FLUKE®
Calibration

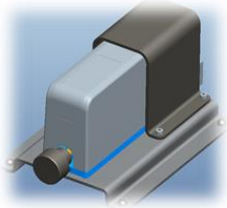
End-to-End Calibration of 750P Pressure Module

Kyle Clark - Presenter

End-to-End Calibration of pressure sensors

Agenda

- Pressure calibration basics
  - Procedures
  - Equipment
- Automating a pressure calibration
  - Benefits of automating
  - Software
- COMPASS for Pressure calibration software
  - Overview
  - Example setup and calibration, with macros
  - Calibration Report
  - Other COMPASS features
- Questions



End-to-End Calibration of pressure sensors

Example

- Calibrate a 750P module (750R30, 5000 psi, ±1.75 psi), with 8270A high pressure modular pressure controller (to 6000 psi)
  - As Found run with data
  - Adjustment
  - Verification run with data

8270A with pressure control module and pressure measurement modules

750P Pressure Module

End-to-End Calibration of pressure sensors

Other Examples of End-to-End tests

Webinar September 2017

Calibrate a PM200 module from a 6270A pressure calibrator in the PMM Calibration Kit with a PPC4 pressure controller.

View the prior Webinar in this Knowledge Base article,

Macros: PM200 and PM600 - Fully Automated Calibration

What is a pressure calibration?

A comparison by applying known pressure(s) to a pressure measuring Device Under Test (DUT) in order to determine the relationship between the reference device and the DUT

- A test is a set of defined set points
- A single set point could be the test (offset verification/adjustment)
- Adjustment is sometimes done (not always possible)
- A verification is typically done after any adjustment
- A report (or data) is often produced

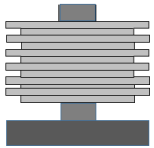
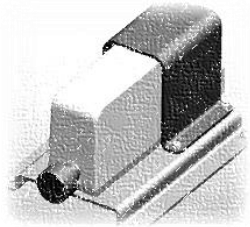
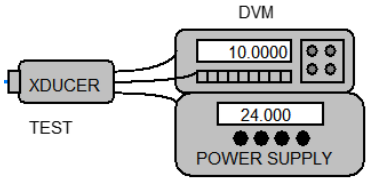
What is a pressure calibration?

Required components:

- DUT(s) – One or more DUTs of the same range
- Reference pressure device(s)
- Generation and control hardware (sometimes integrated into the reference device)
- Measurement and/or control hardware:
  - DMM, power supply, multiplexor, temperature, humidity, etc.
- Interconnect hardware
- Software and computer if automating the test

Manual or automated test?

How much can you automate the test?

- Depends on the DUT communications interface (and the reference's)
  - Manual  
  - RS232, GPIB/IEEE, TCP/IP   
  - Other device like a DMM 

  - The DUT's PC software, if it can communicate with your calibration software (COMPASS for Pressure has an example of this in it)

Automated tests

Benefits of automating a pressure calibration

- Automatic entry and saving of test values (no typo’s)
- Long and complicated tests can be accomplished unattended or overnight
- Complex calculations can be done real-time (apply corrections)
- Standardization – The test is run the same intended way every time
- Tests can be duplicated by multiple operators, in multiple locations

Automation software

COMPASS for Pressure calibration software is PC software designed to assist in the pressure calibration process

- Various levels of automation; manual, semi-automated, fully automated
- More than one DUT – Typically limited only by the data acquisition hardware
- User-scripted test point definitions
- Data saved in unique, write-protected data files
- Calibration report generation tool that is configurable

COMPASS for Pressure

Configuring COMPASS to run a test

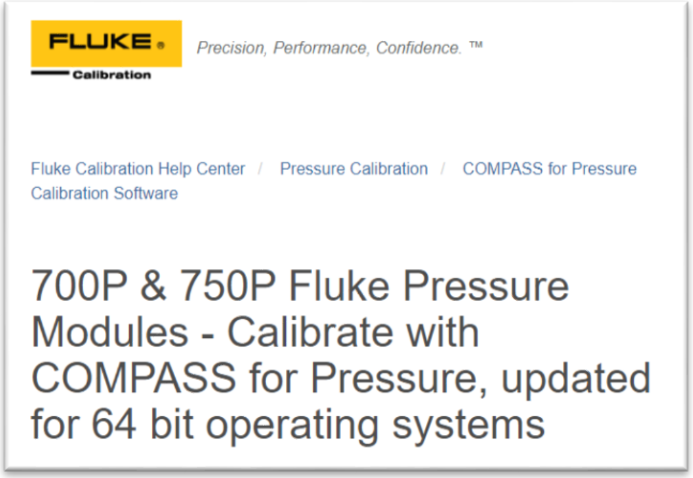
- Setup → DUT
- Setup → Piston Gauge (only if you use piston gauges or deadweight testers)
- Setup → Support Device (any device that is not a DUT, deadweight tester or piston gauge)
- Setup → Test

Setup DUT

- Enter for all devices
  - Manufacturer, model, serial number, ID (not for profile/generic DUTs)
  - Test to use with the DUT
  - Communication method (manual, RS232, IEEE, other device, etc.)
  - Min/max range, unit, tolerance
  - Remote command(s)
- The entered info can be used during the test, is saved to the data file, and can be shown on calibration reports

Setup DUT

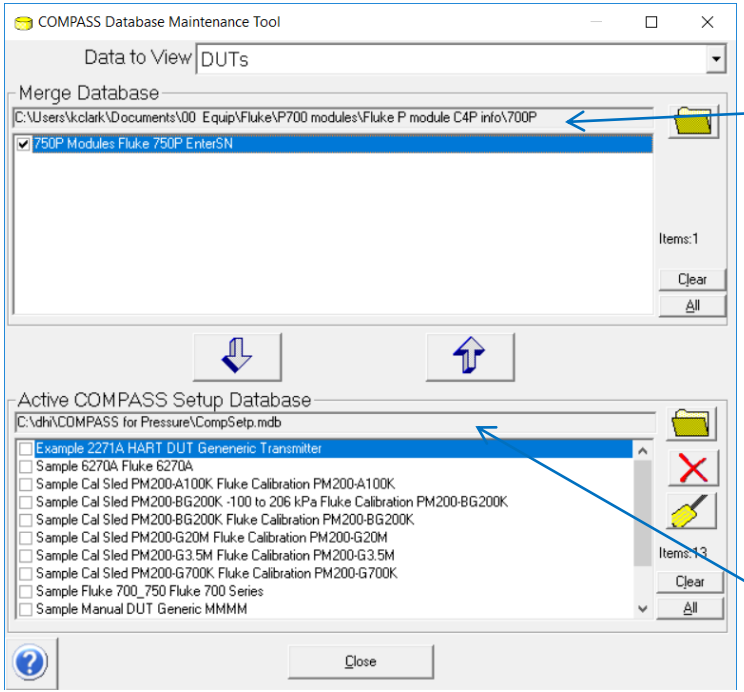
- Import DUT setup into COMPASS from an existing database
  - Database for 700P/750P is an attachment in the Online Knowledge Base article, [700P & 750P Fluke Pressure Modules - Calibrate with COMPASS for Pressure]
  - Note that any DUTs, Tests, Macros with 700P or 750P in their name are updated for 64-bit OS and 700PCK version 4.00. Don't need old flukeinterface.exe file



Setup DUT

- Import DUT setup into COMPASS

  Menu path; *[Database]* → *COMPASS Database Maintenance Tool*

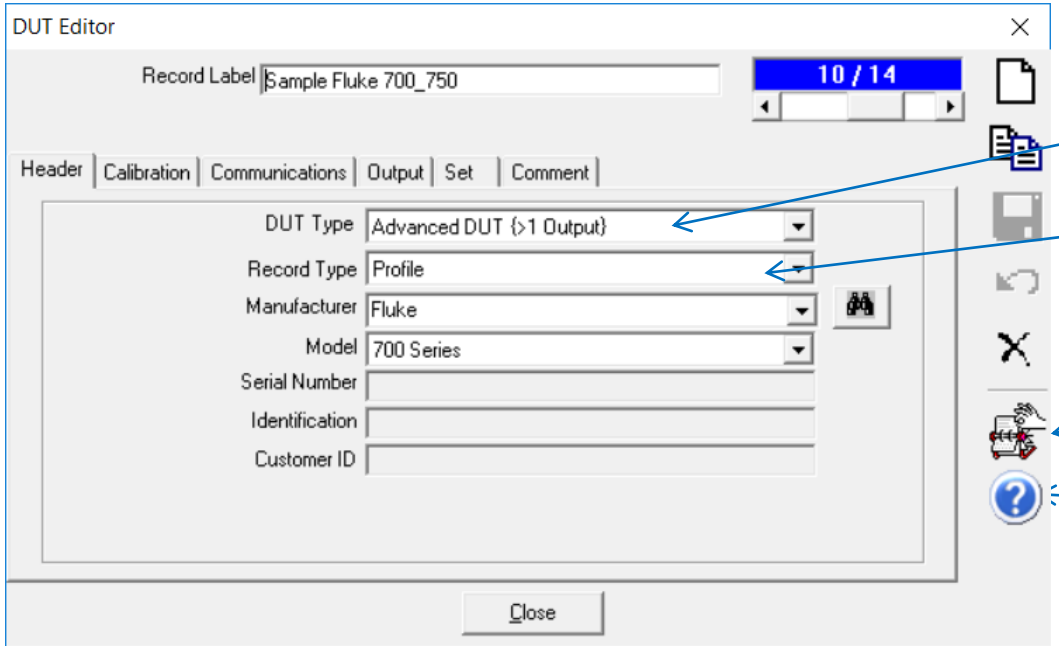


1. Select the database to import from by clicking the yellow folder icon. Get this database from 700P/750P Knowledge Base article (previous slide)
2. In “Data to View” window at top, Select “DUTs”
3. Select the 750P Module and/or 700P
4. Press the down arrow icon to copy the DUT setup to the active database. It automatically copies any needed macros.
5. While here, select “Tests” and copy tests with 750P in their name also. Test macros will also be copied
6. Close this window

Active database

Setup DUT

Header Tab



Has to be an Advanced DUT to use a macro for communications

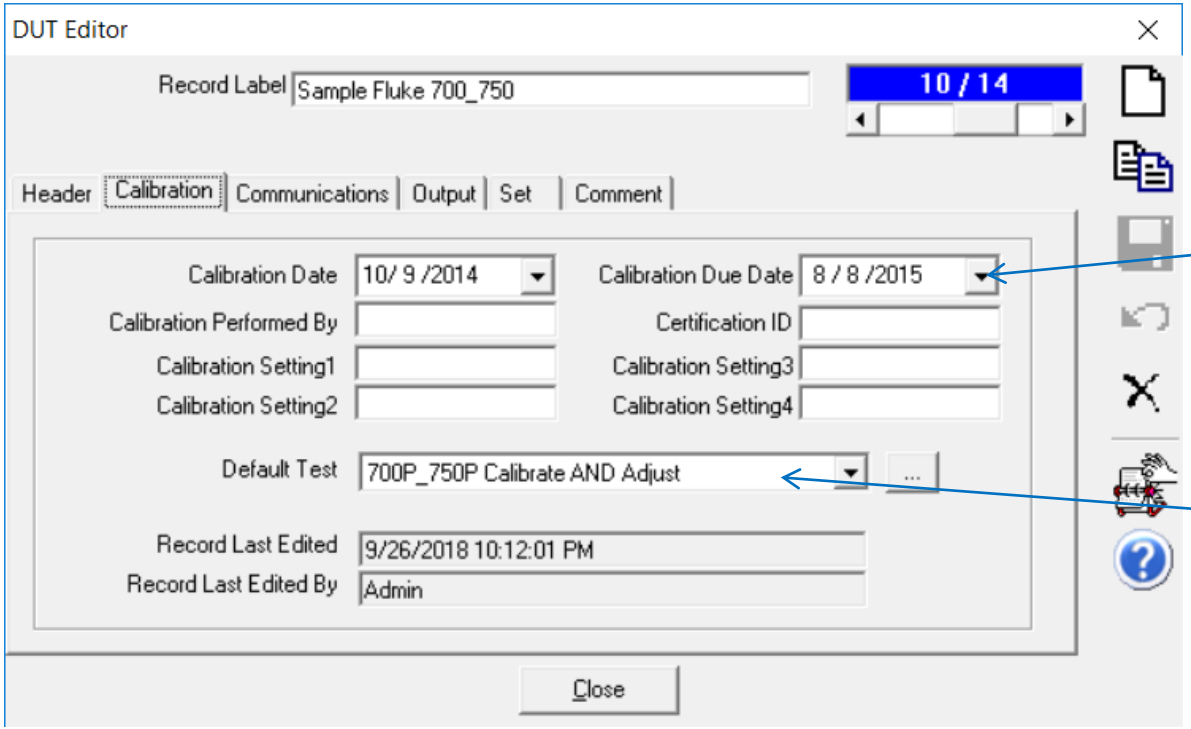
Profile – Enter serial number and edit range, model, ID, Cust ID when initializing test

Click the rolodex to see the list of DUTs

Help icon opens the online help file at the applicable section

Setup DUT

Calibration Tab - All cells are optional

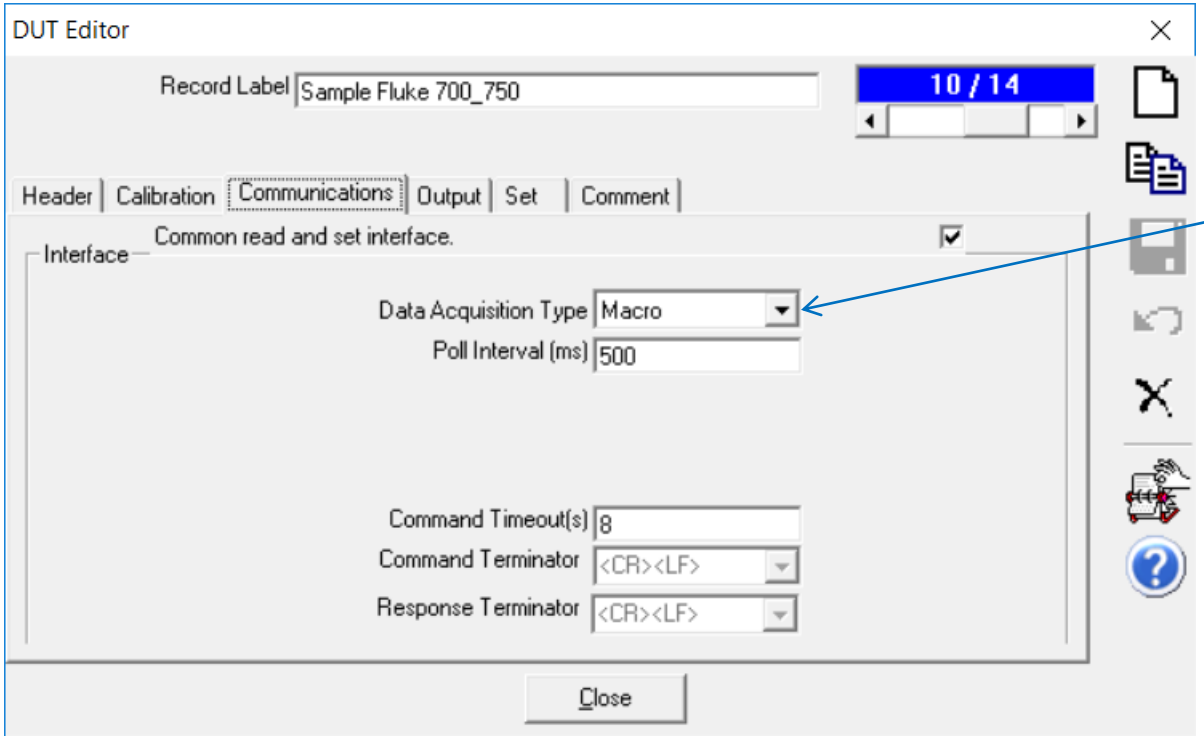


Calibration Dates for a Profile DUT don't matter. Will use actual run date as cal. date.

Specify the Default Test so the technician doesn't have to pick it when initializing the test. Can change when initializing test.

Setup DUT

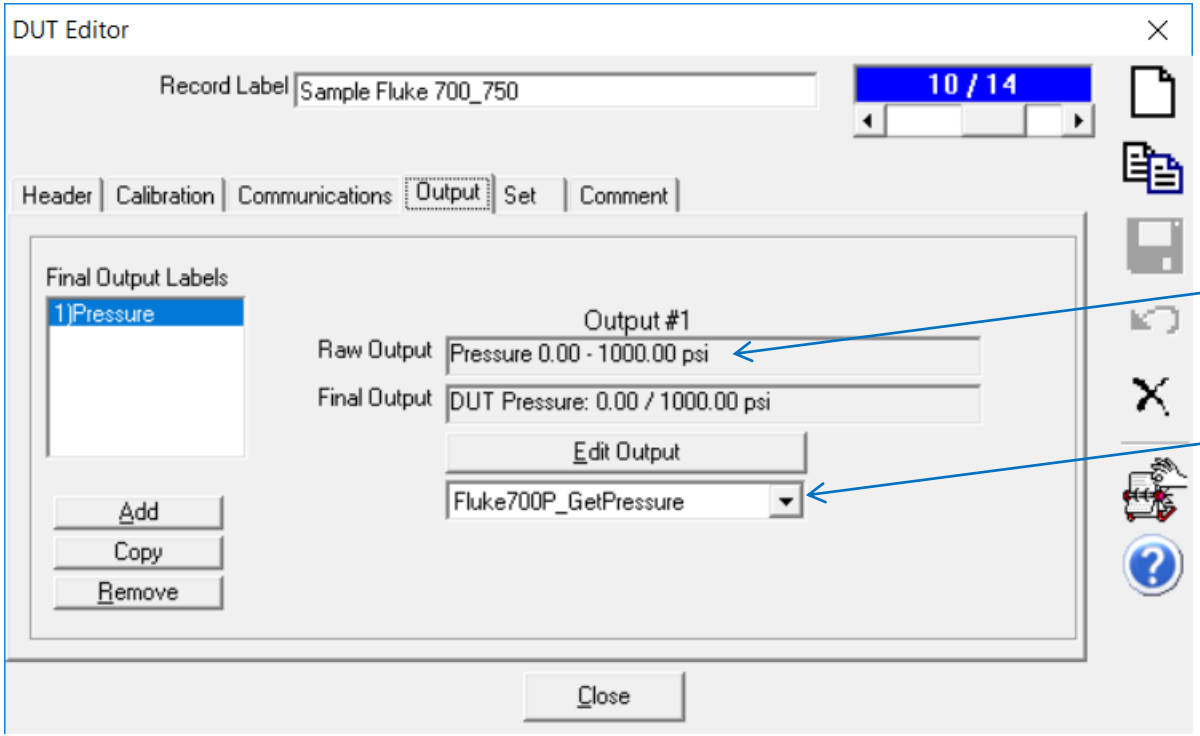
Communications Tab



Many communications methods possible. COMPASS uses a macro to communicate to the 750P module through the 700PCK software

Setup DUT (Device Under Test)

Output Tab – Advanced DUT

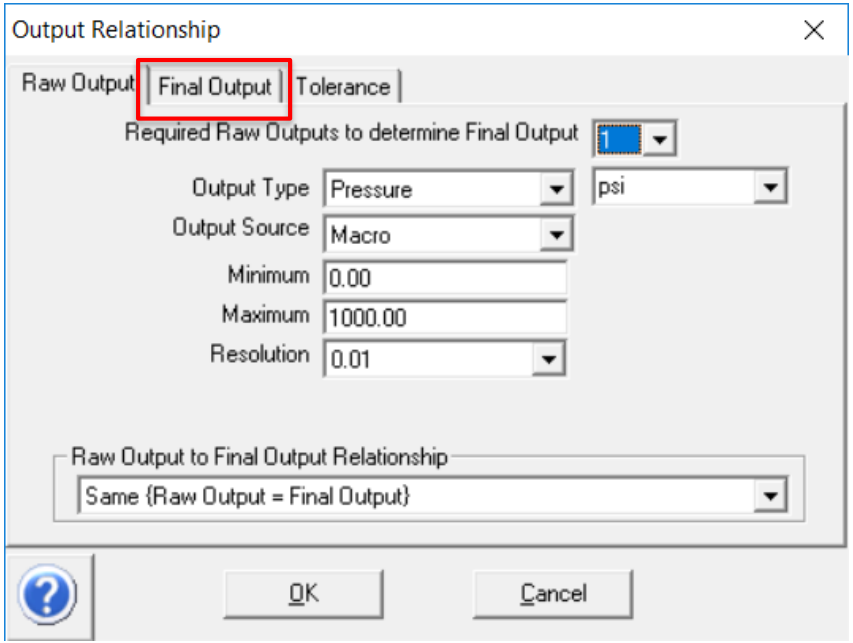


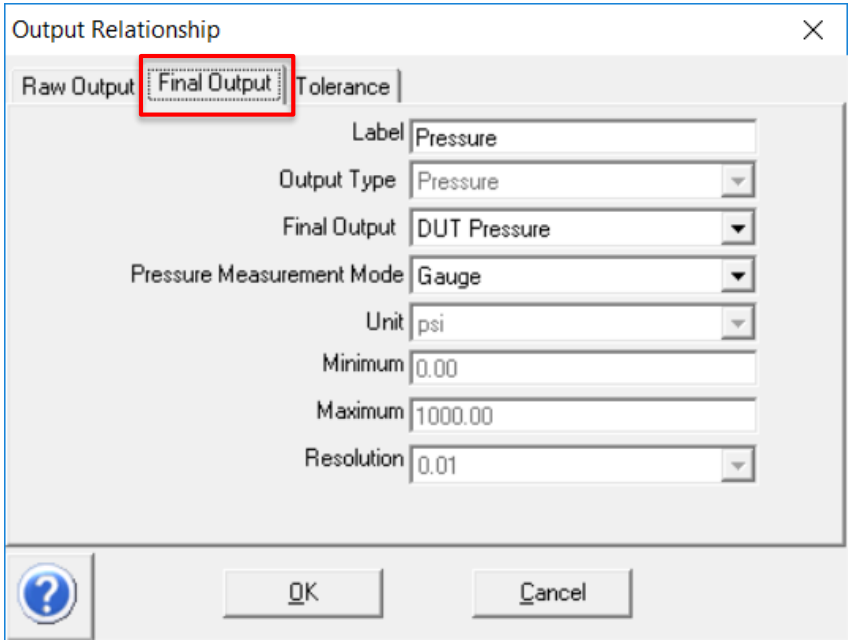
Will edit the range when initializing the test

The Test Macro to communicate with the module is specified here

Setup DUT (Device Under Test)

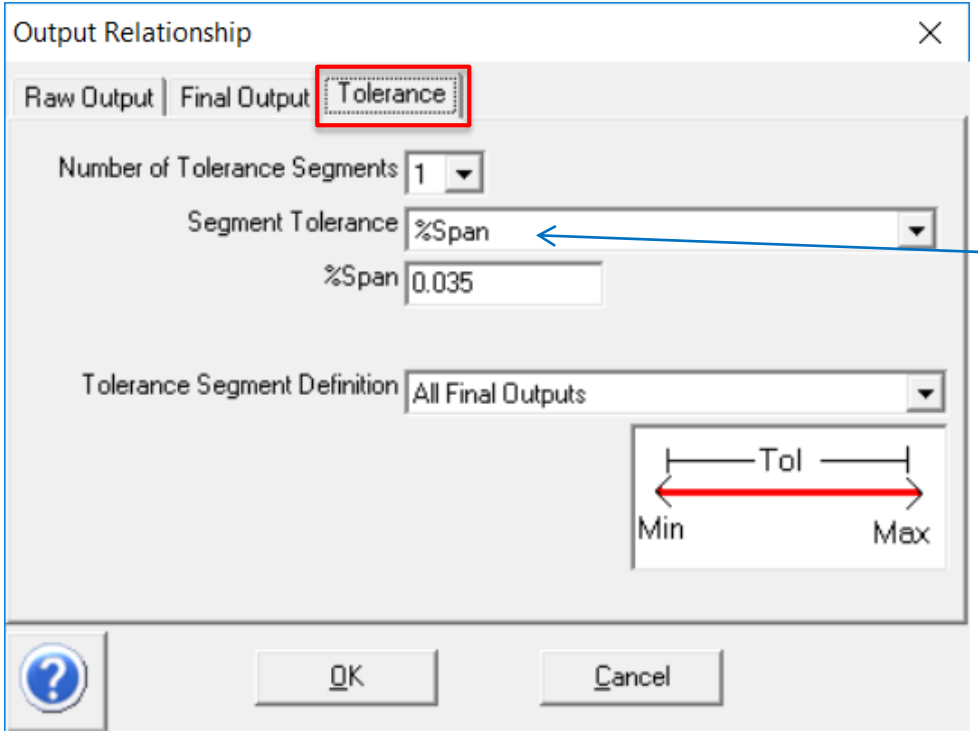
Output Tab – Advanced DUT: Raw & Final Outputs are in separate windows





Setup DUT (Device Under Test)

Output Tab – Tolerance



Can change tolerance when initializing test for Profile DUTs

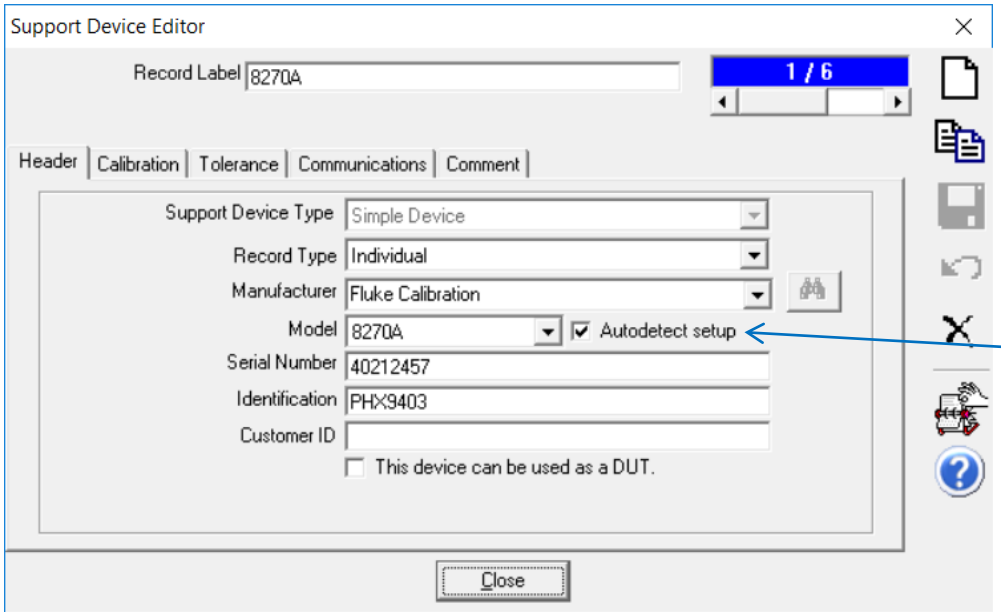
Setup Support Devices

Support Devices are all devices that are not DUTs, piston gauges or deadweight testers

- Setup is the same as DUT (advanced/simple device, read and set outputs, communications)
- Example today uses an 8270A controller

Setup Support Devices

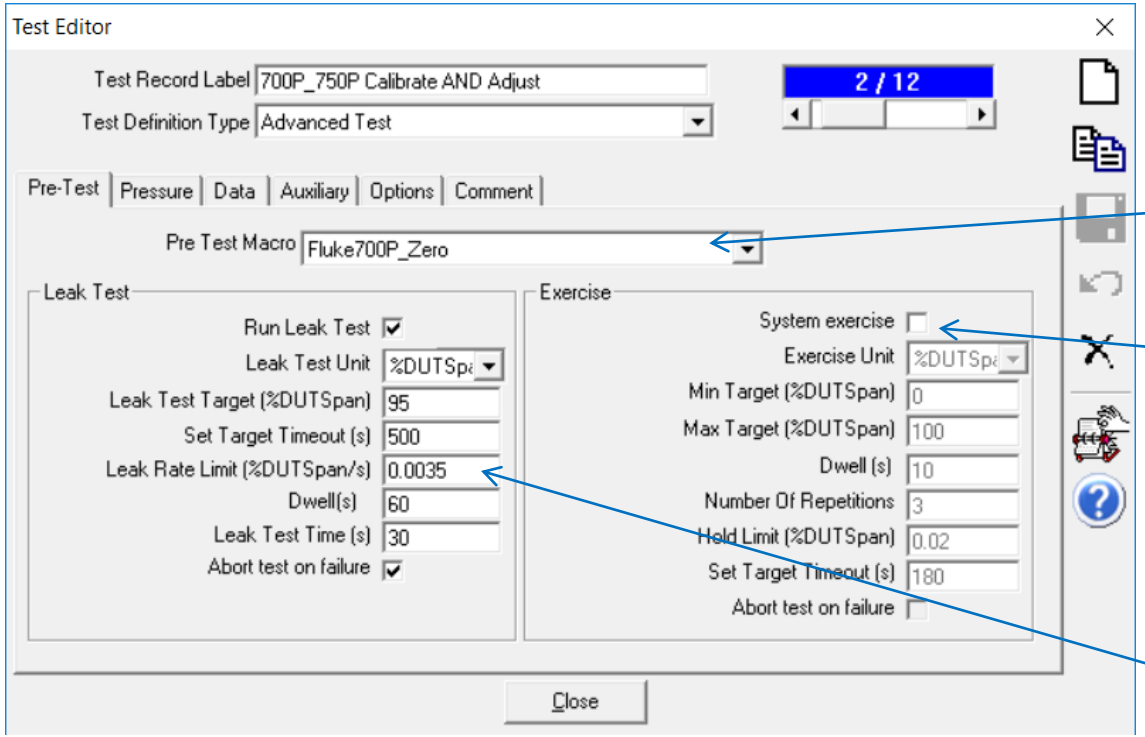
Support Devices



Autodetect works for most Fluke Calibration (and DHI and Ruska devices). With this, you don't have to setup the range, outputs, etc. COMPASS will read during test initialization.

Setup Test

Pre-Test Tab



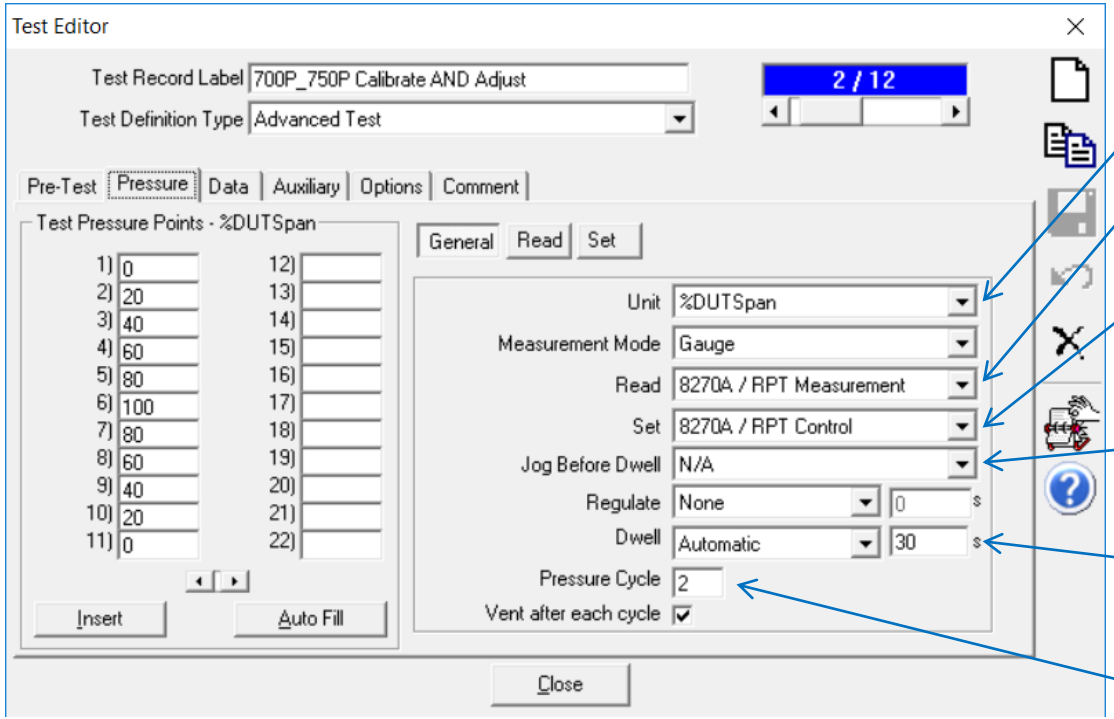
Pre Test Macro to zero the module (through the 700PCK software and hardware)

Exercise Test – Optional, sometimes treat the Leak Test as an Exercise (so don't have to do the Exercise routine)

Leak Test – Typically set "Leak Rate Limit" to 10% of the DUT's tolerance

Setup Test

Pressure Tab – “General” Child tab



Unit - Set to %DUT FS for a more universal test

Read - Specify the Reference Device

Set - Specify the Controller

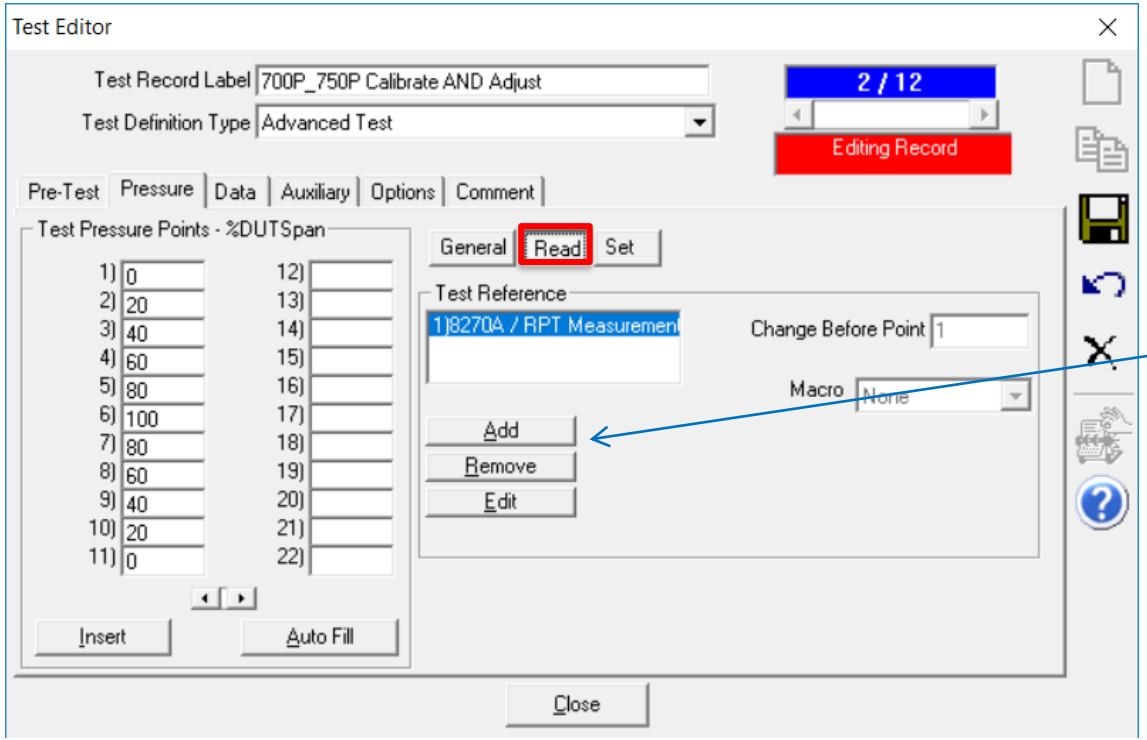
Jog Before Dwell - Typically only for cardinal point calibrations on analog gauges (needle exactly on the mark)

Dwell – Sometimes called “soak “time

Presure Cycle – 2. first is as-found, second is as-left

Setup Test

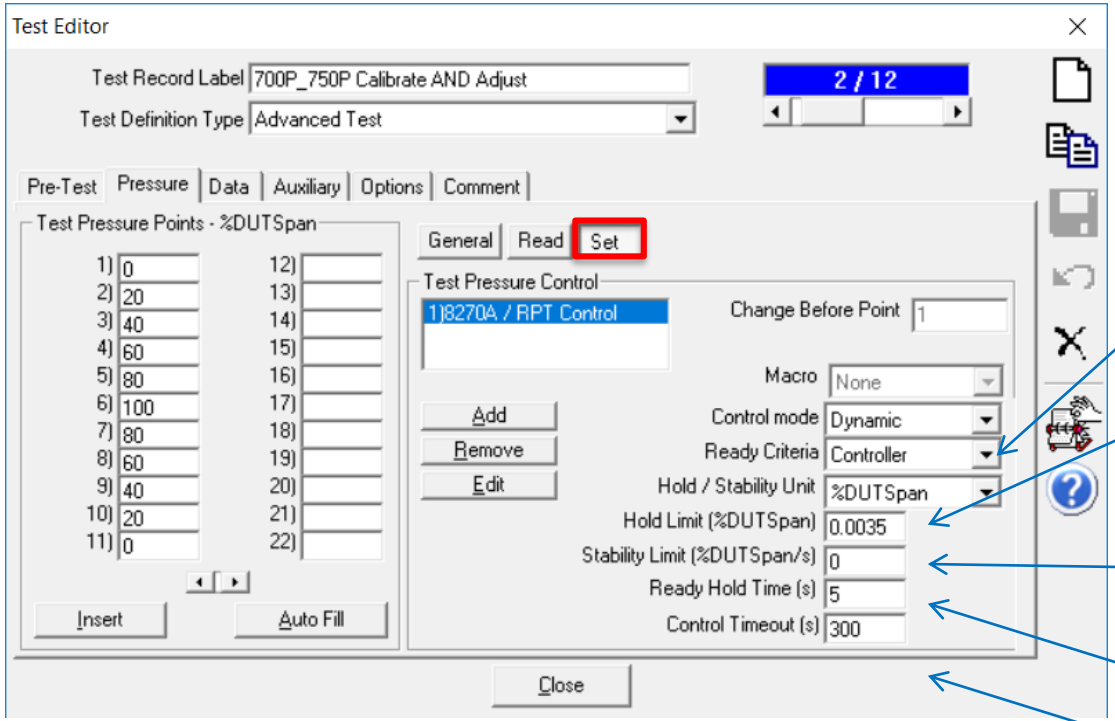
Pressure Tab – “Read” Child Tab



Add or Edit References, can specify what points they are used at. We’re not doing this. COMPASS will record which module in the 8270A is used for each test point in the data file.

Setup Test

Pressure Tab – “Set” Child Tab



Get Ready/Not Ready status from **Controller**

How close to set point to get a Ready condition (in Dynamic mode). Ideally 10% of the DUT tolerance (if possible)

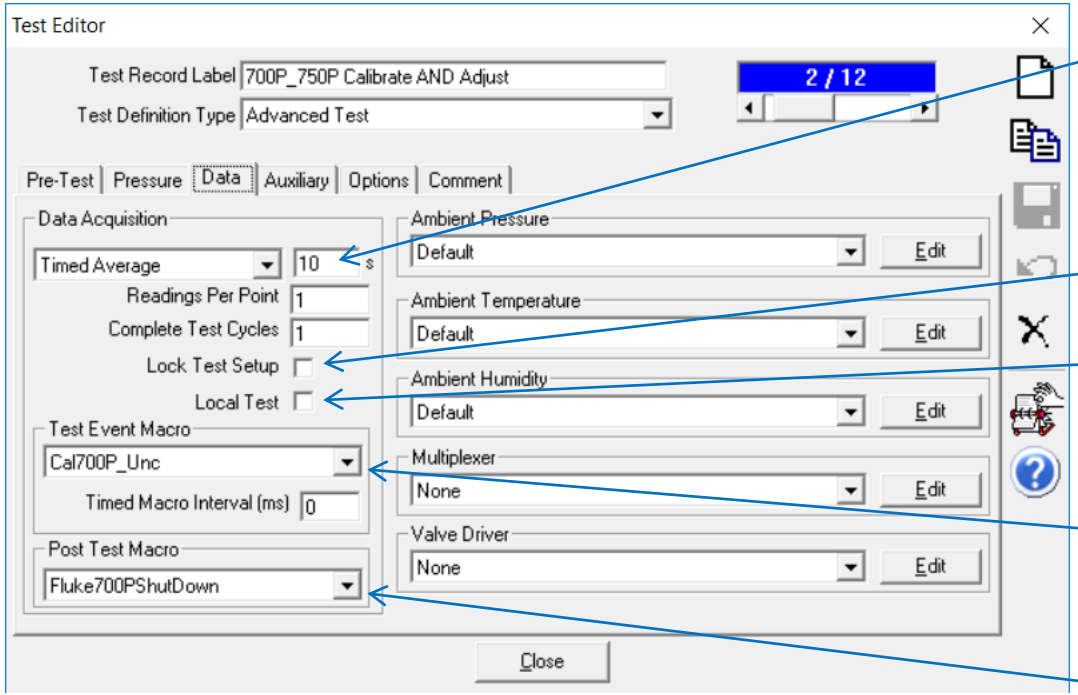
How stable to get a Ready condition (only for Static mode). Typically 10% of the DUT tolerance (if possible)

How long to be Ready before going to Dwell

Timeout to get Ready (continue or abort test)

Setup Test

Data Tab



Enter zero for no averaging

Prevent users from editing tests

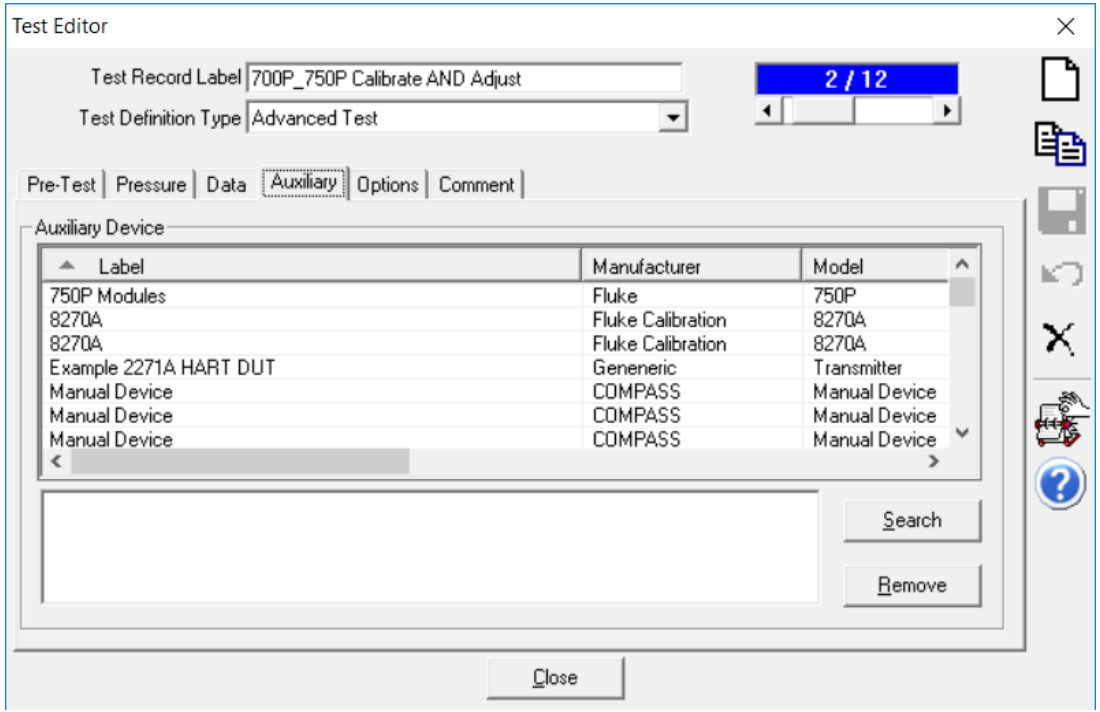
If checked test can only run on this PC (must have networked install)

Test Macro – Determines if as-left or as-found and runs the 700PCK Adjust (zero/max) run between. Also calculates per-point measurement uncertainty. Timed interval of zero runs this without any delays

Post Test TestMacro – Close 700PCK interface

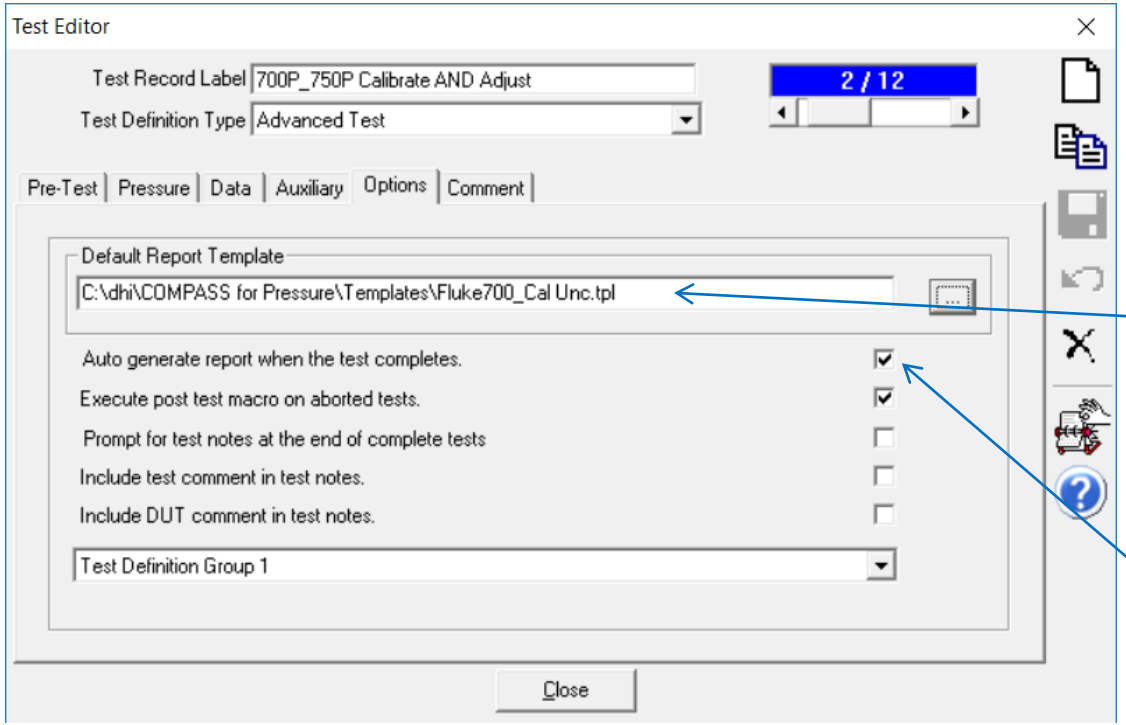
Setup Test

Auxiliary Tab – Optional, specify any Aux devices to use



Setup Test

Options Tab (only with Advanced Test)

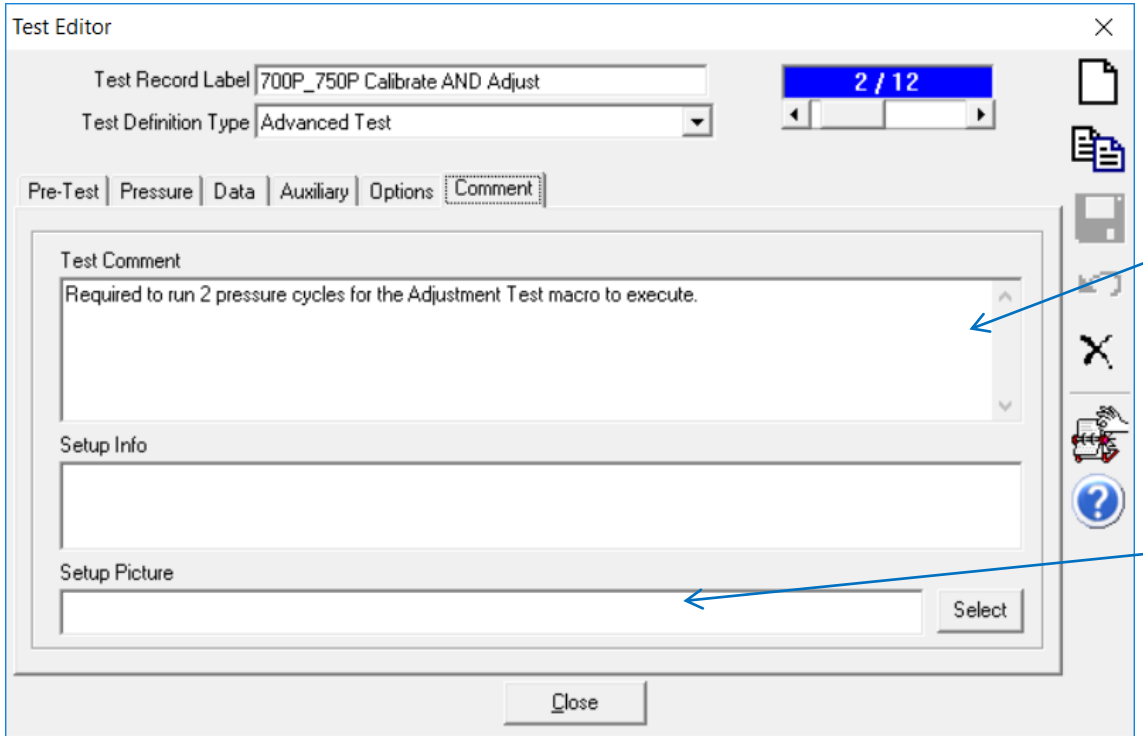


Specify calibration report template. Useful if you have multiple templates. Our example uses a custom As Found – As Left template with measurement uncertainty fields

Automatically open cal report when test is done

Setup Test

Comments Tab – All cells are optional



Can be saved to data file if desired

Technician can view a specified picture when initializing the test

Run Test

Two options:

Run → Run Test Definition (video and screen-shots follow)

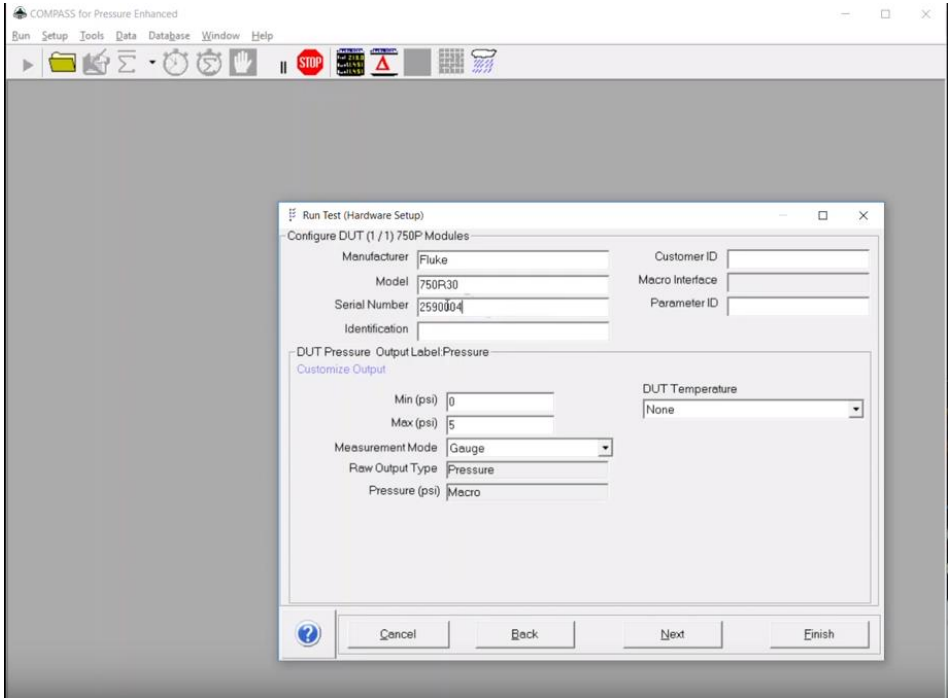
- Initialize Test - Follow the on-screen prompts for selection of DUT(s), the Test and any Support Devices
- Run Test - Proceed through the leak test/exercise, test points, collecting data (might be fully automated)
- End Test - Upon completion, click to create the calibration report in the COMPASS Report Editor (or it might open automatically if configured to do so)

Run → Run Manual Test

- Same but don't choose a test. User selects points
- Can be good for logging data or troubleshooting COMPASS setups/tests

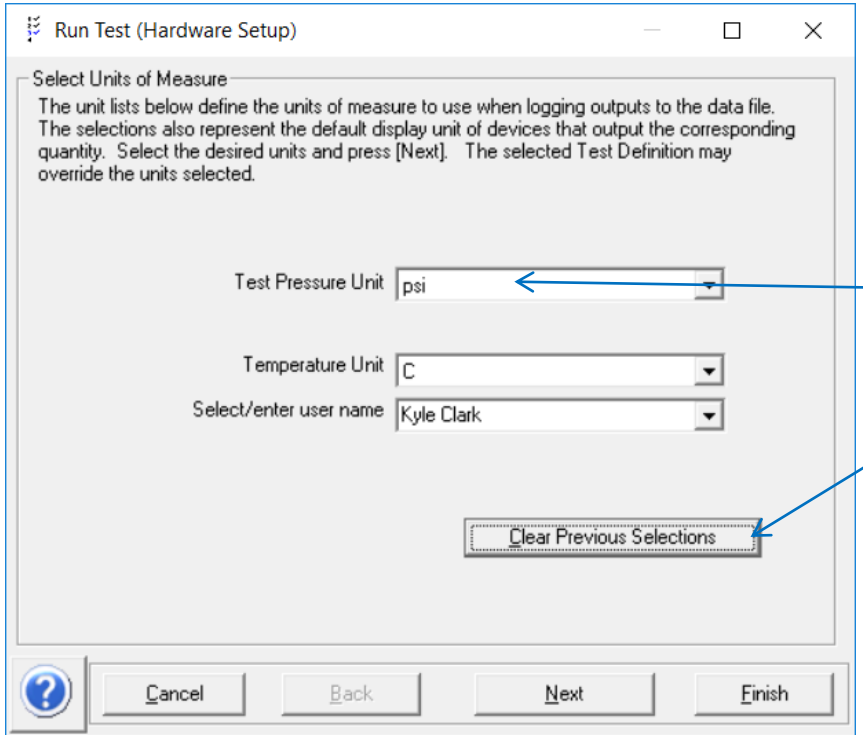
Initialize Test (Video)

[750P module with COMPASS, Part 1 - Initialize Test (click to play video)]



Initialize Test – Screenshots (same as video)

Select Units / User

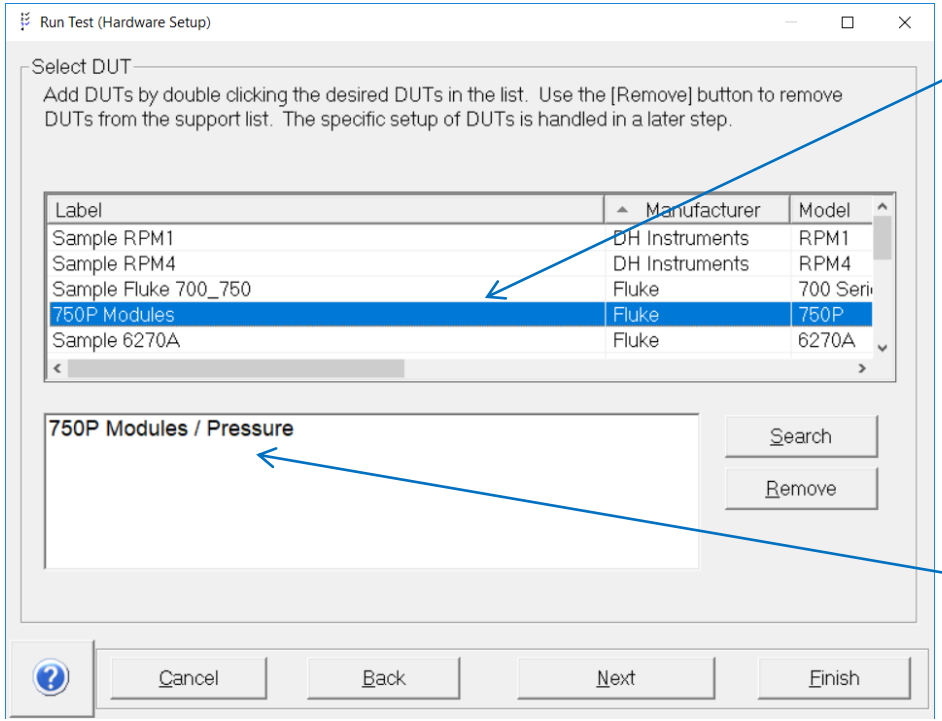


Can run test in different units than device and/or test setups

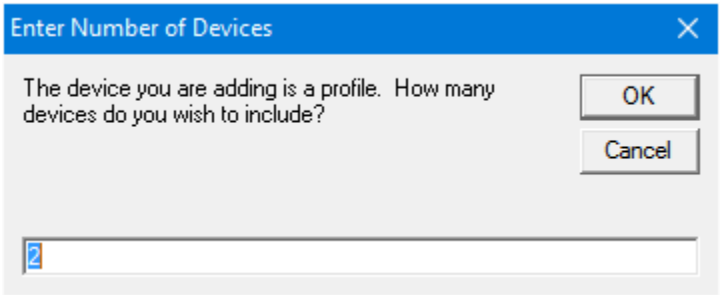
Clear history of the previous run. If you want to run the same exact DUT, test, etc. (you made a mistake the last time) just press the [Finish] button and the same previous test will run

Initialize Test

Select DUT(s)



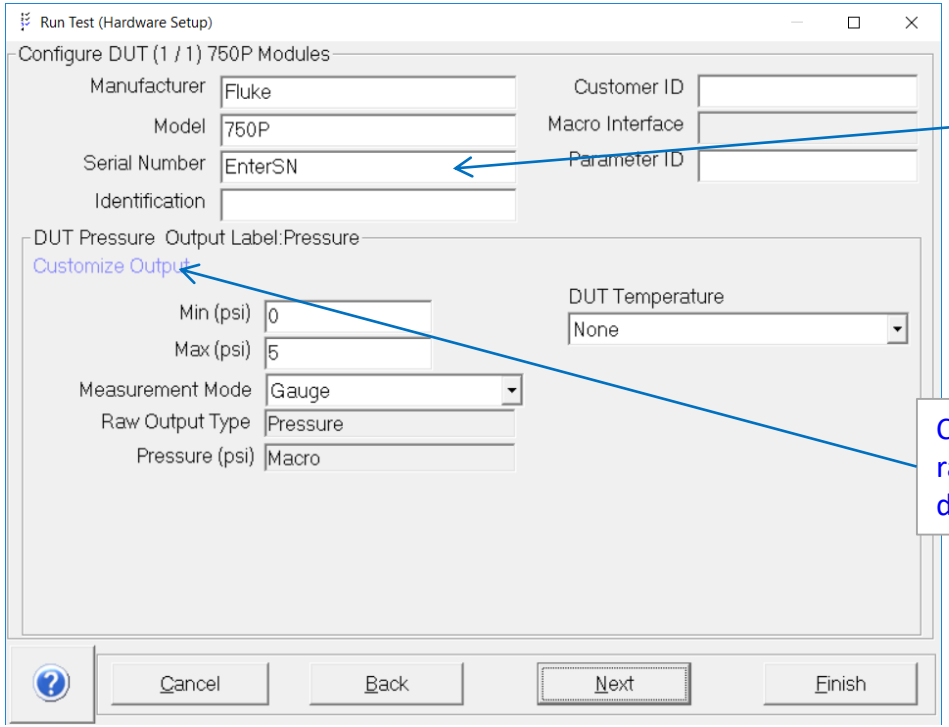
List of available DUTs. Double-click to select (then shows in bottom window). Double-click a profile DUT more than once and COMPASS will prompt you for how many



Selected DUT, 750P Module

Initialize Test

Configure DUT(s)

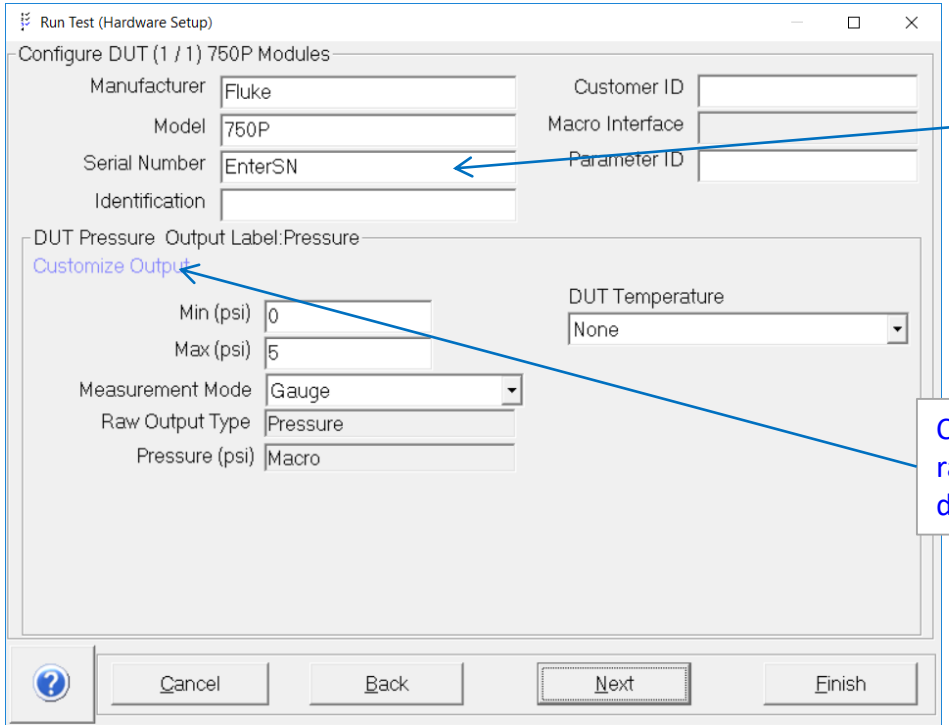


Have to enter Serial Number, Identification or Customer ID for any Profile DUTs now

Click “Customize Output” link to change the range, resolution, tolerance of a Profile DUT if desired

Initialize Test

Configure DUT(s)

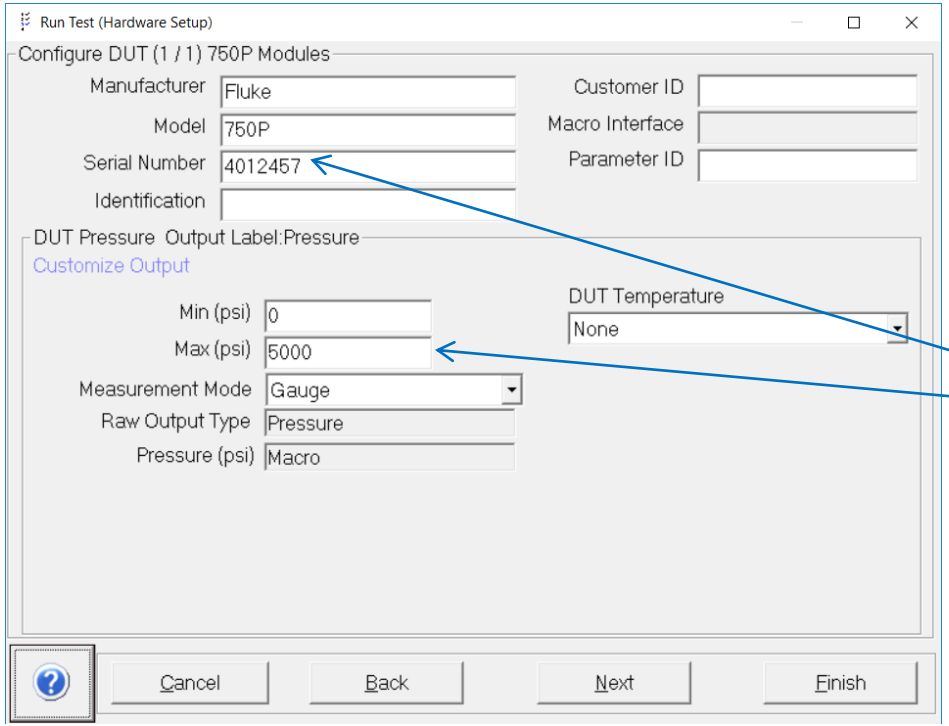


Have to enter Serial Number, Identification or Customer ID for any Profile DUTs now

Click “Customize Output” link to change the range, resolution, tolerance of a Profile DUT if desired

Initialize Test

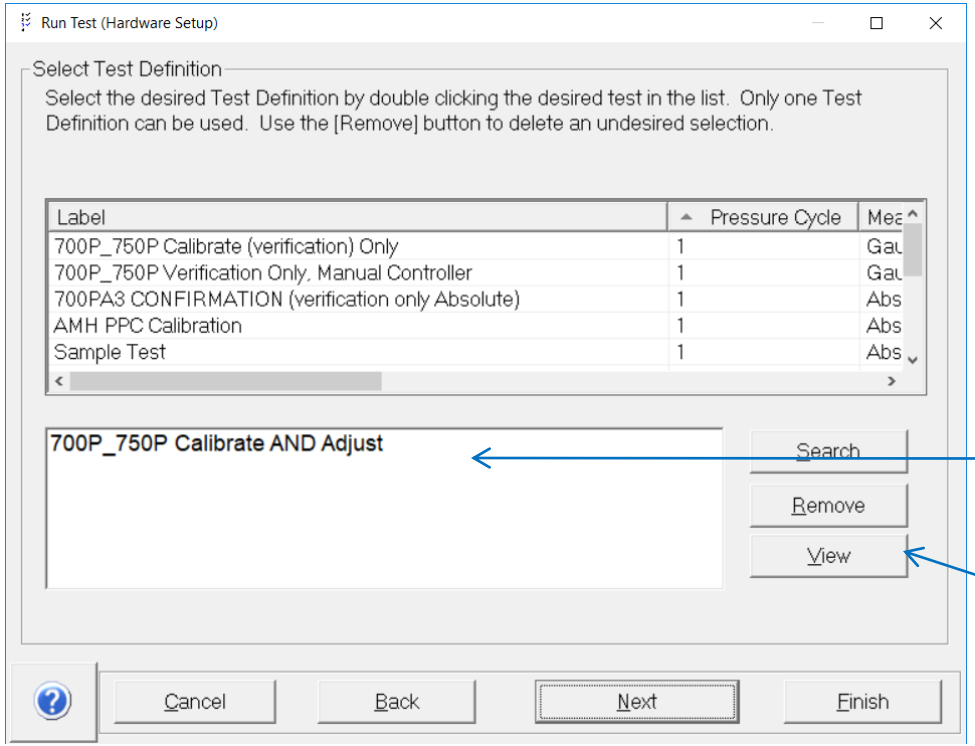
Configure DUT(s) – After editing the Output



Changed serial number, range, resolution, tolerance

Initialize Test

Select Test

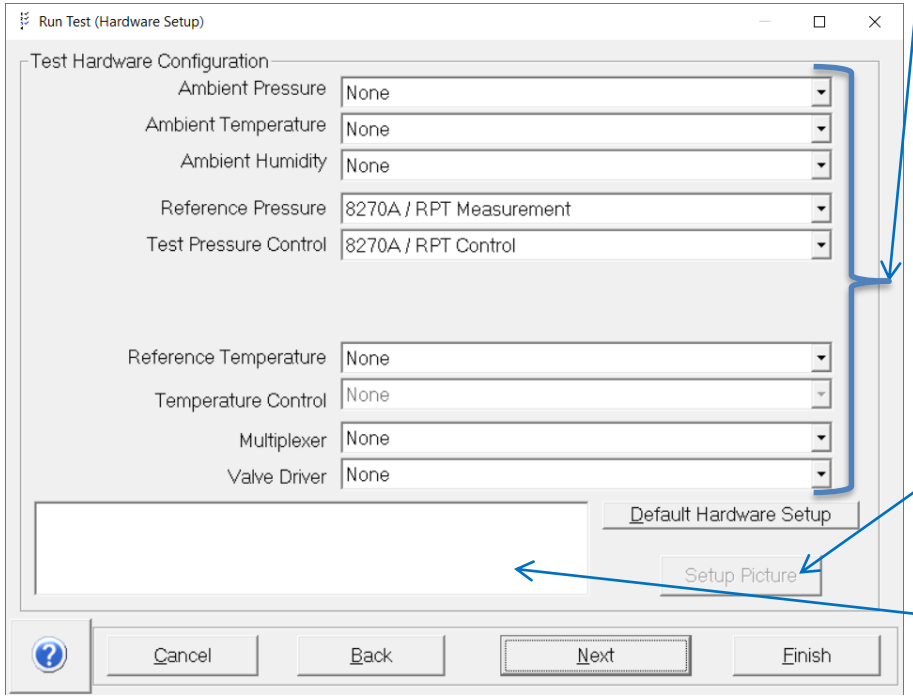


The Test we specified on the “Calibration” tab in the DUT Setup is here. Can change if desired unless the Test is locked

Can view all tabs of the Test here

Initialize Test

Test Hardware Configuration



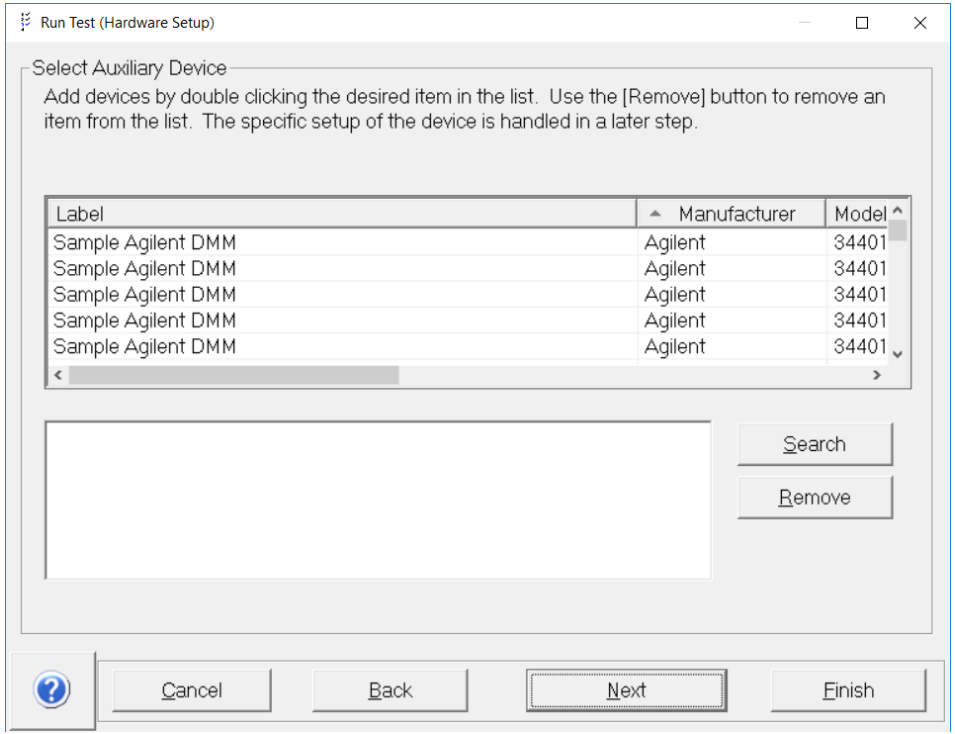
Devices that we specified in the Test setup populate here. Can change if desired unless the Test is locked

The image specified in the Comments tab in the Test setup shows if you click the [Setup Picture] button

Text from the “Comments” tab in the Test setup (bold and blue to stand out)

Initialize Test

Select Auxiliary Devices (optional)

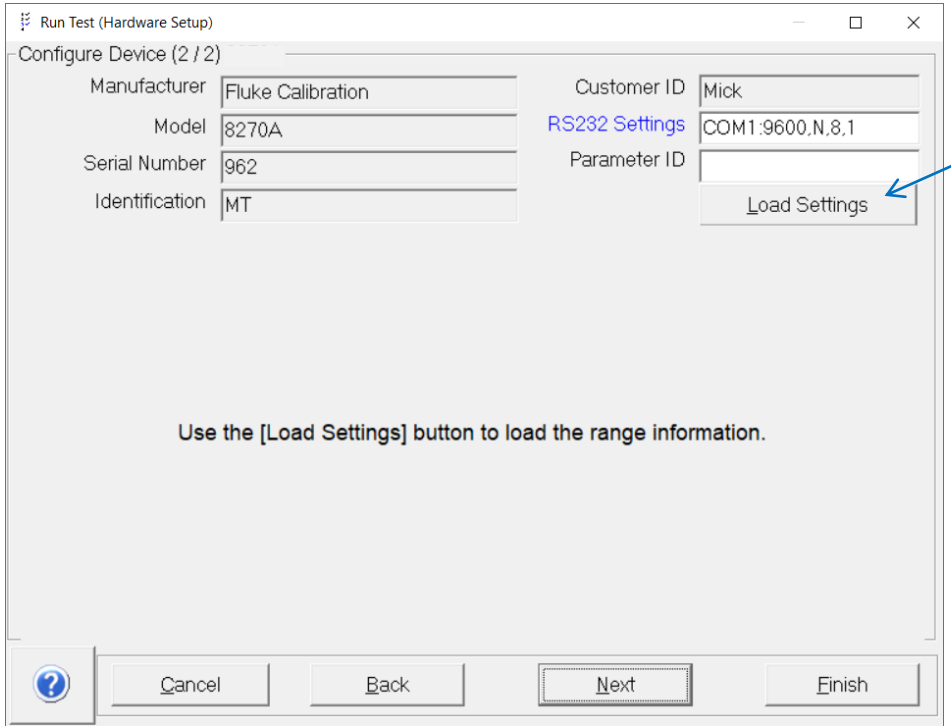


Same selection method as DUTs

You can prevent this screen from showing by this path: [Tools], <Options>, “Initialize” tab

Initialize Test

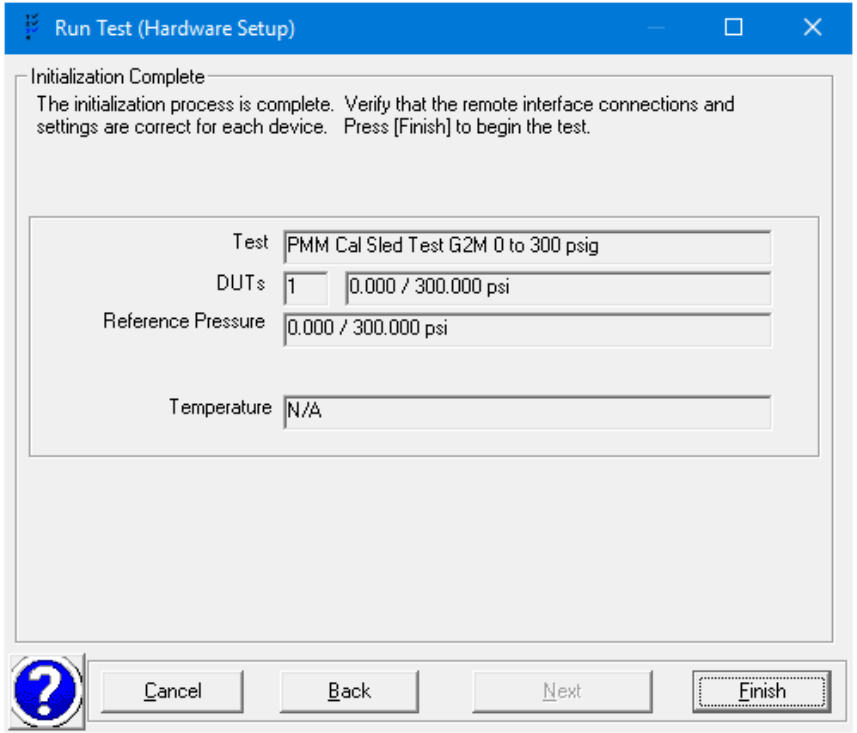
Configure/Verify Reference, Controller, Auxiliary Device(s)



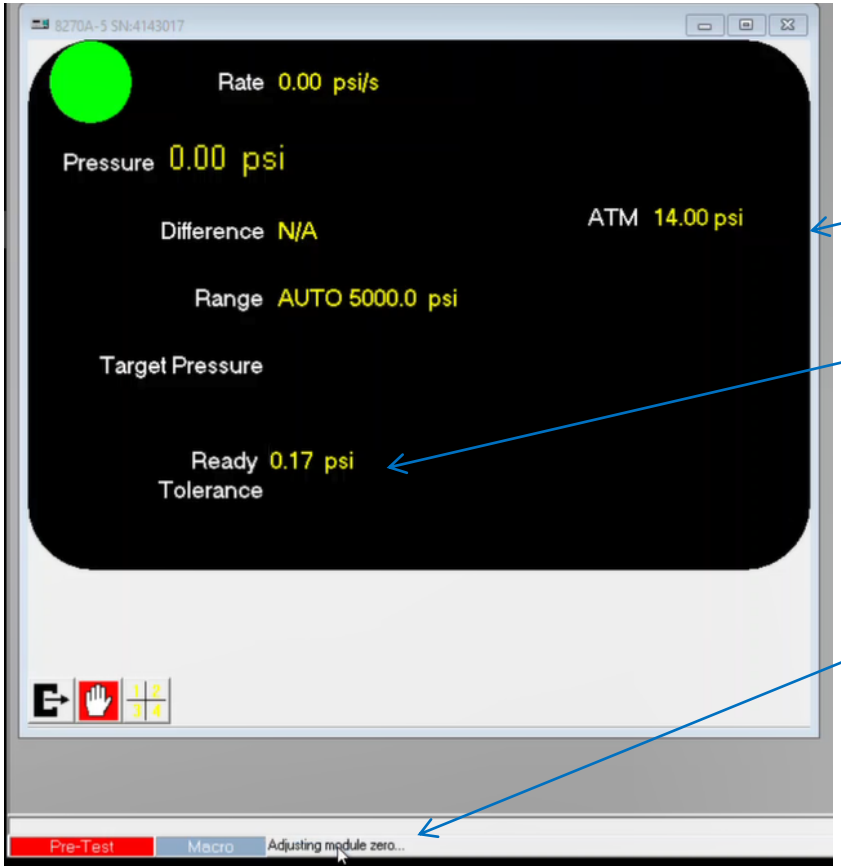
Press [Load Settings] to have COMPASS query the Autodetect device for range(s), etc.

Initialize Test

Final Verification / Summary



Run Test – Various Run Windows



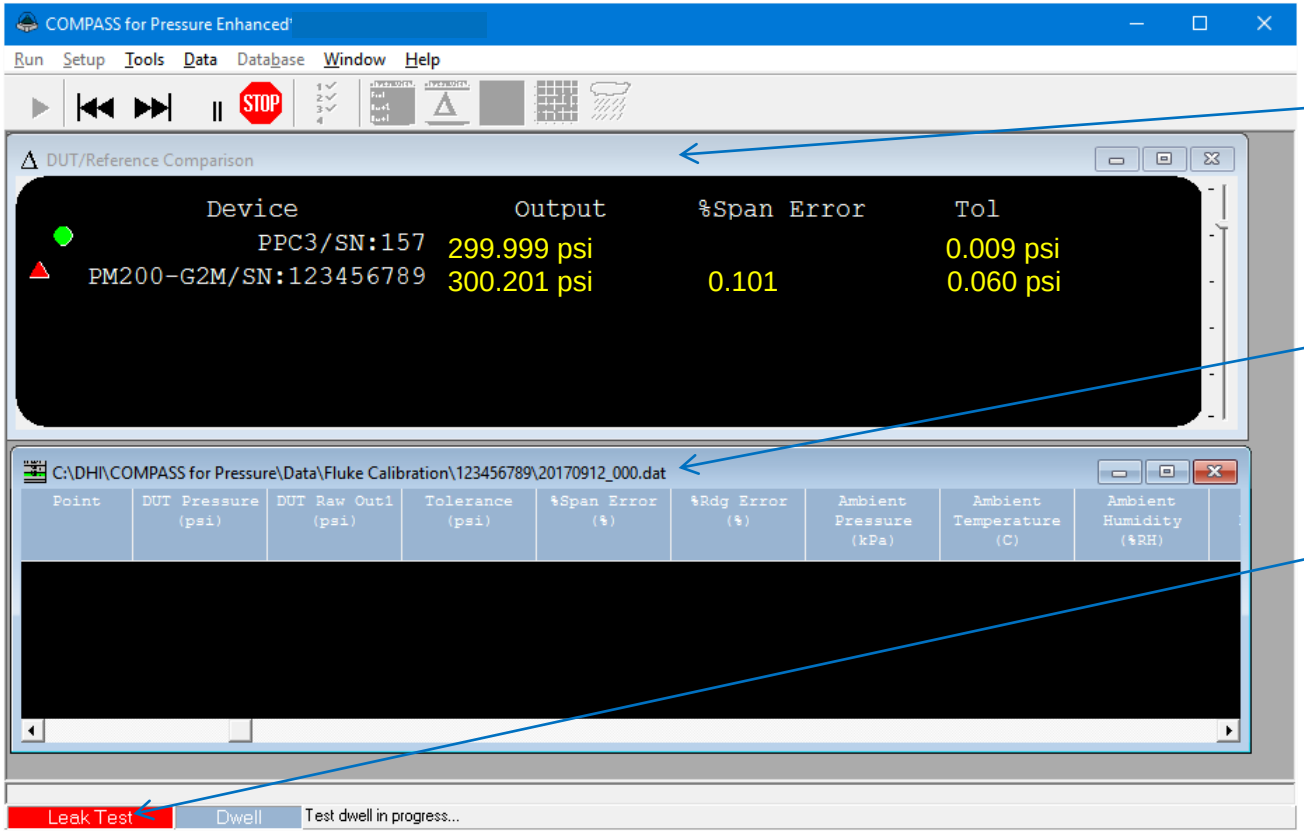
Autodetect 8270A Window

ATM as setup in the 8270A

Ready Tolerance from Test Setup

Pre-Test Macro shows “Adjusting Module Zero” when module is being zeroed

Run Test – Various Run Windows



DUT/Reference Comparison Window (can choose fields to show)

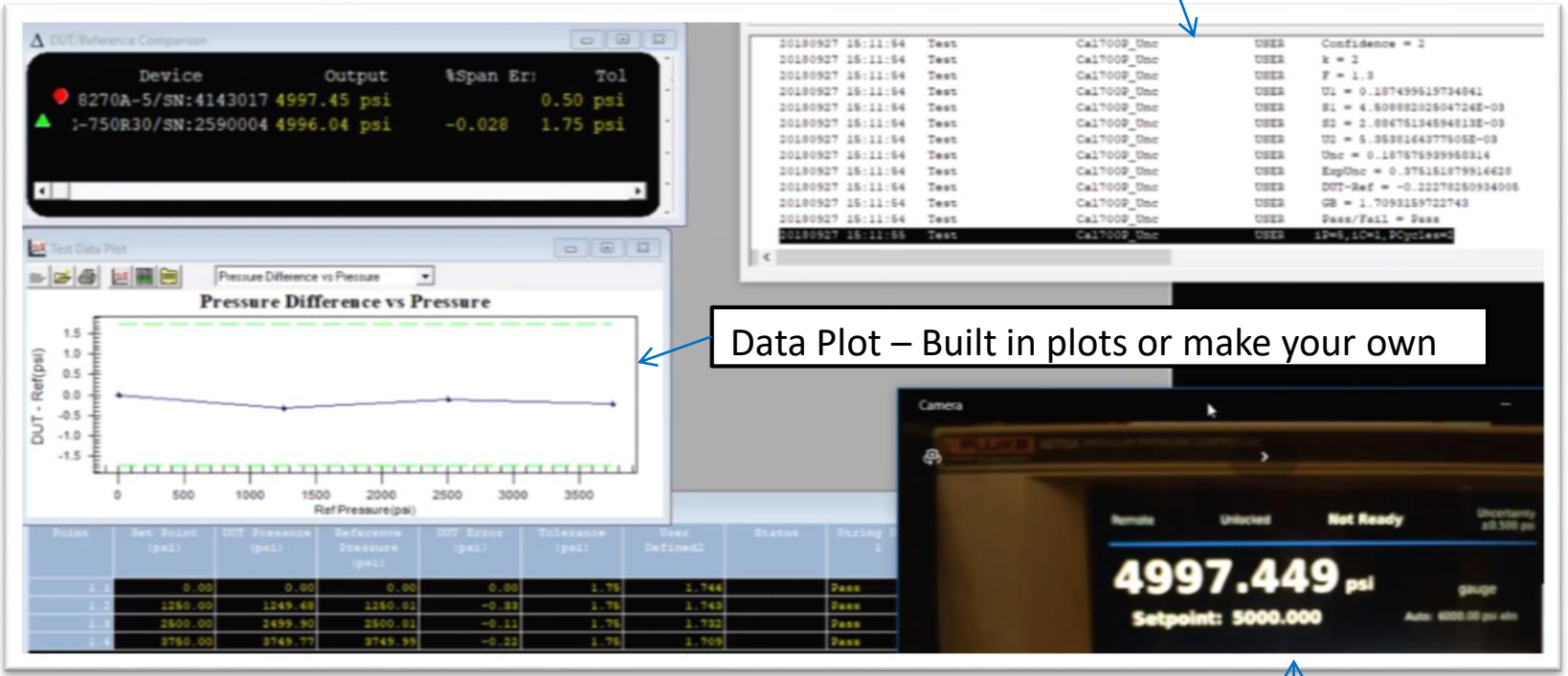
Data Grid shows Test Data (configurable, not same as data in data file)

Click Red/Blue status to view more detailed status information

Run Test – As Found Data (screen-shot)

COMPASS run windows

Macro spy (optional) shows uncertainty components, status of macros

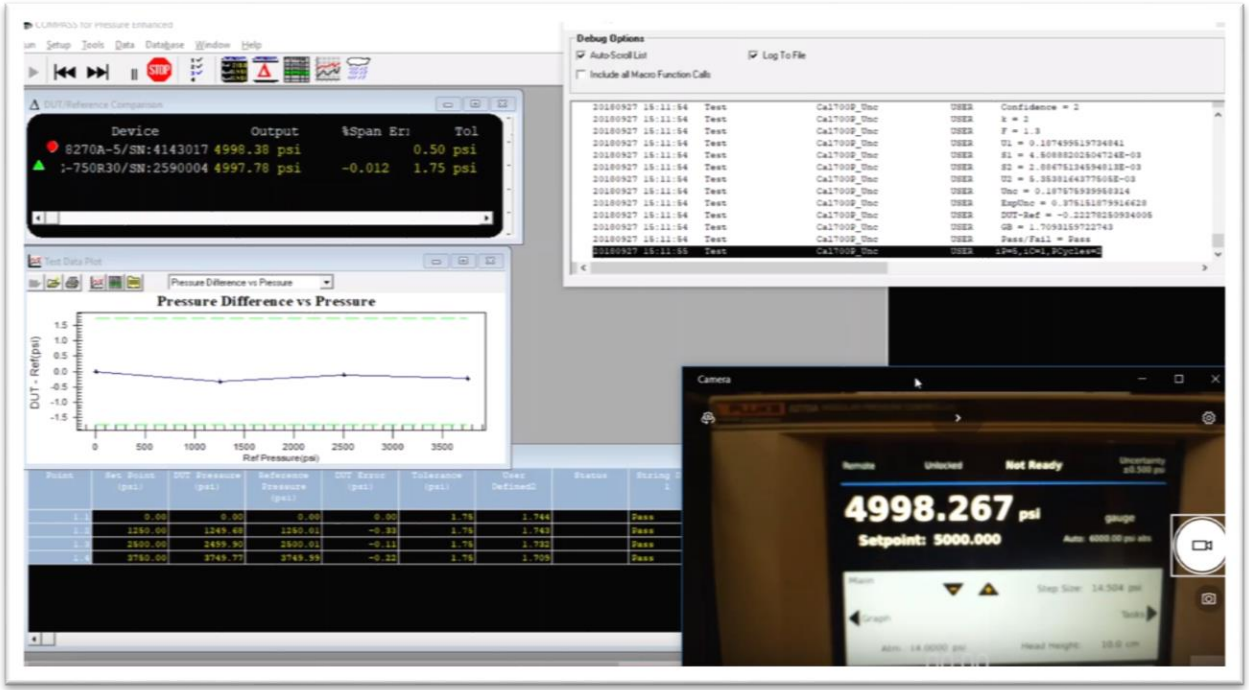


Data Plot – Built in plots or make your own

8270A controller display (not in COMPASS)

Run Test – As Found Data (Video)

[750P module with COMPASS, Part 2 - As Found Data (click here for video)]

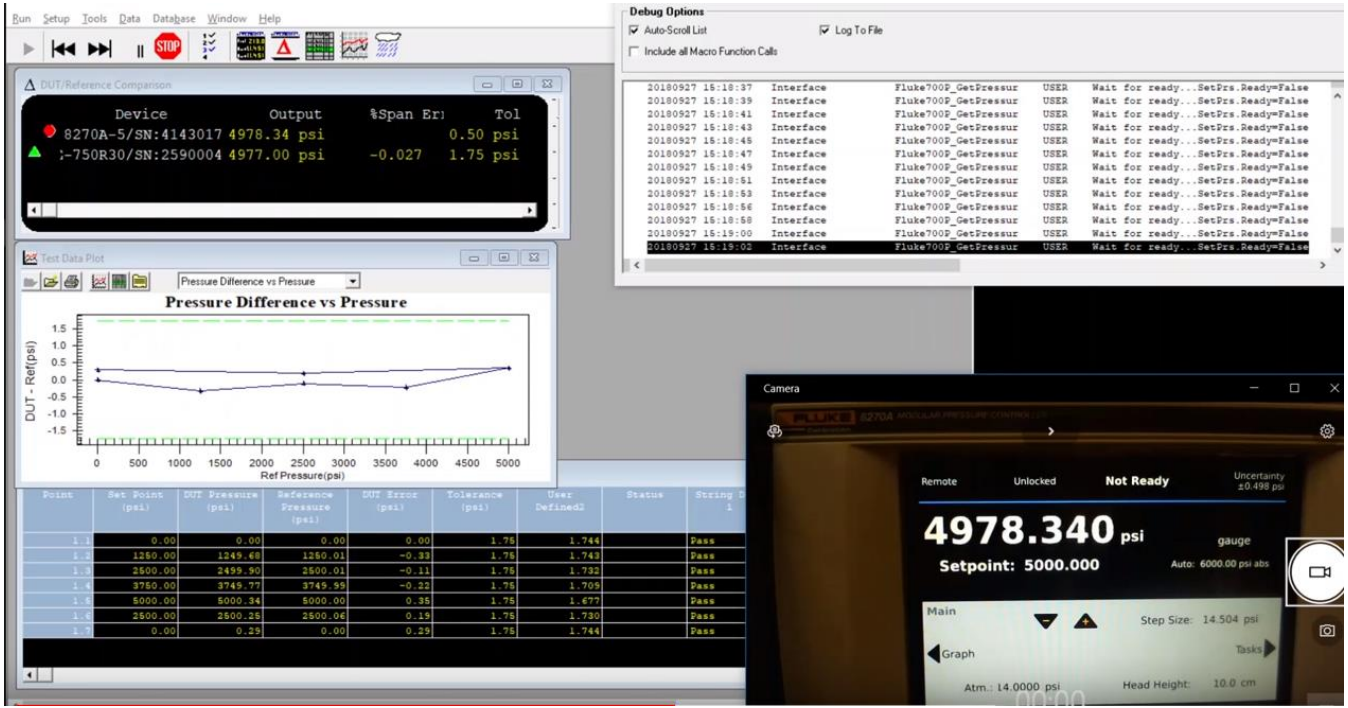


Run Test – Adjustment (screen-shot)

Macro spy window shows that adjustment macro code completed

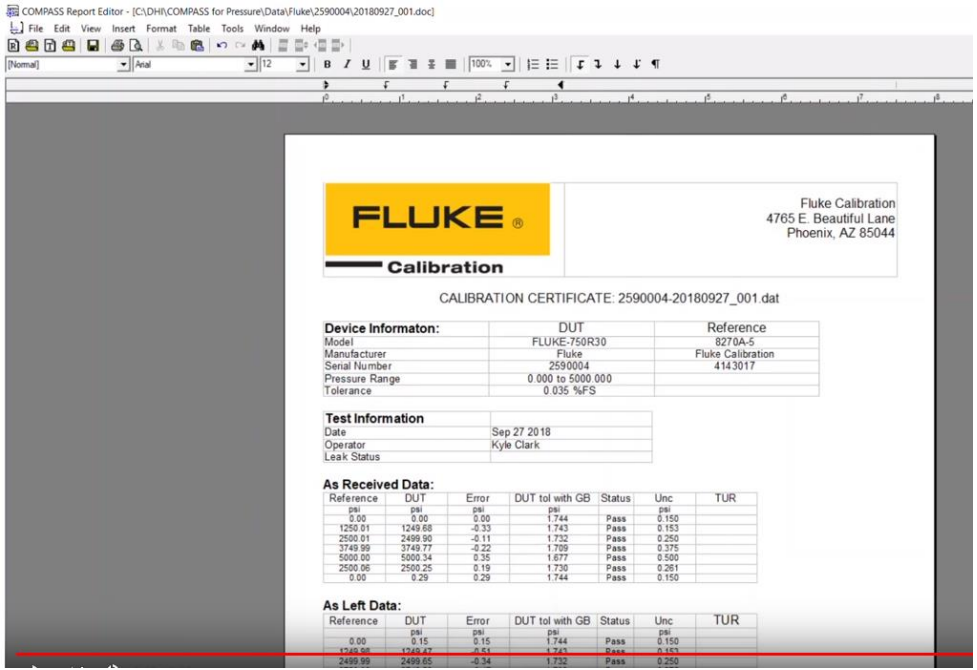
Run Test – Adjustment (Video)

[750P module with COMPASS, Part 3 – Adjustment (click here for video)]



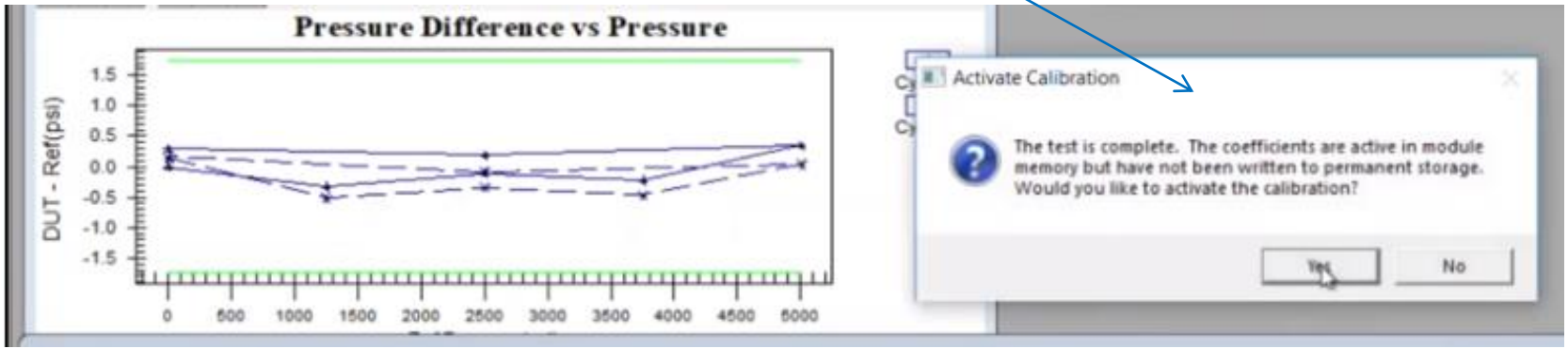
Run Test – As Left Data / Verification (Video)

[750P module with COMPASS, Part 4 - As Left Data (click here for video)]

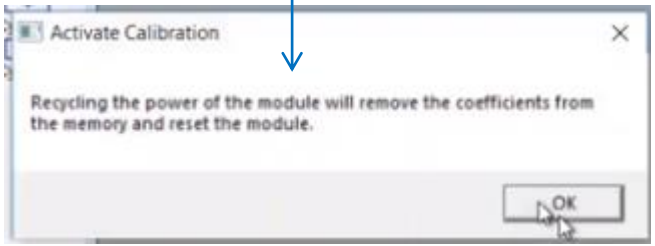


Run Test – As Left Verification (screen-shot)

Pop up window shows that coefficients are active in the module but not written. Activate yes/no?



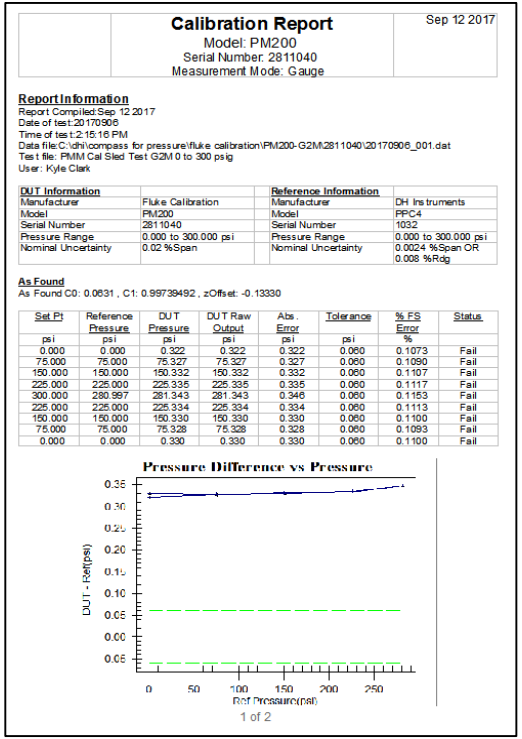
Next pop up window shows to cycle the power of the module to remove the new active coefficients.



Calibration Report

FLUKE® Calibration

COMPASS Report Editor Produces professional quality calibration reports



Calibration Report
Model: PM200
Serial Number: 2811040
Measurement Mode: Gauge

Sep 12 2017

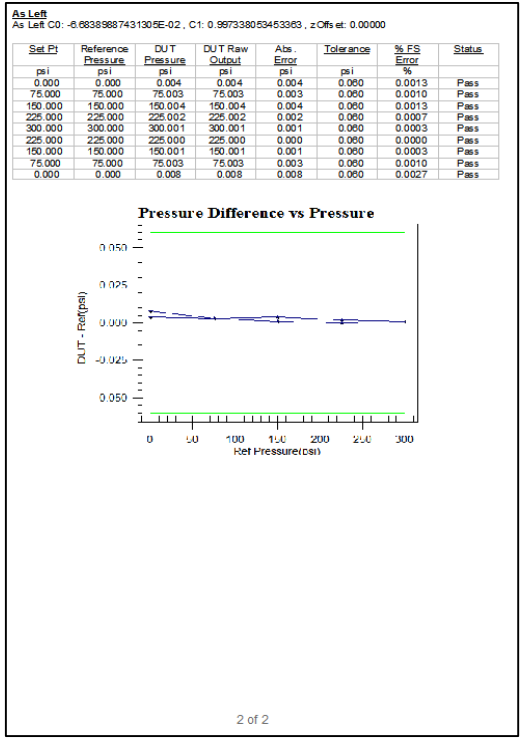
Report Information
Report Compiled:Sep 12 2017
Date of test:20170906
Time of test:2:15:16 PM
Data file:C:\dh\compass for pressure\fluke calibration\PM200-G2M\2811040\20170906_001.dat
Test file: PMM Cal Sled Test G2M 0 to 300 psig
User: Kyle Clark

DUT Information		Reference Information	
Manufacturer	Fluke Calibration	Manufacturer	DH Instruments
Model	PM200	Model	PPC4
Serial Number	2811040	Serial Number	1032
Pressure Range	0.000 to 300.000 psi	Pressure Range	0.000 to 300.000 psi
Nominal Uncertainty	0.02 %Span	Nominal Uncertainty	0.0024 %Span OR 0.008 %Rdg

As Found
As Found C0: 0.0631 , C1: 0.99739492 , zOffset: -0.13330

Set Pt	Reference Pressure	DUT Pressure	DUT Raw Output	Abs. Error	Tolerance	% FS Error	Status
psi	psi	psi	psi	psi	psi	%	
0.000	0.000	0.322	0.322	0.322	0.060	0.1073	Fail
75.000	75.000	75.327	75.327	0.327	0.060	0.1090	Fail
150.000	150.000	150.332	150.332	0.332	0.060	0.1107	Fail
225.000	225.000	225.335	225.335	0.335	0.060	0.1117	Fail
300.000	280.997	281.343	281.343	0.346	0.060	0.1153	Fail
225.000	225.000	225.334	225.334	0.334	0.060	0.1113	Fail
150.000	150.000	150.330	150.330	0.330	0.060	0.1100	Fail
75.000	75.000	75.328	75.328	0.328	0.060	0.1093	Fail
0.000	0.000	0.330	0.330	0.330	0.060	0.1100	Fail

1 of 2



As Left
As Left C0: -6.6838988743130 5E-02 , C1: 0.997338053453363 , zOffset: 0.00000

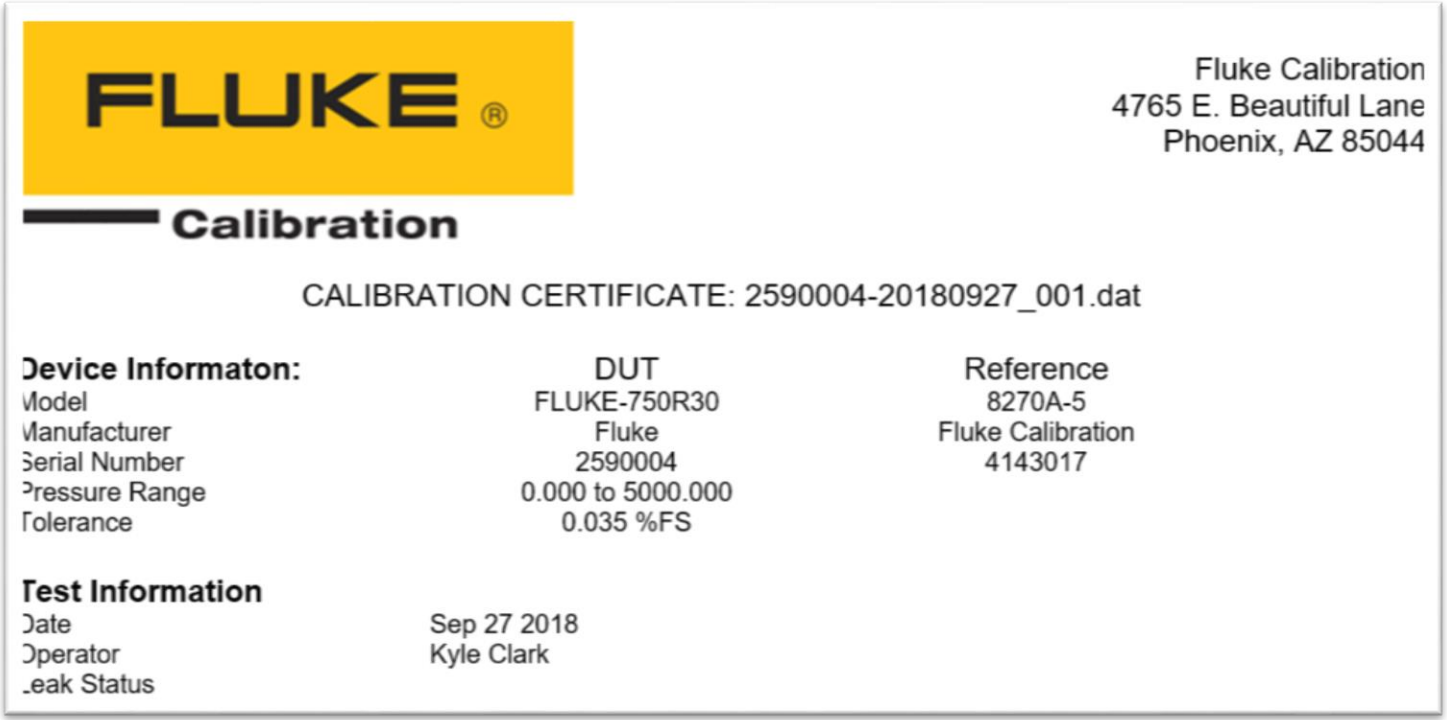
Set Pt	Reference Pressure	DUT Pressure	DUT Raw Output	Abs. Error	Tolerance	% FS Error	Status
psi	psi	psi	psi	psi	psi	%	
0.000	0.000	0.004	0.004	0.004	0.060	0.0013	Pass
75.000	75.000	75.003	75.003	0.003	0.060	0.0010	Pass
150.000	150.000	150.004	150.004	0.004	0.060	0.0013	Pass
225.000	225.000	225.002	225.002	0.002	0.060	0.0007	Pass
300.000	300.000	300.001	300.001	0.001	0.060	0.0003	Pass
225.000	225.000	225.000	225.000	0.000	0.060	0.0000	Pass
150.000	150.000	150.001	150.001	0.001	0.060	0.0003	Pass
75.000	75.000	75.003	75.003	0.003	0.060	0.0010	Pass
0.000	0.000	0.008	0.008	0.008	0.060	0.0027	Pass

2 of 2

Calibration Report

COMPASS Report Editor Produces professional quality calibration reports

Title / Header section



FLUKE®
Calibration

Fluke Calibration
4765 E. Beautiful Lane
Phoenix, AZ 85044

CALIBRATION CERTIFICATE: 2590004-20180927_001.dat

Device Informaton:	DUT	Reference
Model	FLUKE-750R30	8270A-5
Manufacturer	Fluke	Fluke Calibration
Serial Number	2590004	4143017
Pressure Range	0.000 to 5000.000	
Tolerance	0.035 %FS	

Test Information

Date	Sep 27 2018
Operator	Kyle Clark
Leak Status	

Calibration Report

Data

As Received Data:

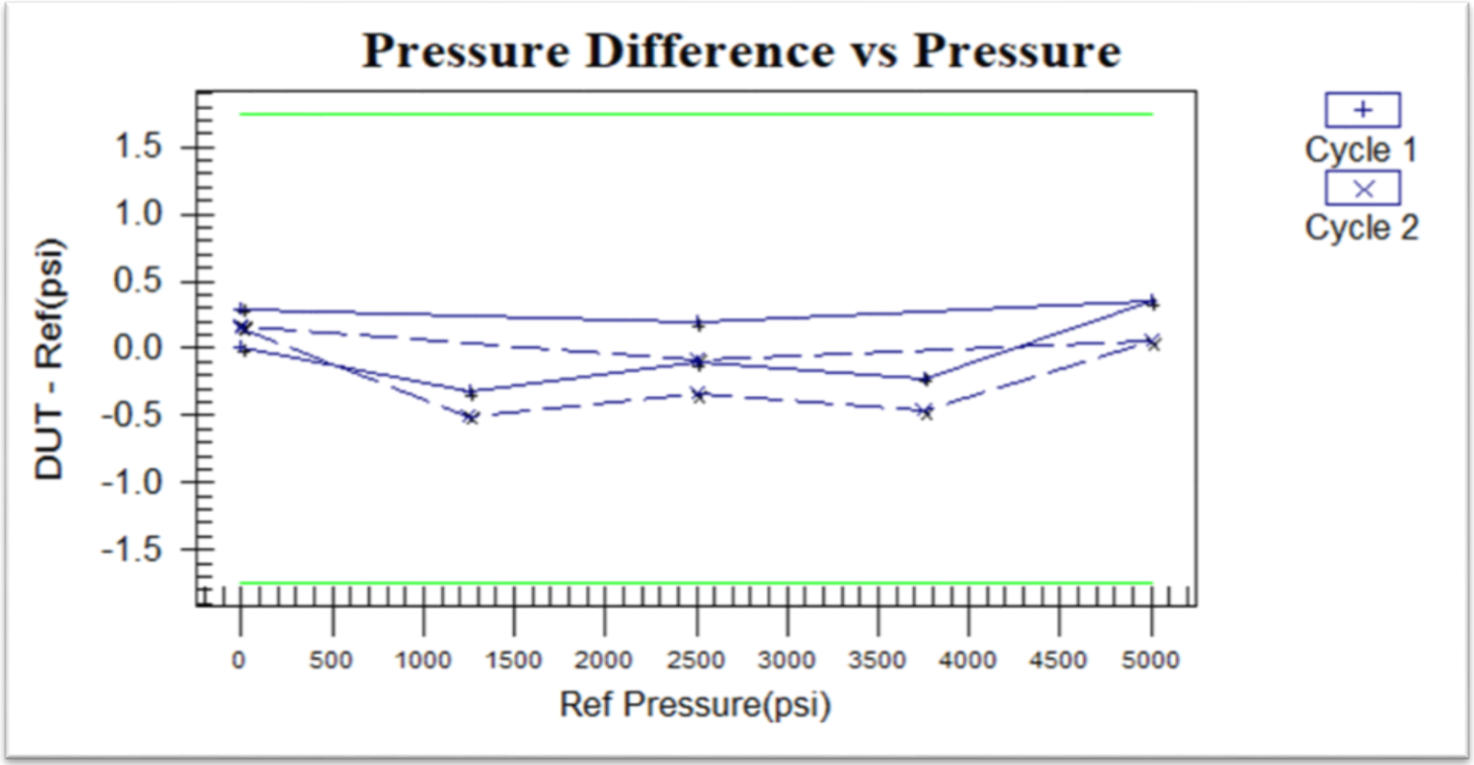
Reference	DUT	Error	DUT tol with GB	Status	Unc
psi	psi	psi	psi		psi
0.00	0.00	0.00	1.744	Pass	0.150
1250.01	1249.68	-0.33	1.743	Pass	0.153
2500.01	2499.90	-0.11	1.732	Pass	0.250
3749.99	3749.77	-0.22	1.709	Pass	0.375
5000.00	5000.34	0.35	1.677	Pass	0.500
2500.06	2500.25	0.19	1.730	Pass	0.261
0.00	0.29	0.29	1.744	Pass	0.150

As Left Data:

Reference	DUT	Error	DUT tol with GB	Status	Unc
	psi	psi	psi		psi
0.00	0.15	0.15	1.744	Pass	0.150
1249.98	1249.47	-0.51	1.743	Pass	0.153
2499.99	2499.65	-0.34	1.732	Pass	0.250
3750.00	3749.53	-0.47	1.709	Pass	0.375
4999.99	5000.04	0.05	1.677	Pass	0.500
2500.01	2499.92	-0.08	1.730	Pass	0.261
0.00	0.17	0.17	1.744	Pass	0.150

Calibration Report

Optional Plot with Tolerance Bars and Legend



Data File

Semi-colon separated file. Can open in Excel

[TEST DATA]											
Point	Date	Time	Elapsed Time	Set Time	Set Point	Reference Pressure	DUT Pressure	DUT Error	Tolerance	Guardband	Status
			s	sec	psi	psi	psi	psi	psi		
[TEST PRESSURE CYCLE]											
1.1	20180927	15:07:01	59.3	16	0	0	0	0	1.75	1.744	Pass
1.2	20180927	15:08:57	174.9	83	1250	1250.01	1249.68	-0.33	1.75	1.743	Pass
1.3	20180927	15:10:22	260.6	60	2500	2500.01	2499.9	-0.11	1.75	1.732	Pass
1.4	20180927	15:11:48	346.4	60	3750	3749.99	3749.77	-0.22	1.75	1.709	Pass
1.5	20180927	15:13:24	442.5	60	5000	5000	5000.34	0.35	1.75	1.677	Pass
1.6	20180927	15:15:28	566.2	81	2500	2500.06	2500.25	0.19	1.75	1.73	Pass
1.7	20180927	15:16:51	649.2	16	0	0	0.29	0.29	1.75	1.744	Pass

PM600-A200K SN3833031
PM600-A40M SN4143003
PM600-A40M SN4143003
PM600-A40M SN4143003
PM600-A40M SN4143003
PM600-A40M SN4143003
PM600-A200K SN3833031

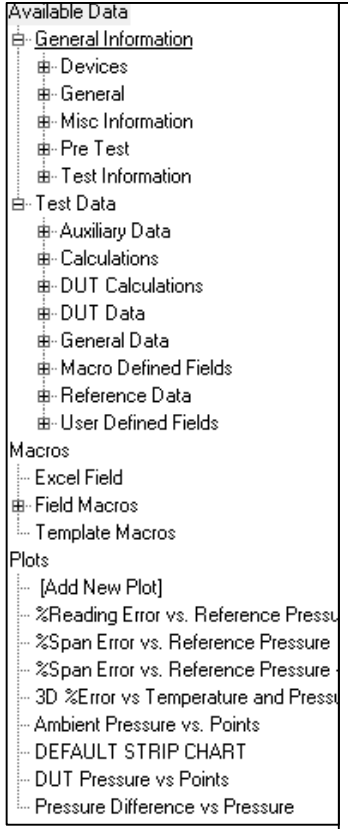
Active Pressure Measurement Module's serial number and model saved for each point. Can be put on cal report if desired

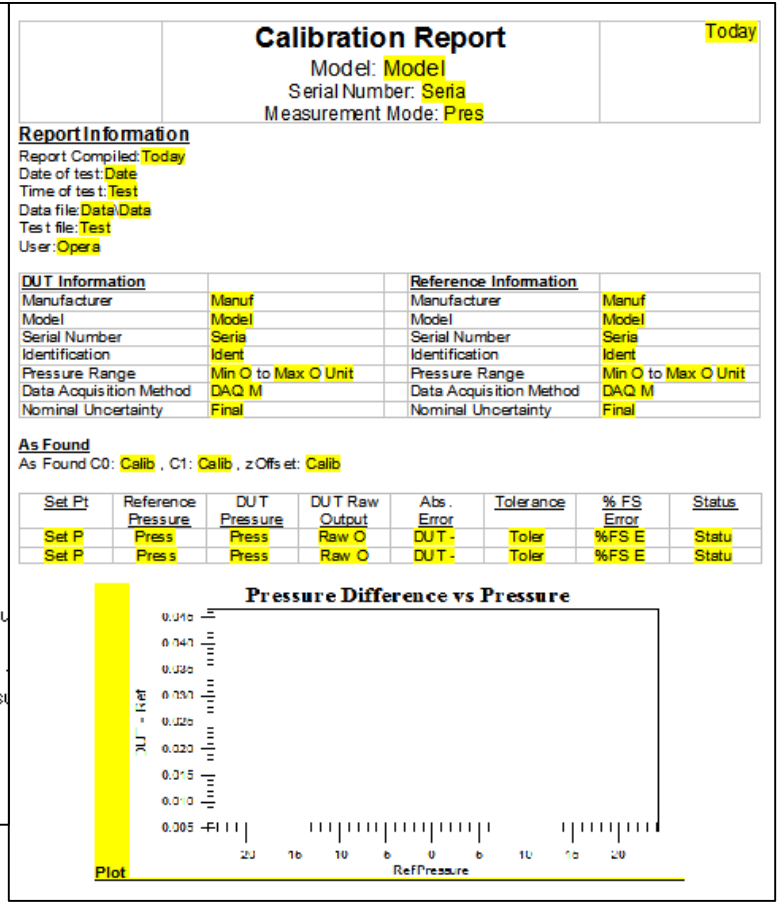
COMPASS Report Editor

FLUKE® Calibration

Customize template (.tpl) files

- Edit any black/white text (even change language)
- Yellow fields can be selected from the available fields to the left
  - Data from data file
  - Plots (edit or make new)
  - Calculations with Report Macros





End of Test

Test data:

- As COMPASS runs, data is written to a storage location, saved as an ASCII delimited text file
  - Storage location is local drive or network location
  - Optional, can also save in *.mdb database file
- Export to Excel® feature in COMPASS Report Editor
  - Open data file(s) in pre-selected Excel workbook (COMPASS Enhanced)
- Import COMPASS data file into MET/TEAM

COMPASS versions (demo version available)

COMPASS for Pressure, Basic - Most features available

COMPASS for Pressure, Enhanced - All of Basic plus…

- Use of multiple references within a test
- DUTs with multiple outputs or DUTs that also control pressure
- Test event macros

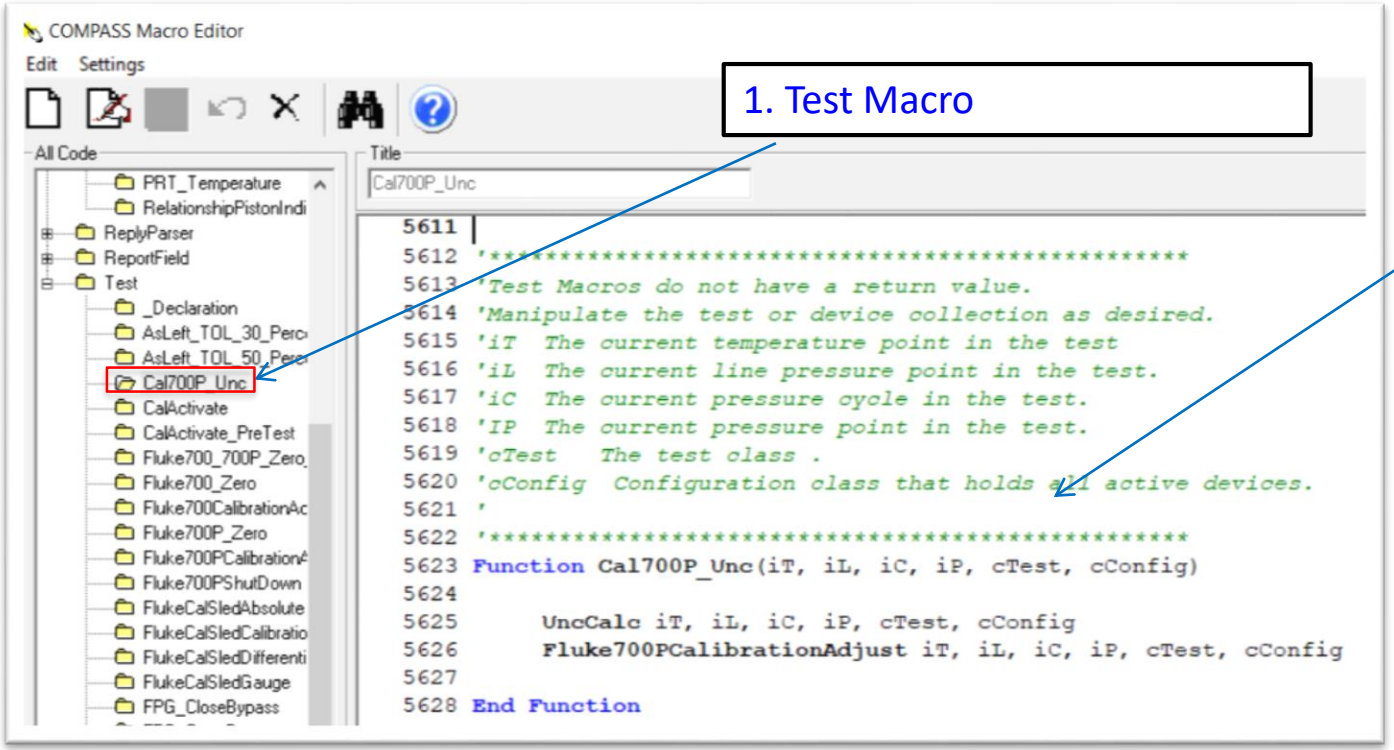
- Single User License included with either version
  - Order additional licenses to run on multiple computers and to share a networked database
- Demo of either version is available at no charge at flukecal.com
- Upgrade to current version at flukecal.com

Other COMPASS features

- Temperature Test - Need Enhanced
  - Typically for temperature characterizing pressure sensors
  - Has to be run with a pressure test
- Pressure Test with Line Pressure
  - Often natural gas or steam differential pressure sensors that operate at high line pressures, but low differential pressures
- User and feature display options
  - User levels with passwords
  - Network options – all files that should be backed up on network drive

COMPASS Macro Editor (view of)

Test Macro “Cal700P_Unc” (Specified on the Data tab in the Test)



1. Test Macro

2. Green text is comments

2. Use this Test Macro to call two other Test Macros; UncCalc Test macro and the 700P Cal Adjust Test Macro. Have to do this because can’t specify two Test Macros in the test

COMPASS Macro Editor (view of)

Test Macro “UncCalc” – ISO 17025 Uncertainty Calculation

Search for “COMPASS Uncertainty” in Knowledge Base to find article

```
'This test macro calculates uncertainty for each setpoint in the test
'at the end of the averaging time. Calculation is done per
'Fluke Calibration Application Note -
'"Implementing ISO 17025 Measurement Uncertainty Requirements In Software"
'dated March 2012, document 1282496C
'Seach www.flukecal.com for "1282496C" to find this App Note
'
'Make sure UserDefined1, UserDefined2 and StringData1 are saved to the data file in
'[Tools], <Options>, <Data In File>. Need an Advanced test and specify this as the
'"Test Event Macro" on the Data tab, and "Timed Macro Interval(ms)" needs to be 0 (zero).
'
'************************************************
Function UncCalc(iT, iL, iC, iP, cTest, cConfig)

'Renaming column headers at start of new pressure/flow cycle
If cCOMPASS.CurrentTestStep = 1100 Then
    For i = 1 To cCOMPASS.DataCollection.Count
        cCOMPASS.DataCollection(i).DataInfoCollection("ID410001").Nomenclature = "Uncertainty'
        cCOMPASS.DataCollection(i).DataInfoCollection("ID410002").Nomenclature = "Guardband"
        cCOMPASS.DataCollection(i).DataInfoCollection("ID410501").Nomenclature = "Status GB"
```

COMPASS Macro Editor (view of)

FLUKE® Calibration

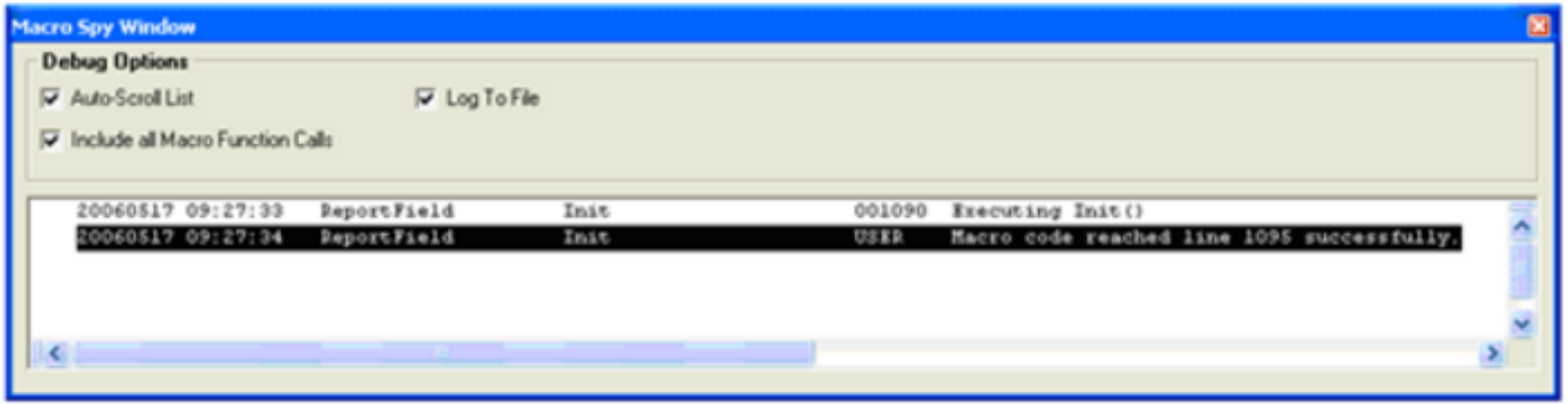
Test Macro “Fluke700PCalibrationAdjust”

```
Function Fluke700PCalibrationAdjust(iT, iL, iC, iP, cTest, cConfig)

Select Case cCOMPASS.CurrentTestStep
    Case 2000 ' Test Complete
        If cTest.TestPrsCycles <> 2 Then  'only support calbration with received and as l
            Exit Function
        End If

        msg = "The test is complete.  The coefficients are active in module memory but "
        msg = msg & "have not been written to permanent storage. Would you like to activat
        msg = msg & "the calibration?"

        If MsgBox(msg, vbQuestion + vbYesNo + vbSystemModal, "Activate Calibration") = vbN
            msg = "Recycling the power of the module will "
            msg = msg & "remove the coefficients from the memory and reset the module."
            MsgBox msg, vbSystemModal, "Activate Calibration"
            Exit Function
```

Run Test – Display macro spy

Macro Spy (show macro calls and macro debug statements)

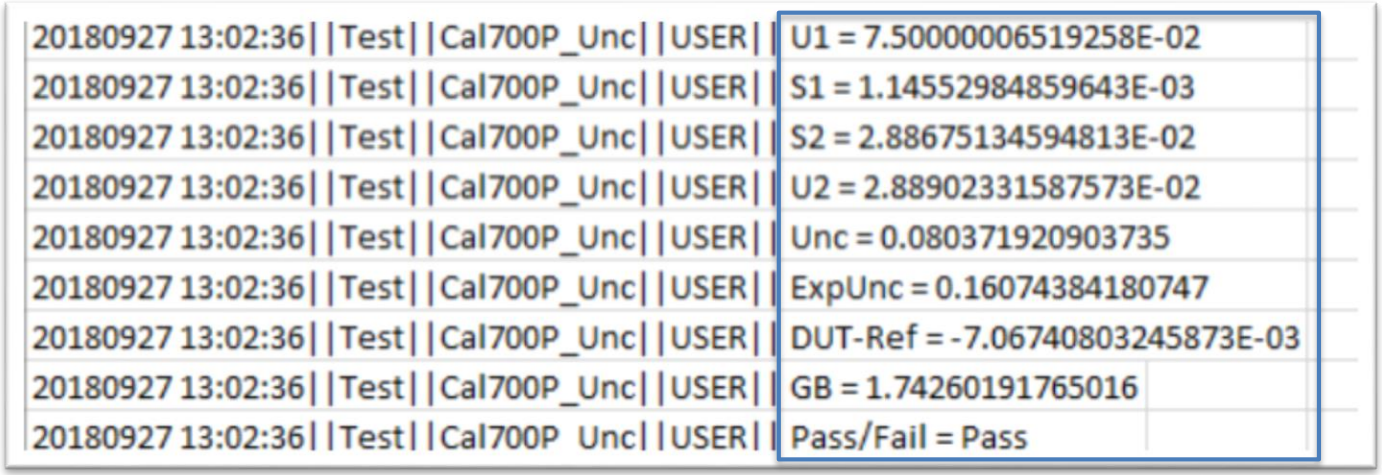
- If the test does not have a macro in it, the option to view the macro spy window does not appear
- Click the Device Run Screen Display icon and select <Show Macro Spy> to bring up the Macro Spy Window



Run Test – Display macro spy

Macro Spy and macstat.log

- Ensure that the “Log To File” and “Include all Macro Function Calls” checkboxes are checked to log any debug statements and macro calls to the file c:\dhi\common\MacStat.log
- Good for investigating problems after the test is done



Piston Gauge or Deadweight Tester

Piston Gauge (pressure is calculated)

- Most don’t provide a direct pressure output so their metrological values are entered and COMPASS calculates the resulting pressure with all corrections (piston effective area, piston coefficients, true mass values, gravity, temperature, etc.)
- PG7000 and PG9000 reply with the pressure by remote command so metrological values don’t have to be entered into COMPASS (but can be)

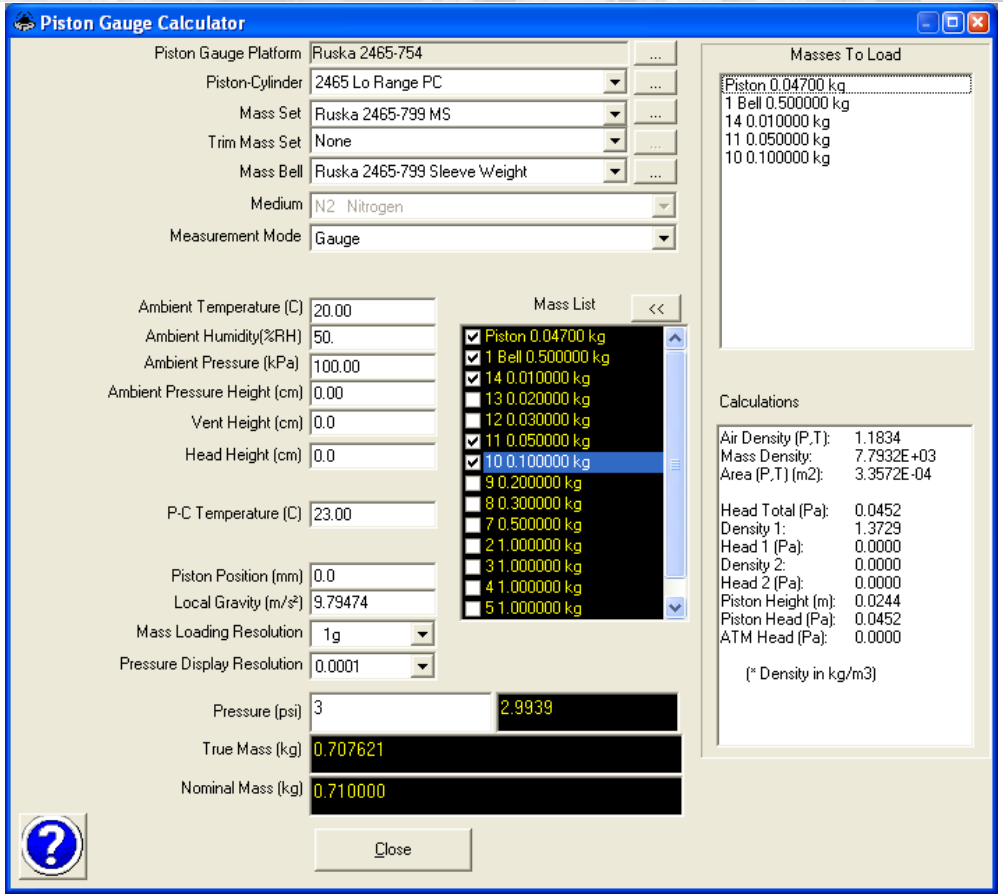
Setup Piston Gauge or Deadweight Tester

Deadweight Tester (pressure values on masses)

- Pressure values for each mass are entered
- COMPASS can apply a gravity correction
- If you have the metrological parameters you can setup the DWT as a piston gauge

COMPASS Piston Gauge Calculator

FLUKE® Calibration



Other COMPASS resources

- Application Notes
  - Knowledge and Information tab of the COMPASS for Pressure web page at flukecal.com
- Overview and video tutorial files
  - Online Knowledge Base at support.flukecal.com
- Miscellaneous
  - Search Fluke Calibration website flukecal.com for “COMPASS for Pressure”

Other COMPASS resources

- Example macros
  - Look through the COMPASS Macro Editor
    - [Ctrl] + [F] for the Find/Search window
    - Copy the text from a macro to a new macro and edit it
      - The macros in this example are a great template for many devices
  - Search the COMPASS Macro Editor help file
  - Search the COMPASS help file (yes, two different help files)
- Contact Pressure Technical Support
  pressuresupport@flukecal.com
- Onsite training by Pressure Technical Support team

FLUKE®
Calibration

Thank you – Questions?

FLUKE®
Calibration

Thank you

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www.flukecal.com/signmeup

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