before the graph in the test workspace clears. If the number is 4, the graph clears before testing specimen number 5.

Offset each Curve by - To reduce the amount of curve overlap, the software can offset the origin of each curve. The default setting, Auto, offsets each curve along the x-axis by an amount determined by the software. To remove any offset, select None.

Show Excluded Specimens - This setting is global and controls whether excluded specimens appear in the graph and results table. If you choose to show them, any excluded specimens are shown in both the graph and the results table; but, not in the statistics. The curve of an excluded specimen is not distinguished visually from any other curves in the graph. However, it is indicated in the results table and the specimen selector by a rejection symbol to the specimen number.

Setup for the Double Y-axis Graph Type

If you choose this Double Y, there can only be one specimen per graph. The default title of the graph is the specimen number, but you can enter a different title.

Setup for the Multi-measurement Graph Type

If you choose this graph type, there can only be one specimen per graph. The default title of the graph is the specimen number, but you can enter a different title.

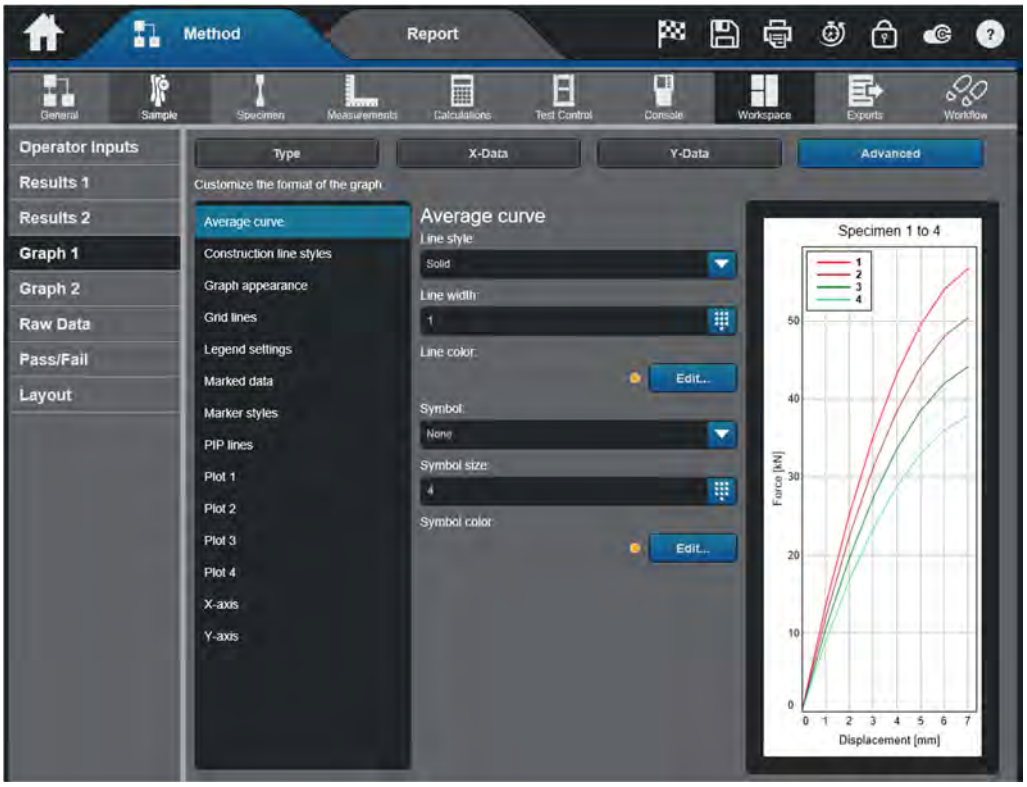
Graph - X and Y Data

This is for selecting the measurements to be plotted, assigning appropriate units and selecting the type of scaling. Automatic scaling works by adjusting the axis as the first specimen is tested to show the entire curve for that axis. On a multi-specimen graph, the axis is adjusted as each specimen is tested. If all axes are set to automatic scaling, the software adjusts the axes so that the entire curve for all specimens is visible. Automatic scaling is the default choice.

If you do not want to see the entire curve, perhaps because you want to see detail in a particular portion of the curve, you can set the scaling to Manual. When you select Manual, two extra fields display to let you set the maximum and minimum values for the x-axis.

Graph – Advanced

The options on this screen are usually a matter of personal preference. When you highlight an item in the list on the left, all the properties available to you for that item display on the right. To change a color or a font, touch on the appropriate Edit... button to open a setup dialog.



Workspace – Raw Data

This screen on the Method tab sets up the content for the raw data table, which can appear on the test workspace. The Raw Data Table component of the test workspace will have a column allocated to that measurement. If the measurement is invalid for a particular specimen, the column for that measurement is blank.

Raw Data – Format

This section works just like the Format option for the graphing section. Various styles, fonts, and colors are available to format the Raw Data table to the user's preference.

Workspace – Pass/Fail

The Pass/Fail feature provides a visible indicator for the status of a tested specimen. The Pass/Fail screen on the Method tab lets you edit the text that displays for the Pass and Fail status. The status pertains to the results in the method that have the following defined acceptance criteria:

- A defined acceptance range.
- "Apply to each specimen" is enabled. This parameter must be enabled to activate the Pass/Fail feature.

If the method includes multiple results with defined acceptance criteria, then the specimen only passes if each result is within its acceptance range. The Pass/Fail status can be displayed on the test workspace and can also be added to a results table.

The available status indicators include:

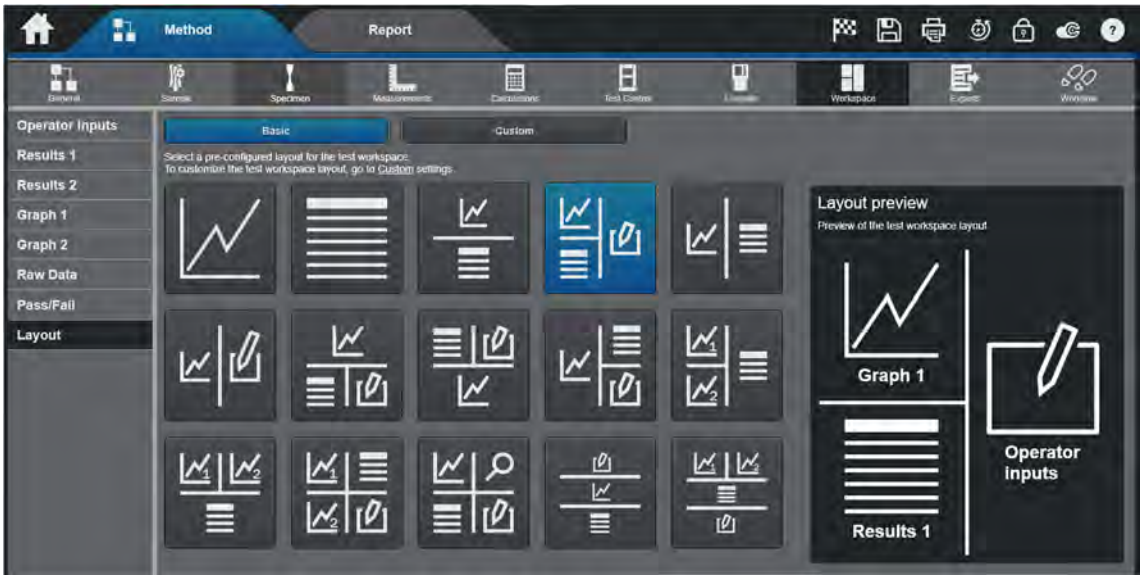
- ***Pass –*** The specimen is tested, and each result is within the defined acceptance range.
- ***Fail –*** The specimen is tested, and at least one of result is outside the defined acceptance range criteria or the system has failed to calculate a result.
- ***Inactive –*** No result has Apply to each specimen enabled.
- ***Not evaluated –*** There is no tested specimens in the sample or the test is in progress and the system has not calculated the results for the specimen yet.

To place the Pass/Fail media in the test workspace, please refer to the Workspace – Layout section.

Workspace – Layout

Here you can split the testing screen into several panes and assign a component to each pane that you create.

Selections can be made from Basic configurations, or the operator can pick and choose from the Custom screen.



You can choose to display the following:

- Graph
- Results and Statistics table
- Operator Inputs
- Raw Data Table
- Test Cam (if installed)
- Pass/Fail
- Video Extensometer (if installed)

Defining Exports

This area provides for selecting a report for your test method from a list of predefined templates. It also provides for defining default information to be included on the report and where the outputs will be stored.

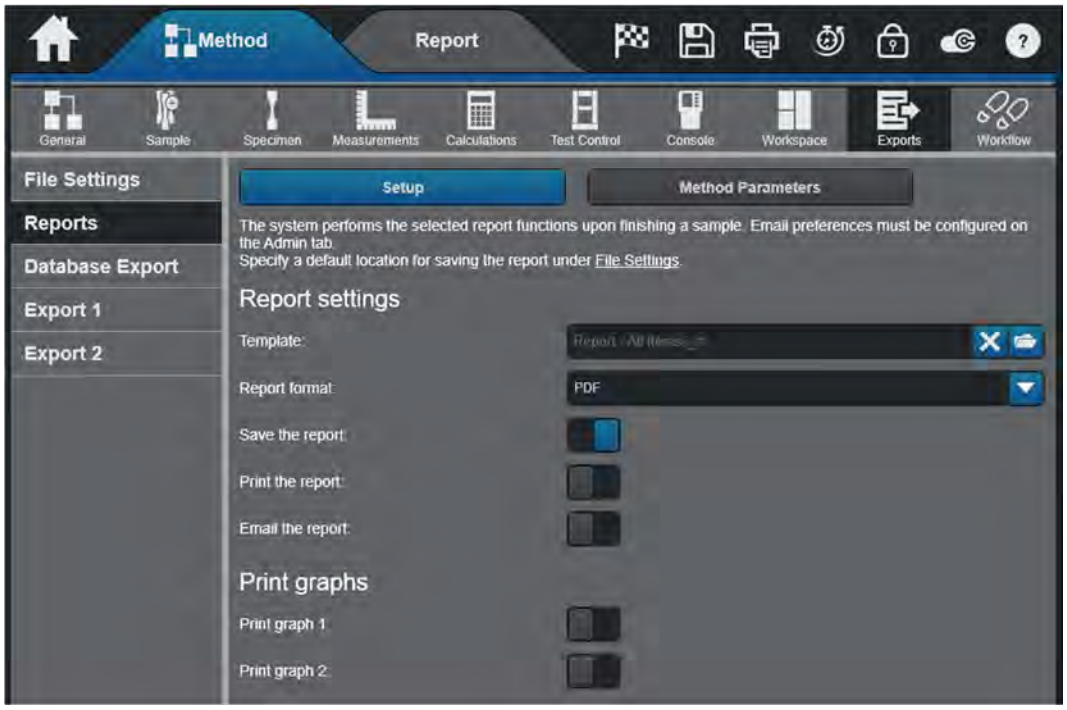
Exports – File Settings

This screen lets you set a default sample name that the system uses to name all samples that use this test method. The output files include the results, raw data, and report files for a sample.

If you do not enable these features, the system produces a suggested name for the sample, based on the most recently used sample name. If there are no recorded samples yet, the system uses "Test Sample" as the default name. The system also saves the sample and its associated output files to the system default location, the Outputs directory.

Exports – Reports

The Reports screen allows you to determine how the system produces a report when it generates output files for a sample. A report template determines the format of the report and the content to be included in the report. This is detailed in Chapter 6.



Reports – Setup

The following selections determine actions when a sample is finished.

Template - The Report template field contains the filename of the report template that is used. If you want to use a different template, Touch the Change button and choose a different template file. You can create and edit your own report templates in the Report tab.

Report Format - If you want to save your report in a file, you must choose a format and check the Save the document box. The file formats available are:

- MS Word
- PDF
- HTML

Print - To send a copy of the report to a printer.

E-mail - To E-mail a copy of the report, check the E-mail document box and type in the E-mail address of one or more recipients. Note that if you want to E-mail the document, you cannot choose HTML as the document format. If you want to send a short E-mail message with the report, type the title into the E-mail title field and your message into the E-mail message field.

Print Graphs – This lets you print copies of the graph independently of the report. Selecting this slider sends copies of the graphs produced during testing to a printer connected to the testing system when you finish the sample. The number of graphs printed is the same as the number of graphs displayed in the test workspace and depends upon the number of specimens in the sample and your setting for number of curves per graph.

Method Parameters

This option constructs a table containing parameters from the test method that do not change from specimen to specimen. This table shows these parameters and the default value that is designated in the test method. It provides a way of including these parameters in the report while showing the value only once. The Method Parameters table must be included in the content of the report for it to show in the report.

Example: If you perform all tests at the same rate, you can add Rate to the Method Parameters table so that it displays only once in the report rather than have a column in the results table that contains the same rate for every specimen.

You can also add parameters to the Method Parameters table that cannot be added to the results table. Such parameters include End of Test criteria or Extensometer Removal criteria. The Method Parameters table can show these criteria in the report.

Exports – Database Exports

This section allows for setting up Instron's TrendTracker™ option.

The TrendTracker™ Plugin is an optional feature that requires a unique key code in the software. The TrendTracker Plugin enables specimen information from sample files to be saved to a database. Storing specimen information in a database provides a more efficient way of analyzing specimen information across multiple sample files and systems. The TrendTracker Viewer is where you set criteria to search the database and then analyze the specimen records by grouping, sorting, and performing statistical analysis.

For configuration information, reference the Bluehill Help section. For product information, please contact your local Sales office.

Exports – File 1 and 2

Setup

Both Export File sections allow the user the set two different test export files for:

- Method Parameters
- Results Table
- Raw Data

The Exports > Export File > Setup screen on the Method tab determines the content that will be included in the export file that the system generates for a finished sample. When this feature is enabled, you can specify the content for the results output file and include additional default information. If you do not enable this feature, then the system does not generate a results output file.

Format

The Format option allows the user to select between exporting a .CSV file or a custom text file.

Method Parameters

This option is similar to the Method Parameters option in the Reports section; however, this allows for setting up a table to be exported within the custom exported file in the same manner.

Workflow

To simplify testing, test methods can be configured to guide an operator through setting up and performing a test. If a method is set up as a Workflow, the software displays each step developed by the method designer and prompts the operator for the required inputs.

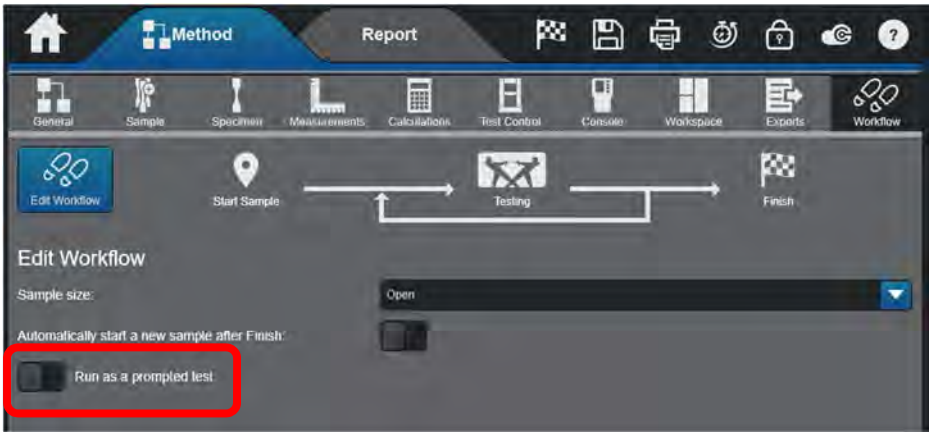
Workflow acts as a wizard that assists the operator in setting up the test and provides instructions to ensure that all tests are performed consistently.

Workflow – Prompt Sequence

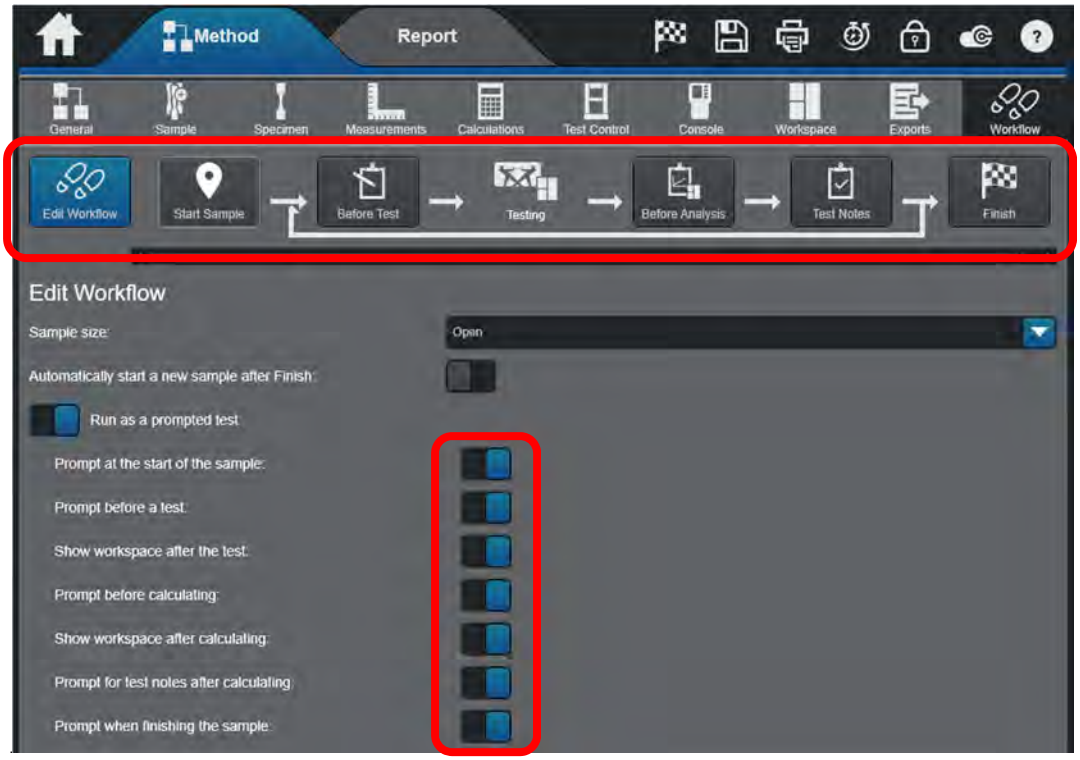
Create Sequence

To set up a workflow, toggle the slider to Run as a prompted test.

Activating this slider lets you set up the content of each screen within the wizard. The prompts provide a logical linear progression for the operator to enter certain parameters at certain points in a test sequence.



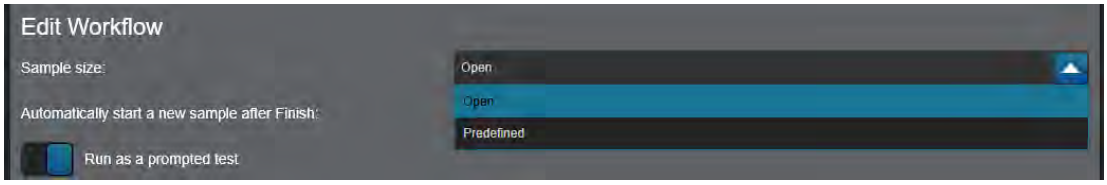
Once the Workflow sequence is turned on, you will see all available steps which can be configured in many ways. By default, all test sequence sections will become active. Each test step can be activated or deactivated by toggling the prompt sliders. As each prompt section is turned on or off, the test prompt icons will reflect these changes.



Each prompt setup screen has one or more of the following components:

- An instructional message for the operator.
- A pick-list from which you can choose parameters that you want the operator to enter in that screen. You can also change the Prompt and Default value for any of the parameters (for example, change the prompt for Text Input 1 to Specimen Color with a Default value of White).

The first selection on the Create Sequence page is to declare whether the sample set has a predefined number of specimen or not. If left Open, the sample does not end until the Finish flag icon is selected from the Test Workspace. If Predefined, the sample will automatically finish once the required number of specimens have been tested.



When “Predefined” is selected, a new option is added to pre-set the number of specimens to be run per sample.

Workflow Option Definitions

The following table defines each option available for selection in the Create Sequence page.

Prompted Test Option	Icon Name	Use
Prompt at the start of the sample	Start Sample	Prompt for parameters that are the same throughout the sample and needed before testing.
Prompt before a test	Before Test	Prompt for parameters for each specimen before it is tested.
Show workspace after the test	---	Show the workspace for inspection of graphs before calculations are run.
Prompt before calculating	Before Analysis	Prompt for parameters for each specimen after it is tested but before performing calculations (e.g. final dimensions).
Show workspace after calculating	---	Review the workspace before making final inputs.
Prompt for test notes after calculating	Test Notes	Prompt for parameters for each specimen after it is tested (e.g. excluding the specimen).
Prompt when finishing the sample	Finish	Prompt for parameters that apply only to the entire sample (e.g. a sample note).

Note: Refer to Workflow Test Examples in Help for example scenarios and test sequences using the prompted test.

Chapter 5

Running a Test

Introduction

A test may be run as a Freeform Test or Workflow depending on how the Method was created as discussed in the previous chapter. This chapter will lead the operator through running a test using Workflow and Freeform Methods.

Workflow

When you set the method to run as a workflow, several more screens become available in the Workflow section of the method. These let you set up a fully prompted test, like a procedure wizard, that overlays the test workspace during testing. The Workflow Sequence screen lets you set up the number of steps in the wizard and will guide you to set up the content of each screen within the wizard. This option also provides a logical linear progression of screens, directing the operator to enter certain parameters at certain points in a test sequence.

Freeform Test

The only prompts available in a freeform test are those that you can add to the Operator Inputs area of the test workspace. You set these up in the Workspace - Operator Inputs screen, which is the only screen available in the Prompted Test area when you are not running a prompted test.

Testing a New Sample as a Workflow

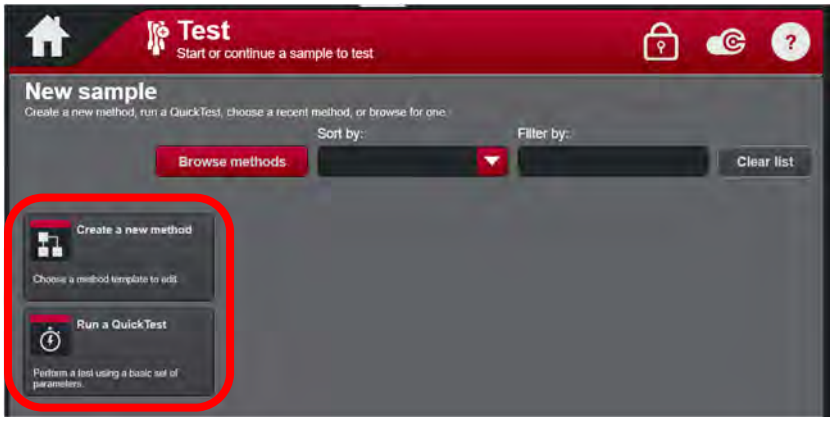
The Workflow is a structured way of running tests consisting of a series of prompts for the operator to enter parameters at specific times and in a specific order. Typically, the operator would be prompted to enter the number of specimens in the sample at the start, enter specimen dimensions before each specimen, and perhaps a comment after each specimen. When the specified number of specimens have been tested, the operator is prompted to finish the sample. Then, upon finishing the sample, the operator would be prompted for final information, such as end of sample comments.

The main advantage of a workflow is that the structured format lets you set up test methods that guide the operator at each stage of testing. These methods can be used by operators who are less familiar with the software or with materials testing in general. The prompted format reduces the possibility of errors by the operator.

From the Home Screen touch on the Test Button.

Method Selection Screen

When the goal is to run a new test, this screen offers two options. The first is to create a new test method via the Test screen. The other is to select a predefined test method. If the method you want to run is not on this screen, you can choose to browse to find the file.



Create a new method

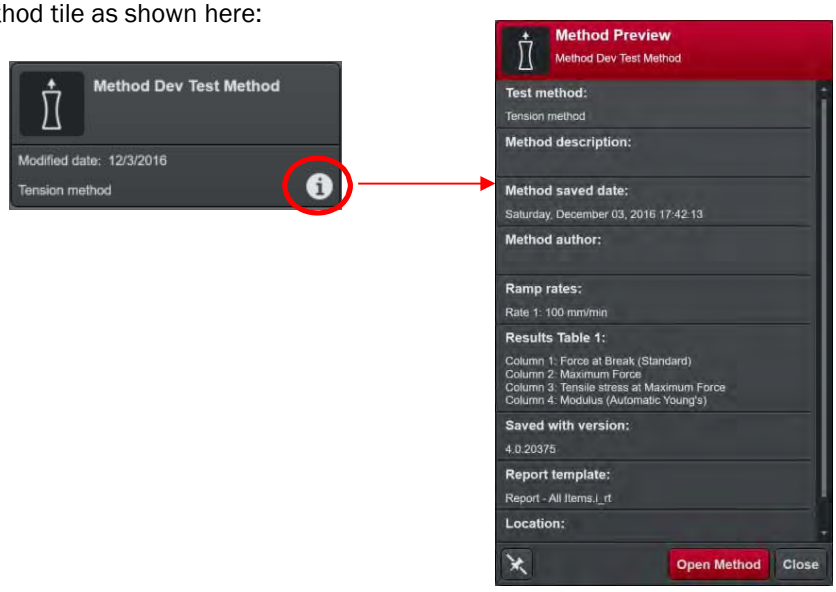
If you choose to create a method from the Test menu, a window will appear to ask you to select the test method type.

Select a method type and Touch Create.

Note: The documentation in this section will work with a method that has been preconfigured to run as a Prompted Test. Reference the Prompted Test section in Chapter 4 for information on creating a Prompted Test.

Test with an existing method

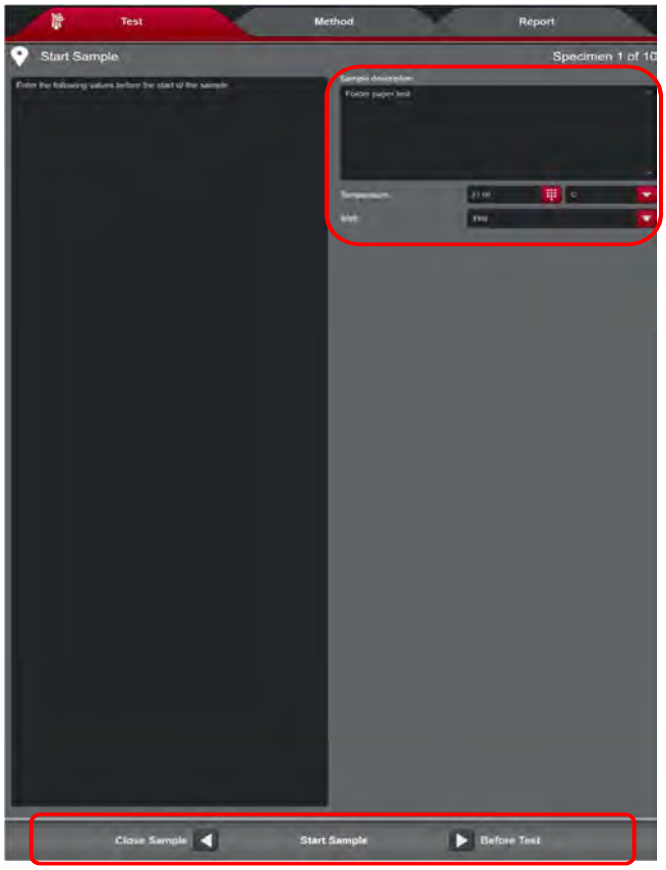
If you choose to use a preconfigured method, select that method from the New Sample screen. If you are unsure if you are selecting the correct method, you can select the information option on each method tile as shown here:



Start Sample

In this screen, the operator will be prompted to enter information requested at the sample level of the test method, such as Operator Name, Lab Temperature, Lot Number, etc.

Enter the requested information and then select the right arrow at the bottom of the screen to move on to the next step. You can switch between screens at any time by using the forward and back arrows.



Note: Before testing, all mechanical limits should be set and all safety precautions taken. If an unsafe condition presents itself after a test has started, the Emergency stop button on the testing frame should be activated.

Before Test

This screen prompts the operator to enter the information required at the beginning of each specimen (e.g. specimen dimensions and gauge length).

Once all fields have been filled out and the test instructions have been followed, the system is ready to start a test.

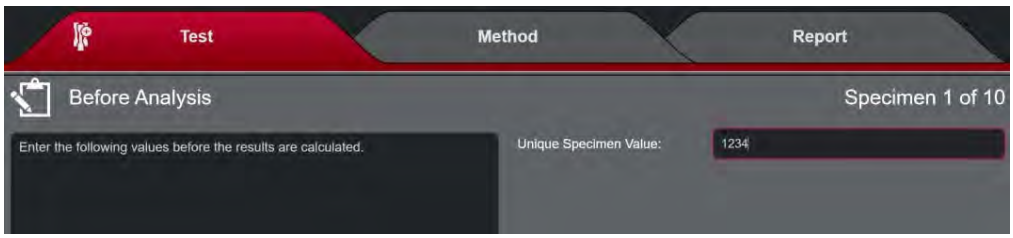
Touching the start icon at the bottom of the screen will initialize the test to begin.

Note: The start icon is not present on 3400 and 6800 systems, Tests must be started using the interlock sequence. Press the interlock button to move into Caution mode, then the start key within 2 seconds on the Operator Panel (3400) or Handset (6800) to start the test.

When the test ends, the graph will display without the results before moving to the Before Analysis screen.

Before Analysis

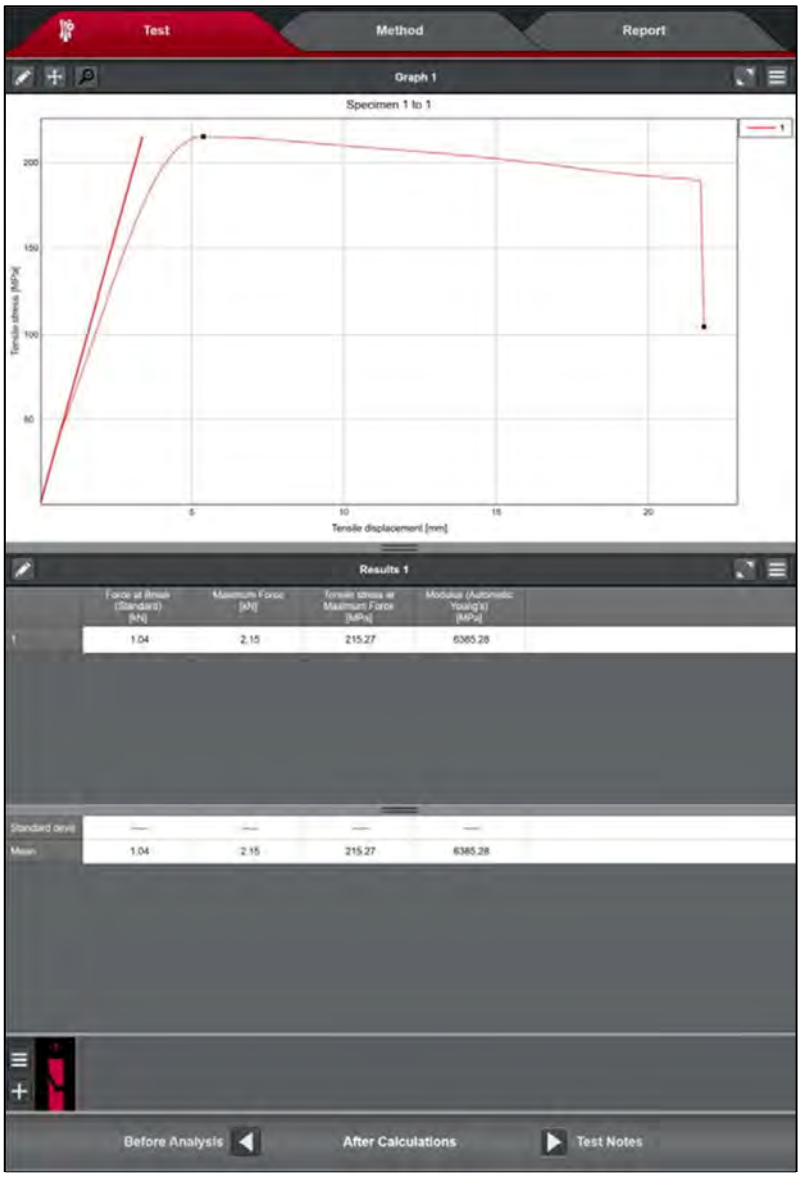
This prompt screen is used for entry of numeric values required for specific calculations that would not be known until after the specimen is tested.



Select the right arrow at the bottom of the screen to show the test workspace with the calculated results and finished graph.

First Specimen Results

The test will be displayed according to the layout selected in the Method setup.



Component Icons

Once specimen graphs and results have been displayed, Bluehill can be manipulated to analyze data. The component icons are useful tools to help with this process.

Note: A component is a workspace display such as a graph or results table.

 The pencil icon is used to open the properties window for each workspace component.

 In the graphing component, this icon will center and scale the graph in a way that the whole graph can be seen clearly.

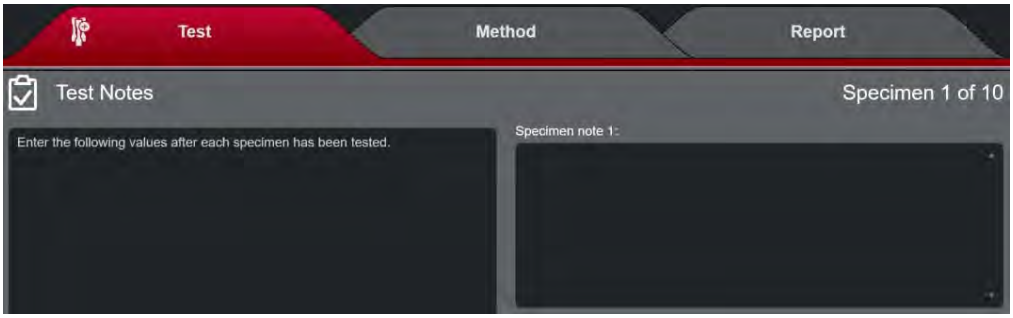
 In the graphing component, this icon will un-zoom the graph.

 This icon will maximize a component to be large and the only visible component.

 This icon will allow you to perform such functions as excluding a specimen or recalculating results after making a change. Right-Touching on a component will give you the same options.

Test Notes

The next section should be used to enter pre-test information such as specimen notes and break location.

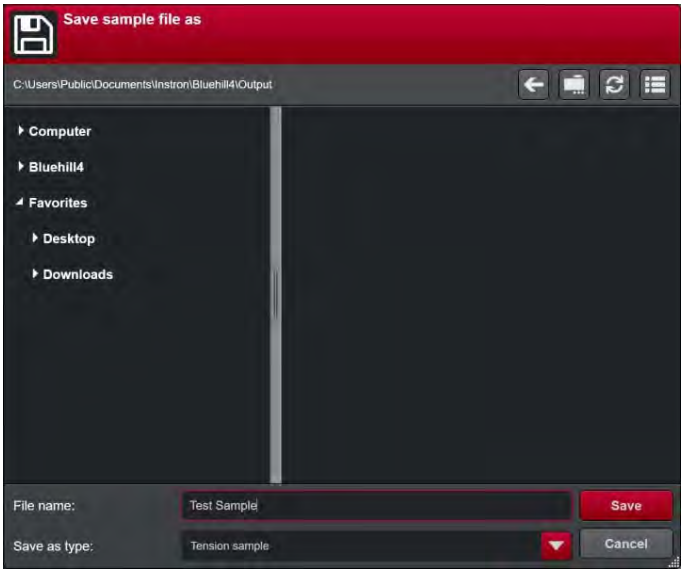


This sequence will continue back to the beginning of the Test Prompt progression until the max number of specimens set for the particular sample has been reached. Once this happens, the prompt sequence will move on to the At Finish part of the Workflow.

At Finish

This prompt screen can be setup to input information on the entire sample, such as after sample comments.

Once the profile has been run and all information has been entered in the At Finish prompt, select the right arrow at the bottom of the screen to Finish the sample. This will bring up the Save sample file as window. Select a sample file name and save location.



Next, select if you would like to start a new sample with the same method or not.

Touch No to return to the Test screen, then Touch the home icon in the upper left corner of the screen to return to the Home Screen.

Testing a New Sample as a Freeform Test

Freeform Test

The Freeform test lets operators enter test parameter values and run tests on specimens in a very flexible way. For example, operators can enter specimen dimensions via Operator Inputs at any time and move backward and forward between specimens (tested/untested) changing values and recalculating results. The operator selects the Finish Button when the Sample is complete. Any parameter/setting in the method may be changed by selecting the Method Tab at the top of the test screen unless the user is restricted by a Security setting.

For this example, select the Test button on the Home Screen and select an unprompted test method.

Reminder from the previous section. The following options also apply in a freeform test.

 The pencil icon is used to open the properties window for each workspace component.

 In the graphing component, this icon will center the specimen graph.

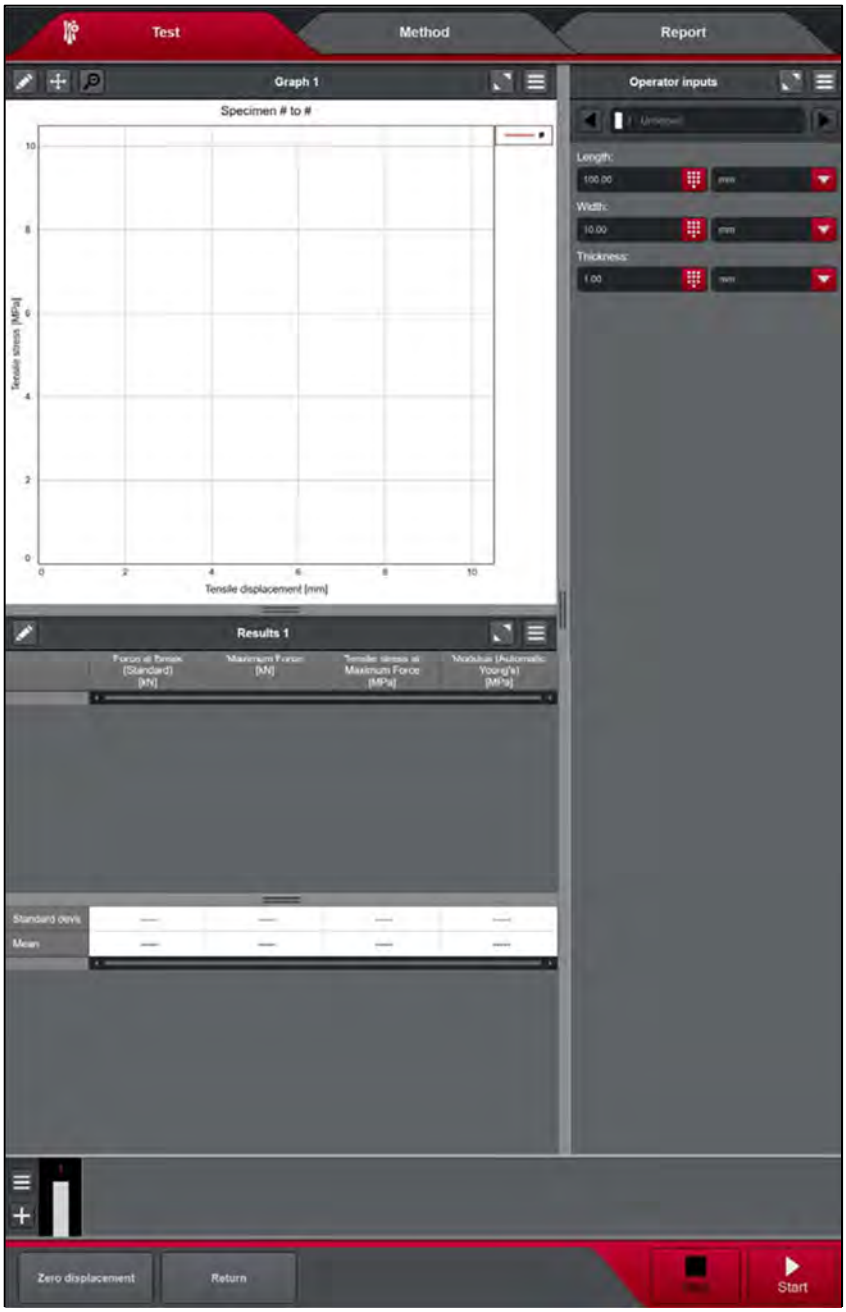
 In the graphing component, this icon will un-zoom the graph.

 This icon will maximize a component to be large and the only visible component.

 This icon will allow you to perform such functions as excluding a specimen or recalculating results after making a change. Right-Touching on a component will give you the same options.

Freeform Test Workspace

This image below is an example of what a common workspace will look like for a freeform test.



Operator inputs

The operator can define the inputs to all the specimens in the sample before testing the first specimen. Multiple specimens can be added for Operator Inputs prior to testing. Select the plus icon at the bottom of the screen to increase the number of specimens in the sample.

Select Start to test the next untested specimen.

Freeform Test Results

This image below is an example of what a common workspace will look like after a few specimens have been run in a freeform test.

Tested Specimens

Reviewing tested specimens can be done by cycling the Operator Input arrows or selecting the specimen at the bottom of the screen as shown here:

Touch and hold on a specimen for options such as deleting or excluding it. For touch users, swipe up with your finger to exclude the specimen.

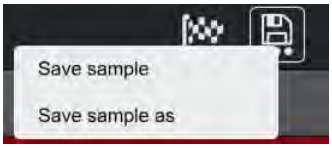
Continue running tests as described above until testing is complete. Then select the Finish icon.

When this icon is selected, the sample will be saved and all post-test actions will be initiated, such as exporting files, printing graphs, and emailing a report.

Select No to return to the Test menu.

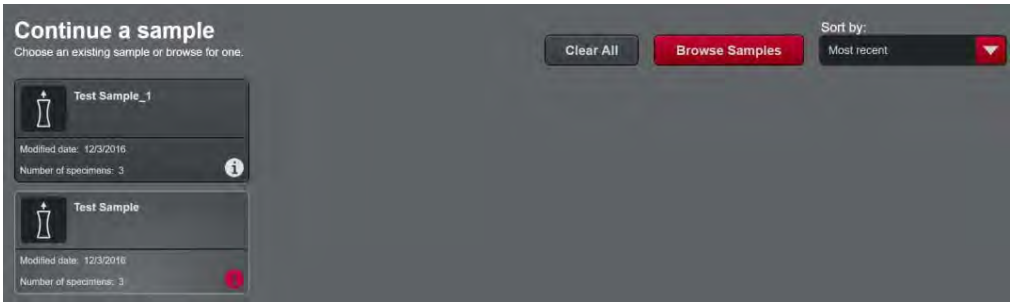
Continuing a Test on an Existing Sample

When a sample is run, but not complete, you can save the sample for future testing. Simply select the Save icon at the top of the test screen.



Even if a specimen has already been “finished”, it can be continued for analysis, recalculation, or report/export file regeneration.

Select the Test icon from the home screen. At the bottom of this screen, samples that were previously run can be viewed. If the file you are looking for is not present, select the Browse Samples icon to search for the file.



Chapter 6

Reports

Introduction

Note: When security is turned on, you must have Manager or Administrator privilege for access to features detailed in this chapter.

The Report tab is available to you when you:

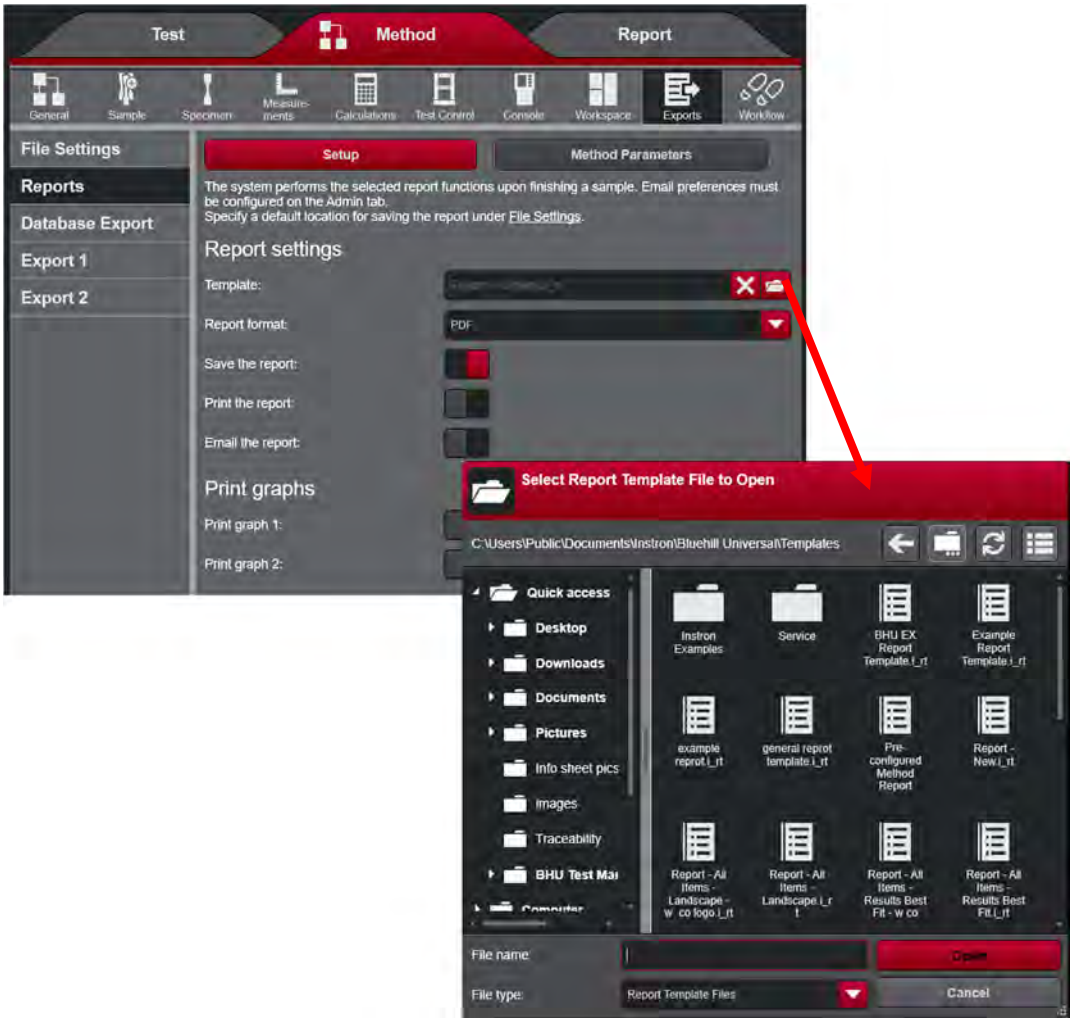
- Select Method on the Home screen and choose a method file to edit. You can then touch on the Report tab to edit the linked report template file that has been opened at the same time as the method file.
- Select Test on the Home screen, followed by opening a New Sample. Choose a method file to use for testing. You can then touch on the Report tab to edit the linked report template that has been opened.
- Select Test on the Home screen, followed by opening a method from Continue a sample. Choose a sample file to open. You can then touch on the Report tab to edit the linked report template that has been opened.

How Report Templates work:

- Report template files are linked to test method files, they are not embedded within them. The test method stores a link to a report template, which the software opens at the same time as the test method file.
- If you open a report template in the Report tab when a method file is loaded, that template is then linked to the test method file. Alternatively, from the Method tab, you can change the report template link in the Outputs - Reports screen and this opens the appropriate report template file in the Report tab. When you save the test method, the new link is saved.

Selecting a Report - Method Editor

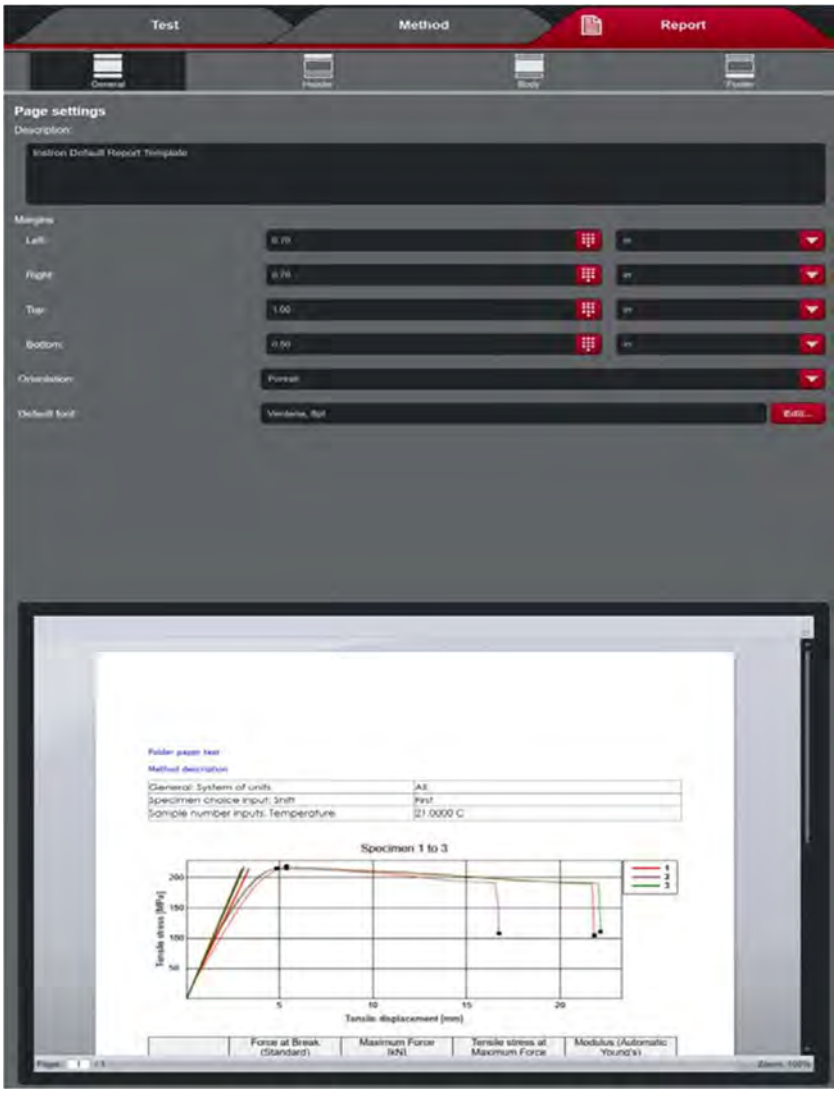
A report can be selected for use with a test method via the Method Editor. This can be found in Exports > Reports > Browse. In this section, you can select a stock report or a report that you have already setup.



Report Editor – General

Each section of the Report Editor will have fields to be configured, along with a preview pane at the bottom of the screen. When changes are made to report settings, they will be reflected in the preview pane.

The settings in this section involve general settings such as margins, font, and page orientation.



Report Editor – Header and Footer

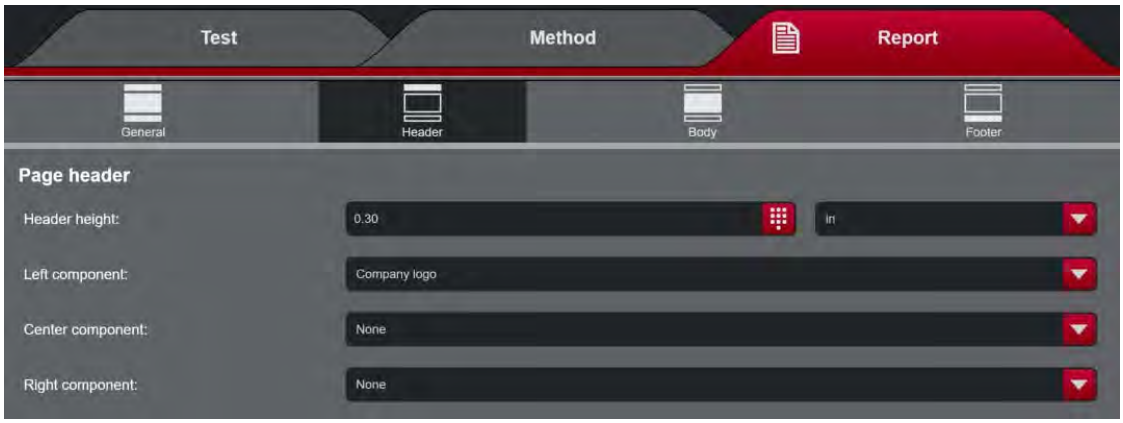
The Header and Footer sections of the Report Editor will allow you to set components at the top and bottom of a report. The alignment options are: Left, Center, and Right.

Select the height of the header and footer and then decide of components are needed in the Left, Center, and Right positions.

A company logo can be set as a component. This logo is selected and saved in the Admin section of Bluehill Universal in Preferences.

As seen below, the options for report header and footer settings are identical.

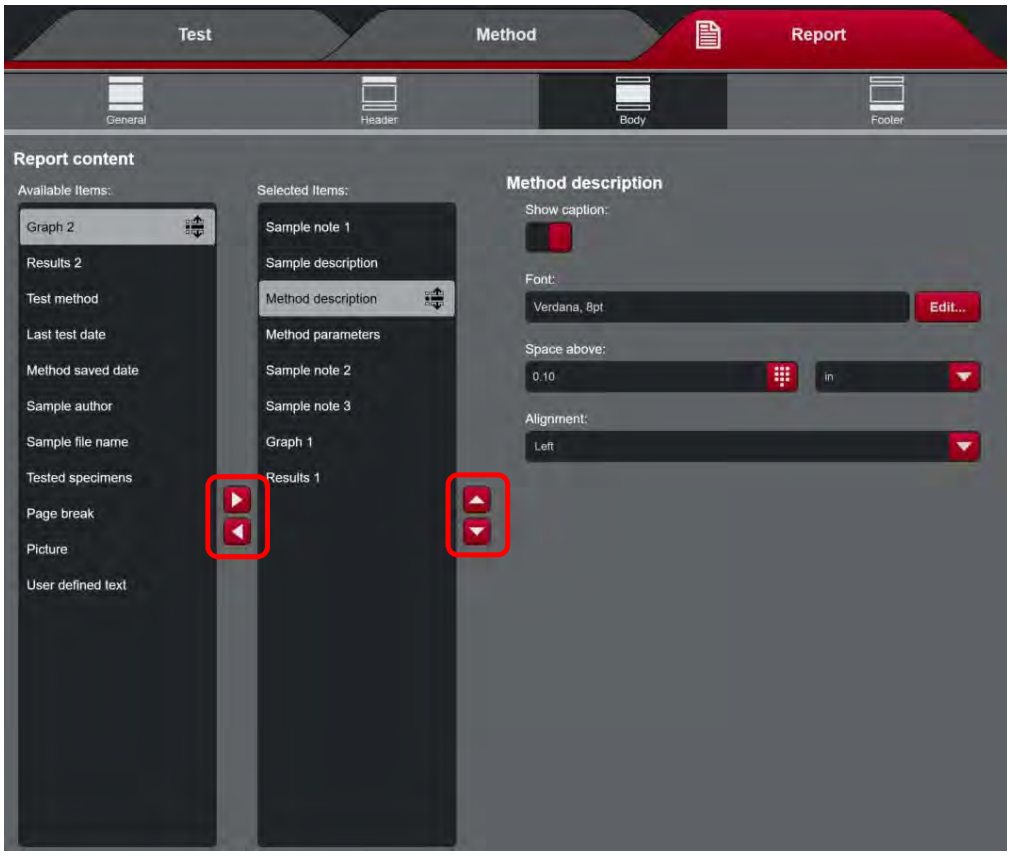
Header



Footer

Report Editor – Body

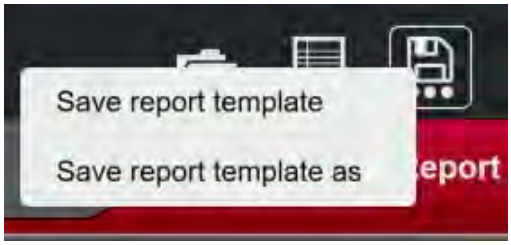
Major report components are added and removed in the Body section of the Report Editor. As components are added and/or removed, this will be reflected in the preview pane at the bottom of the screen.



As selections are moved from Available Items to Selected Items (using the left and right arrows, highlighted above), their position can be moved up and down on the report body by touching the up and down arrows (highlighted above). Reference the preview pane at the bottom of the screen to see if the position and spacing of each item is adequate.

Saving the Report

Once changes to the report are done, be sure to save it. Choose the disc icon above the Report tab. You can save the existing report or give it a new name to create a new report.



Your report will now be available for selection with any test method.

Product support: **www.instron.com**