

Manual MET/CAL®

Calibration Management Software

Datasheet Edition

Users Manual

February 2010

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Introduction

Manual MET/CAL[®] Calibration Management Software is a paperless calibration system used to collect and report calibration data. Unlike paper-based spreadsheets and forms that take up storage space, Manual MET/CAL software saves all calibration results and records in the MET/CAL[®] and MET/BASE databases. This tool calibrates more than one item at a time and captures both as-found and as-left readings.

If you already use MET/CAL[®] Plus software to automate part of your calibration workflow, now you can use Manual MET/CAL for the remaining workload.

New in Version 2.0

Many new features are available in Version 2.0:

- Additional datasheet development tools
- Additional run-time capabilities, including the ability to hibernate a calibration for later completion
- Batched Crystal Reports
- Single-click printing for sticker, certificate of calibration, and all other calibration reports
- Optional datasheet approval system
- Batch-assigned datasheets to specific assets
- Datasheet import/export
- New test types available
- Measurement uncertainty entry
- N/A test entry
- Decimal placeholder control

Installation

The installer program ships on a USB Flash Drive. Install the software on a workstation by running **MMC Setup.exe**. See your IT department if you do not have install permission on your computer.

Minimum System Requirements

Either MET/CAL® or MET/TRACK® version 7.0 software or later must be installed before installing and running Manual MET/CAL software. You should understand the operation of MET/TRACK software, as it is the primary searching and browsing tool for calibration records added by Manual MET/CAL software. A display screen with 1024 x 768 resolution or greater is highly recommended.

Security

Manual MET/CAL software is a secure system that requires both a User ID and a Password for operation. The MET/CAL System Manager can create these for you. Manual MET/CAL conforms to the MET/TRACK security model, permission system, and customizing.

First Time Operation

When using Manual MET/CAL version 2.0 software for the first time, the database must be initialized. After logging in with your MET/CAL User ID and Password, you will be prompted to enter the System Manager (MT) password so the database can be initialized. The system manager may need to do this for you. Users new to this software will want to read “*Learning and Experimenting*” on page 42.

Users upgrading from previous versions will also need to login as the system manager so the database can be patched for Version 2.0 operation.

Licensing

You must have an installed license to use Manual MET/CAL. See “*Installing a Licensing*” on page 44. Additional concurrent licenses can be purchased from your Fluke representative.

How to Contact Fluke

To contact Fluke, call one of the following telephone numbers:

- Technical Support USA: 1-800-44-FLUKE (1-800-443-5853)
- Calibration/Repair USA: 1-888-99-FLUKE (1-888-993-5853)
- Canada: 1-800-36-FLUKE (1-800-363-5853)
- Europe: +31 402-675-200
- Japan: +81-3-3434-0181
- Singapore: +65-738-5655
- Anywhere in the world: +1-425-446-5500

Or, visit Fluke's website at www.fluke.com.

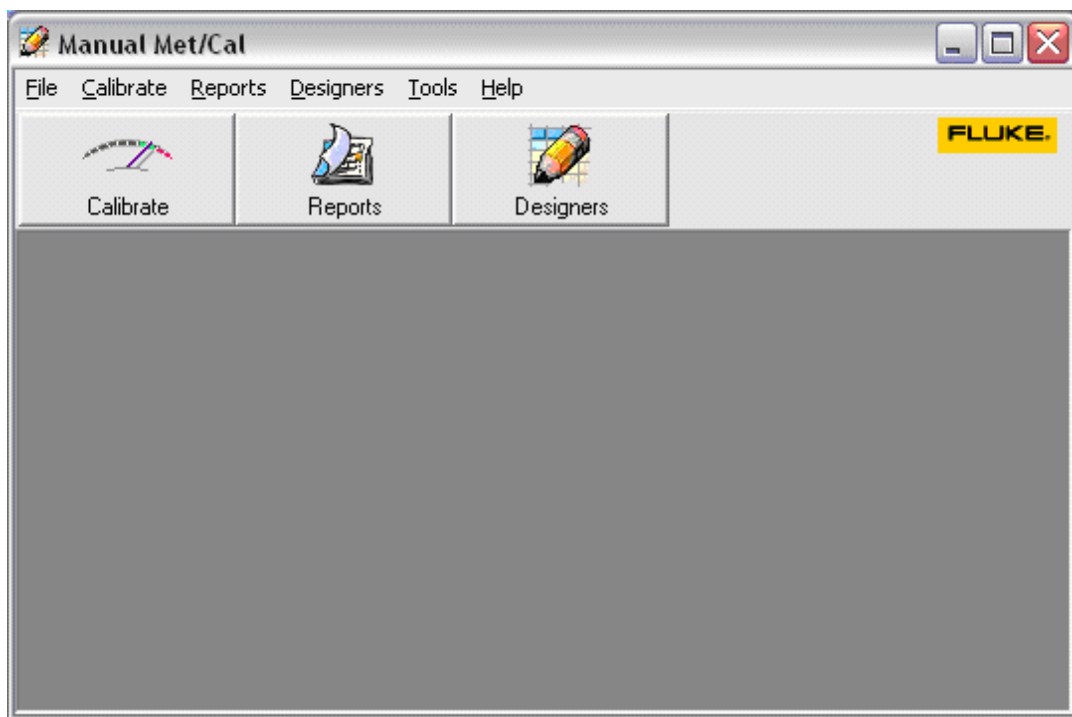
To register your product, visit <http://register.fluke.com>.

To view, print, or download the latest manual supplement, visit <http://us.fluke.com/usen/support/manuals>.

Toolbar and Menus

The toolbar has three buttons: Calibrate, Reports, and Designers. The **Calibrate** button initiates a calibration. The **Report** button opens access to the reports. The **Designers** button opens access to the datasheet designer. Permission to use these tools and capabilities conforms to the MET/TRACK[®] security system. Datasheets are treated like MET/CAL[®] procedures. As an example, if the System Manager has revoked your privilege to edit procedures, you will not be able to use the Datasheet Designer to edit datasheets.

The Toolbar turns on or off from the **Tools** menu. All Toolbar functions are available in the menu system also.



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Datasheets

A datasheet is an electronic form for recording calibration readings and values. It consists of one or more rows that describe each test and verify performance. Manual MET/CAL software compares measurements to test limits and determines a pass/fail status. Optionally, a datasheet can include instructions about how to perform the calibration.

A test step includes a test value and test limits as well as the results evaluation methods. At run-time, you follow the instructions and complete the datasheet for each step. When the

calibration is complete, you save the contents of the datasheet to the database. Once saved, you can display, export, or print data in a report.

A Manual MET/CAL software datasheet is similar to popular GIDEP and NAVAIR calibration methods.

Creating a Datasheet

The Datasheet Designer creates a datasheet. To display the Datasheet Designer, click the **Designers** button or push **F6**. Several datasheet examples are available from the Examples menu. A simple four-line datasheet is shown below. Each row represents a test the technician performs at run-time.

Datasheet Designer[4 Line Datasheet]
File Tools Examples
Open Check Save Info Transducer Wizard Instructions Append Insert Copy Multiply Delete Delete All

	Test Step	Test Description	Test Type	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty
▶	1.001	Test 1		1.00	V	0.98	1.02	2	18	1.1 mv
	1.002	Test 2		2.00	V	1.96	2.04	2	16	1.25 mv
	1.003	Test 3		3.00	V	2.94	3.06	2	22	909 µv
	1.004	Test 4		4.00	V	3.92	4.08	2	28	714 µv

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Creating an Ammeter Datasheet

As an example, this section explains how to create a datasheet for a 3½-digit ammeter. The input is fuse protected and has a single 1.000 amp range. The calibration manual states that the full-scale accuracy is ± 3 digits. The calibration manual also states that at zero input, the meter should read ± 2 digits or less.

To create a datasheet for this item:

1. Check that the input fuse is not open.
2. Verify that all display segments are working.
3. Create a test to verify the zero input accuracy.
4. Create a test to verify the full-scale accuracy.
When you begin, there will be a single test row.
5. Click the **Test Type** cell.
6. Select the **Check test type** from the drop down list.
7. Type **Is the Fuse OK?** into the Test Value column.

To check that the display segments are all OK:



1. Click **Append** to add a new datasheet row.
2. Select the **Check** test type.
3. Type **Are all display segments OK?** into the Test Value column.

Tests three and four test the zero and full-scale accuracy:

1. Append a new row for test three.
2. Enter the description and select **Less than Passes** for the test type.
3. Enter the test level of 0.000 into the Test Value column and 0.002 into the High Limit column.
4. Append a new row for test four.
5. Create the full-scale test using **Inside Limits Passes** as the test type.
6. Add the low and high limits.

After you enter all the test steps, the datasheet looks like the one below:

Test Step	Test Description	Test Type	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty
1	Fuse check		Is the fuse OK?						
2	Segment check		Are all display segments OK?						
3	Zero test		0.000	A		.002			
4	Full-scale		1.000	A	0.997	1.003			

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Creating a Micrometer Datasheet

This example is for a 1-inch micrometer. To create a datasheet for a micrometer:

1. Select **New** from the **File**.
2. Add steps to datasheet.

The calibration procedure for the micrometer can potentially include the following checks and tests. The preceding datasheet is available from the Examples menu.

Checks

- Item is clean and undamaged
- Thimble moves freely

Flatness Test

- Anvil face: 0.000005 inches max
- Spindle face: 0.000005 inches max

Length Tests

Length	Low Limit	Hi Limit
0.0000	0.0001	
0.1950	0.1949	0.1951
0.3900	0.3899	0.3901
0.5850	0.5849	0.5851
0.7800	0.7799	0.7801
1.0000	0.9999	1.0001

The information from the micrometer specifications and calibration procedure has been entered into the datasheet. The completed micrometer datasheet is shown below:

Datasheet Designer [micrometer]										
File Tools Examples										
Open Check Save Info Transducer Wizard Instructions Append Insert Copy Multiply Delete Delete All										
Test Step	Test Description	Test Type	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty	
1.001			Item is clean and undamaged							
1.002			Thimble moves freely							
1.003	Anvil face flatness		0.0	micro inch		5.0				
1.004	Spindle face flatness		0.0	micro inch		5.0				
1.005	Zero test		0.0	inch		1.0				
1.006	Length tests		0.1950	inch	0.1949	0.1951				
1.007			0.3900	inch	0.3899	0.3901				
1.008			0.5850	inch	0.5849	0.5851				
1.009			0.7800	inch	0.7799	0.7801				
1.010			1.0000	inch	0.9999	1.0001				

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Datasheet Designer Wizards



Wizards are available to speed the datasheet design process. In the example shown below, information about a test has been entered including the device specification.

Single Test Wizard



After you enter all information, click the **Single Test Wizard** button to create the test shown below. In this example, the wizard calculates the limits based on the specification.

Note

TUR and Uncertainty are not calculated. They must be determined independent of the software and entered into the datasheet. Once entered, they will be included in the calibration test results at run-time.

Datasheet Designer []

File Tools Examples

Open

Check

Save

Info

Transducer

Wizard

Instructions

Append

Insert

Copy

Multiply

Delete

Delete All

Test Wizard...

Reading

Full scale

Step Size

Resolution

Units

% Reading

% FS

Floor Value

1

2

3

dcvolts

0.1

0.05

☐ Multi-line

☐ PPM

☐ PPM

Test Step

Test Description

Test Type

Test Value

Units

Low Limit

High Limit

Resolution

TUR

Uncertainty

▶ 1.001

1.000

dcvolts

0.998

1.002

3

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Multistep Wizard

The wizard also generates a sequence of tests over a range of test values:

1. Check the **Multi-line** box.
2. Enter the Start, End, and Step Size values and the accuracy.
3. Click **Check**.

In the example below, the datasheet has Test Values from 0 to 100 volts in 20-volt steps. There are several important points to notice:

- If the test value is 0, and the specification is a percentage or a PPM of reading, or full-scale, the limits calculate to 0.00. You will need to enter a new set of limits at this test value. In other words, 1% of 0.00 is zero.
- If the number of decimal places is blank, the software determines the number of places based on the resolution needed to display the test limit.
- For computing the contribution of the %FS specification, the full-scale value is equal to the End Value.

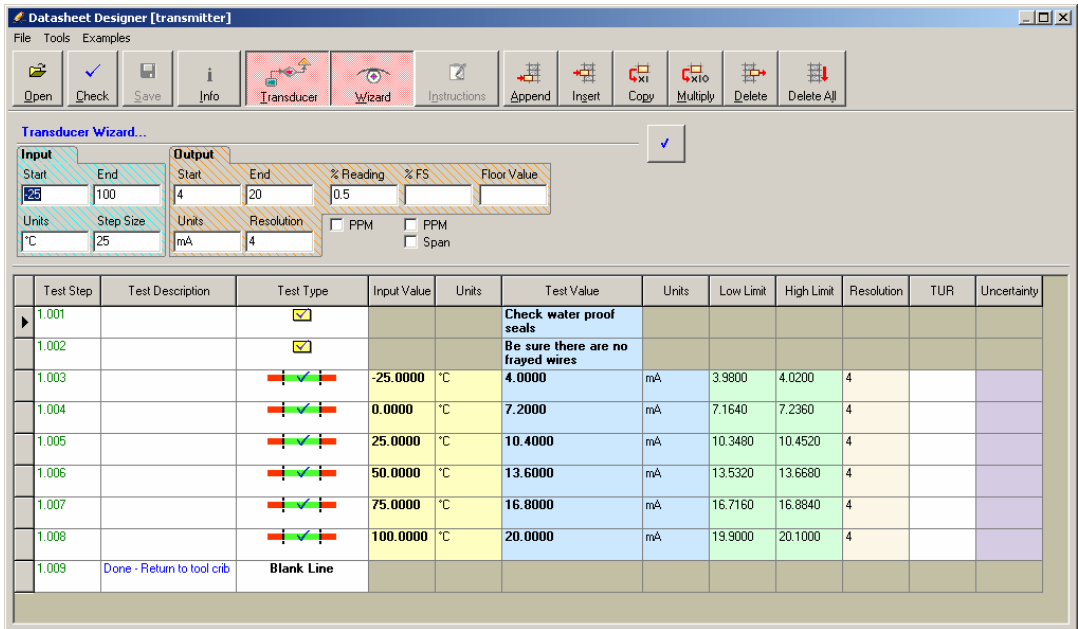
Test Step	Test Description	Test Type	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty
1.001			0.000	dcVolts	-0.050	0.050	3		
1.002			20.000	dcVolts	19.930	20.070	3		
1.003			40.000	dcVolts	39.910	40.090	3		
1.004			60.000	dcVolts	59.890	60.110	3		
1.005			80.000	dcVolts	79.870	80.130	3		
1.006			100.000	dcVolts	99.850	100.150	3		

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Transducers

The term “transducer” describes a device that detects a parameter in one form and reports it in another, such as a pressure transducer or a temperature to current transducer. These devices may also be called transmitters.

Manual MET/CAL software can create calibration procedures for transducers. To enable this mode, click the **Transducer** button. The software adds columns for the transducer input values and units.



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The Transducer Wizard created this datasheet. Use the wizard to define both the input and output conditions. The software performs the mathematics to complete the datasheet.

Datasheet Column Descriptions

A test consists of a row of information with individual columns for data.

Test Step	Test Description	Test Type	Input Value	Units	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty
1.001		✓									

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Test Step – A test reference to identify a test. The format is set from the Tools Menu.

Test Description – Optional information to describe the test. This field is not intended for instructions. It is best to use this field as information about the test or type of test. Examples could be full-scale test, flatness test, or output power.

Test Type – The test evaluation method.

Input Value – Transducer only. This is the transducer input test value. Enter a number such as 1.00.

Units (Input) – Transducer only. Units for input. Volts, mA, degrees, and PSI are examples of typical units. Right-mouse click this cell to paste in other hard-to-find symbols.

Test Value – For tests evaluated numerically, this is the nominal test value such as 1 volt, 100 PSI, or 3 mm. For text-based tests that require a Y/N response, this is a question or a statement, such as **Are all display segments working?** or **Does the thread work smoothly?** If the calibration item is a transducer, this is the output measurement.

Units (Output) – Output units such as ft/Lbs, PSI, or Amps. Right-mouse click this cell to paste hard-to-find symbols such as μ , or $^{\circ}\text{C}$ or In^2 .

Low Limit – A numeric value that indicates the low pass/fail point.

High Limit – A numeric value that indicates the high pass/fail point.

Note

Some test types use a single limit. Always enter the single limit in the Low Limit column.

Places – The number of decimal places after the decimal point (optional).

TUR – The computed Test Uncertainty Ratio of the test (optional).

Uncertainty – The computed uncertainty of the test (optional).

Test Type

Test type determines how the software evaluates test readings at run-time. Ten test types are available from a drop down list. The list displays when you select the test types column. After selection, a graphic displays in the column. This simple datasheet uses all of the test types.

Datasheet Designer [test-types]
File Tools Examples
Open Check Save Info Transducer Wizard Instructions Append Insert Copy Multiply Delete Delete All

Test Step	Test Description	Test Type	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty
1.001	General Tests	Bold Label							
1.002	Connector		Check - Threads are OK						
1.003	Noise	Y =	Is fan noisy?						
1.004	Open Input Test	Y =	Reading between 1.25 and 3.47						
1.005		Blank Line							
1.006	Performance Tests	Bold Label							
1.007	Frequency Measure		12.00	Mhz	10.80	13.20	2	4.86	453 Hz
1.008	Residual Noise		6.50	μV		6.50	2	6.6	0.1 μV
1.009	Minimum Power		13.50	dbm	13.50		2	4.8	0.1 dbm
1.010		Blank Line							
1.011	Enter case color	Enter Text							

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Inside limits pass () – The test passes if the reading falls within the low and high test limits.

Less than passes () – The test passes if the reading is less than the low limit.

Greater than passes () – The test passes if the reading is greater than the low limit.

Y = Pass (**Y** = ) – If the answer is Y in response to a question, then the test passes.

Y = Fail (**Y** = ) – If the answer is Y in response to a question, then the test fails. If the answer is N in response to a question, then the test passes.

Check () – Not actually a test, it is a record that the user has performed an action, such as checking a fuse or the condition of a screw thread.

Blank Line – This is not a test. It is a spacer, comment line, or blank row. Use it to put empty rows in a test report.

Label & Bold Label – Indicates the type of tests that follow. Bold Labels print as bold text on Crystal Reports.

Enter Text – At run-time, respond to a prompt and enter a value or message. This text prints in the calibration report.

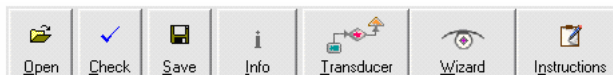
Designer Buttons



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Use these buttons to:

- append test rows to the datasheet
- insert a row at the current line
- duplicate lines and multiply them by 10
- delete an individual test
- delete all tests



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These buttons are for datasheet management. Use these to:

- load existing datasheets
- check that the datasheet limits are OK
- save the datasheet to the database
- set the operation mode with the Transducer button
- enable the Test-Step Wizard
- enable the Instruction Wizard

Datasheet Designer Hot-Keys

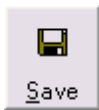
Hot-Key	Action
CTRL + A	Appends a new row
CTRL + I	Inserts a new test row
CTRL + T	Duplicates the current row
CTRL + *	Duplicates a test on a new row and multiplies values by 10
CTRL + P	Copies the datasheet to the Windows clipboard (handy if pasting into Excel spreadsheet)
CTRL + V	Pastes a datasheet from the Windows clipboard

Checking the Datasheet



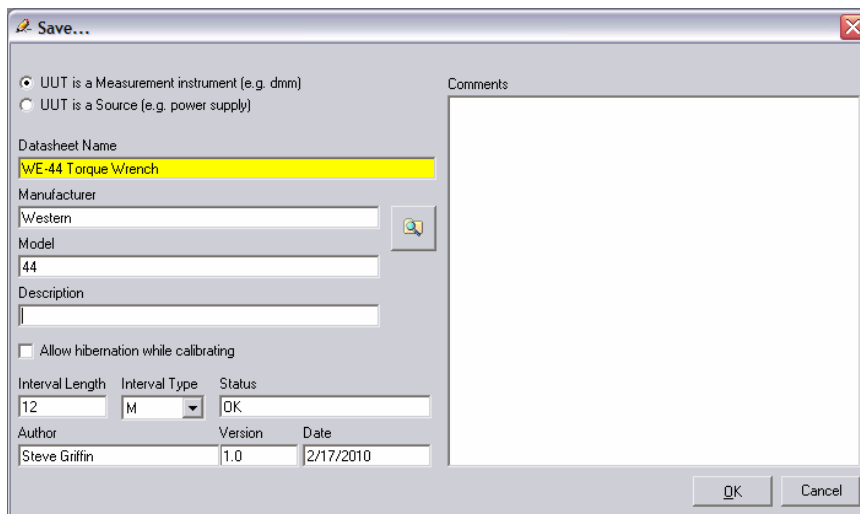
Before saving, you must check the datasheet with the **Check** button. This insures proper use of the columns and limits for each test type. After this check, the **Save** button enables and you can save the datasheet to the database.

Saving the Datasheet



Click the **Save** button to add this datasheet to the datasheet library.

By default, the software requires that the datasheet name is unique. This means that the name cannot be the same as any other datasheet. Optionally, you can set the software to an alternate mode where the combination of name + Mfg + Model is unique. This assigns a generic datasheet that you can use with various models. See “*Options and Customizing*” on page 38 for more details.



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If a datasheet is for a specific model, enter that information in the Manufacturer, Model, and Description fields. To select this information directly from the database, click the button to the right of the fields and select an asset from the list. Also indicate if the UUT is a measurement or source item.

Hibernation

Manual MET/CAL software includes the option to hibernate, or pause, a calibration and resume later. This is helpful for lengthy calibrations of items such as thread gage sets where calibrations may take more than one workday. To allow datasheet hibernation, check the **Allow Hibernate while calibrating** checkbox.

Changing Datasheet Properties

To save a datasheet during development, click the **Save** icon. However, to edit the datasheet information on the Save form, select **Save** from the **File** menu.

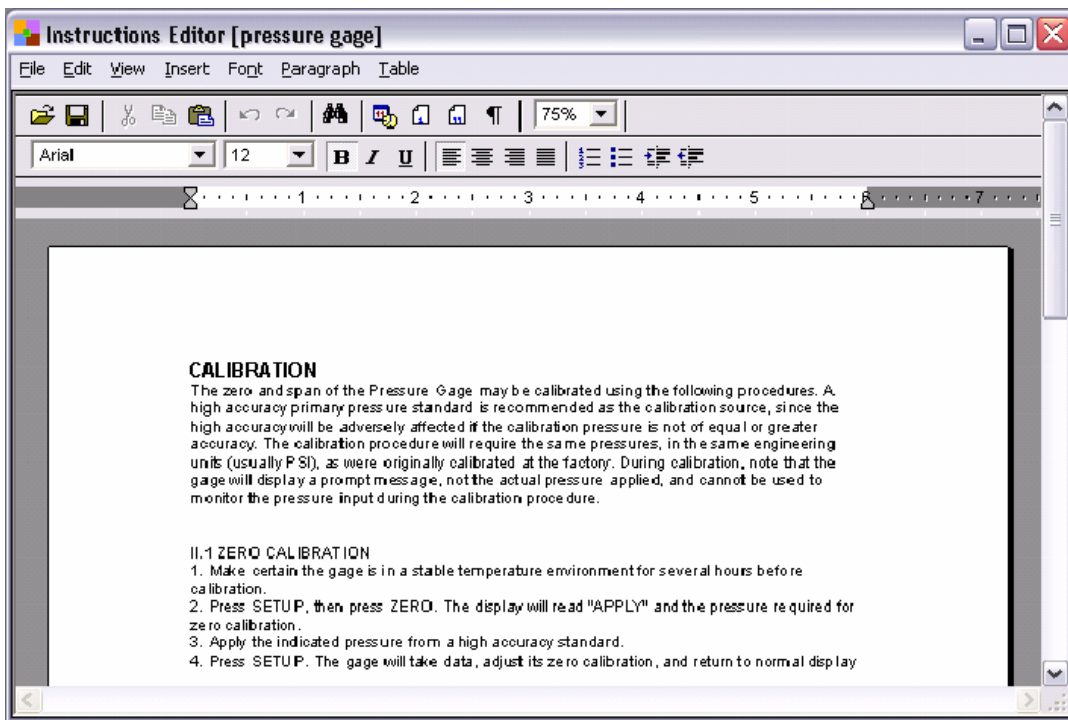
Making a Copy of a Datasheet

Select **Save As** from the **File** menu to make a copy of a datasheet. The Save dialog box displays to enter a new name for the datasheet.

Instruction Designer

To create and save instructions for the datasheet to the database, the software includes a word processor. Multiple datasheets can use the instructions during a calibration. The word processor provides writing and editing capabilities. Since the use and operation are similar to other word processors such as Microsoft Word[®], this manual does not include instructions on the use of all of the features.

If you prefer, you can create the instructions in another word processor tool and then paste them into the Manual MET/CAL word processor. These internal instruction documents are known as Manual MET/CAL documents or MMCs. You can import a TXT or RTF format file directly into the instructions.



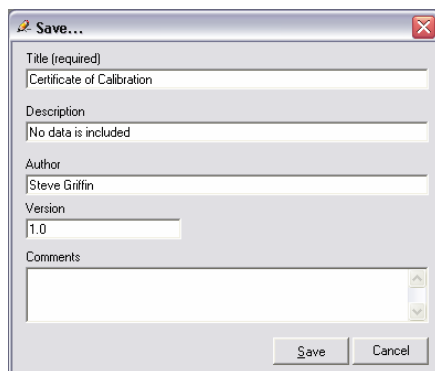
Saving Instructions



Click the **Save** button to save instructions to the database. This opens the Save dialog box. Enter a title and other descriptive information.

Note

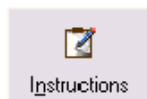
The title must be unique for each document.



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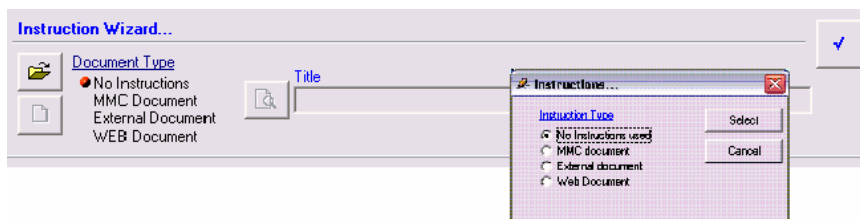
Attaching Instructions to a Datasheet

You can assign instructions to multiple datasheets. MMC documents are the most flexible because during a calibration the instructions display on the run-time screen in the software. For increased security, the software saves and backs up the MMC documents to the database.



To create instructions:

1. From the Datasheet designer, click **Instructions** to display the Instruction Wizard.
2. Click **Open**.
3. Select an instruction type.
4. Click **Select**.
5. Select an internal document (MMC), or navigate to an external document. You may also enter a URL path for where the software can find the instruction file on the Web.



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The software displays several instruction types:

MMC documents are instructions created with the MMC instruction editor and retained within the database.

External documents are files such as Microsoft Word or Adobe PDF files that are available to the workstation.

Web documents are files viewable in a Web browser.

Note

Always check and save the datasheet after making changes.

The screen below shows the calibration run-time with instructions. Generally, these instructions are internal documents loaded from the MET/TRACK[®] database. However, you can open files with an RTF or TXT file extension from other network locations.

The screenshot displays the 'Calibration Run-Time' window. At the top, there are 'Setup...' and 'Calibrate...' buttons. Below these are icons for 'Save', 'Hibernate', and 'Reports'. A 'DE: 4 Line Datasheet' header is visible above a table. The table contains four test steps, each with a test description, test value, limits, and a UUT Reading. To the left of the table is a vertical toolbar with icons for various functions. Below the table is an 'Instructions' panel with a scrollable text area.

Test Step	Test Description	Test Value	Limits	UUT Reading
1.00	Test 1	1.00 V	0.98 1.02	
1.01	Test 2	2.00 V	1.96 2.04	
1.02	Test 3	3.00 V	2.94 3.06	
1.03	Test 4	4.00 V	3.92 4.08	

D. CALIBRATION PROCEDURE:

Vertically operating dial indicators will be checked for accuracy and repeatability using a precision bench micrometer in a horizontal position (a special holding fixture may be constructed for the purpose). The horizontal test type indicator may be checked for accuracy and repeatability using the micrometer height gage or gage block stack-ups. In addition each indicator will be inspected for smoothness of operation, spindle looseness, proper spring tension and backlash in reversing direction. The following steps must be taken in inspecting dial indicators:

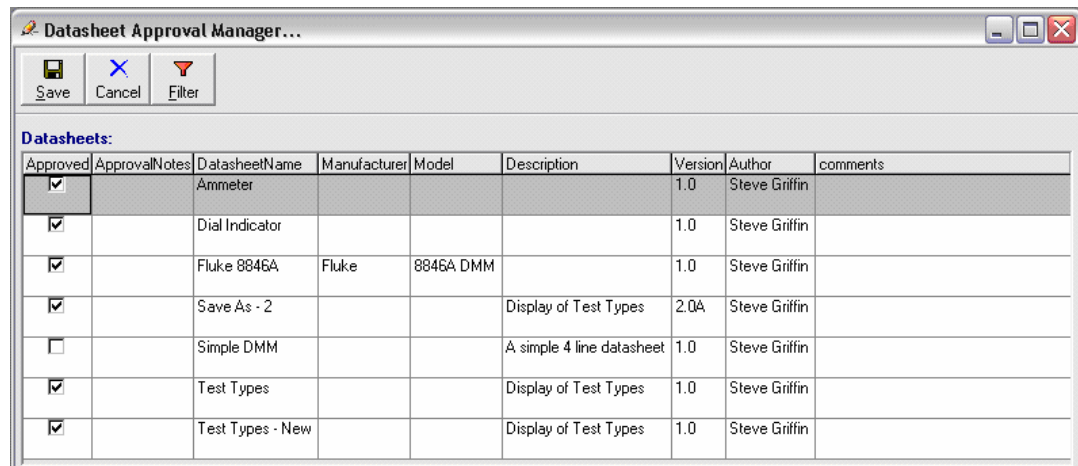
1. Check for sticking. Move the spindle slowly from the rest position to the maximum limit of travel and return by means of hand pressure.
2. Check for spindle looseness by pushing the spindle back and forth in a direction

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Approving Datasheets

If the datasheet approval system is enabled, new and revised datasheets will be marked as unapproved when saved. You cannot use an unapproved datasheet in a calibration until a level 4 or 5 operator approves the datasheet.

The datasheet approval screen is accessible from the **Tools** menu. After review, the level 4 or 5 operator approves the datasheet by checking it off. A notes window is available to add comments about the approval.



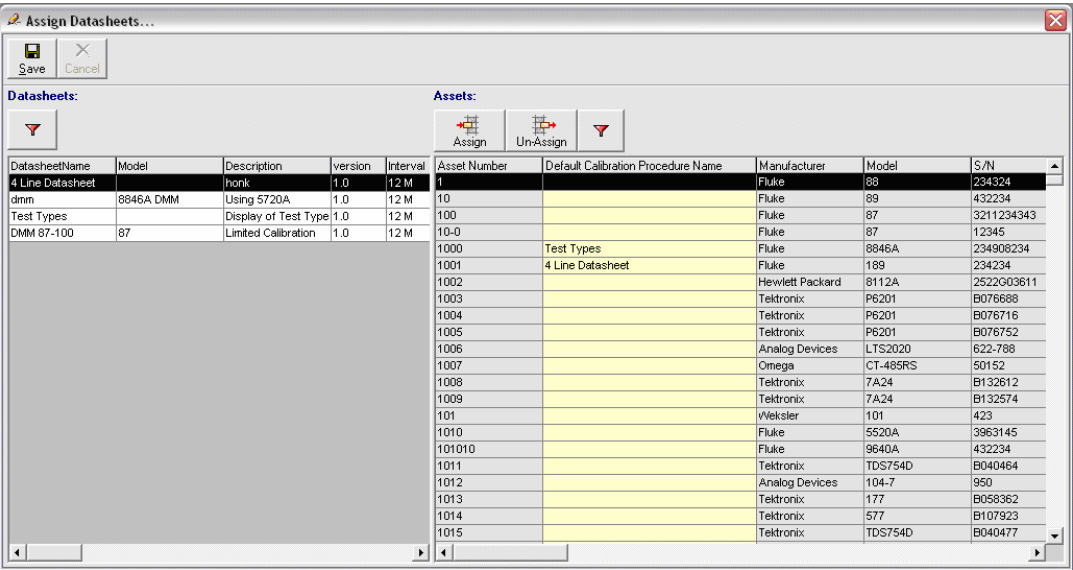
The screenshot shows a window titled "Datasheet Approval Manager...". It has a toolbar with "Save", "Cancel", and "Filter" buttons. Below the toolbar is a section labeled "Datasheets:" containing a table with the following columns: "Approved", "ApprovalNotes", "DatasheetName", "Manufacturer", "Model", "Description", "Version", "Author", and "comments".

Approved	ApprovalNotes	DatasheetName	Manufacturer	Model	Description	Version	Author	comments
☒		Ammeter				1.0	Steve Griffin	
☒		Dial Indicator				1.0	Steve Griffin	
☒		Fluke 8846A	Fluke	8846A DMM		1.0	Steve Griffin	
☒		Save As - 2			Display of Test Types	2.0A	Steve Griffin	
☐		Simple DMM			A simple 4 line datasheet	1.0	Steve Griffin	
☒		Test Types			Display of Test Types	1.0	Steve Griffin	
☒		Test Types - New			Display of Test Types	1.0	Steve Griffin	

ggl024.bmp

Setting the Default Datasheet Name

This productivity enhancement tool allows the user to set the default calibration datasheet quickly for multiple items. In the example below, the asset list uses a filter to display only Fluke model 8846A multimeters. Both of them were selected, and the datasheet for this item highlighted in the left panel. The default datasheet field (I4241) updates when you click **Assign**. To make the changes permanent, click **Save**.



ggl025.bmp

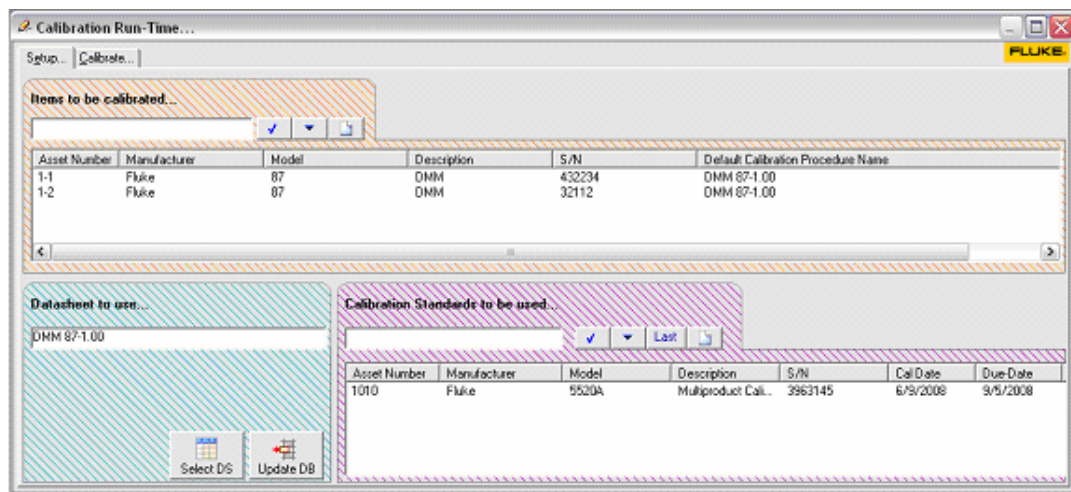
Calibration

This manual section is about how to use a datasheet for calibration. To calibrate, you follow the instructions and, as each test step is complete, enter the test values into the datasheet. When all steps are complete and the calibration data is entered, the results are written to the database. After saving, you can print reports.



To start a calibration:

1. Click **Calibrate**.
2. Select **Calibrate Instruments** from the **Calibrate** menu or push **F2**.

A screenshot of the 'Calibration Run-Time...' dialog box. It has two tabs: 'Setup...' and 'Calibrate...'. The 'Calibrate...' tab is active. It contains three main sections: 'Items to be calibrated...', 'Datasheet to use...', and 'Calibration Standards to be used...'. The 'Items to be calibrated...' section has a table with columns: Asset Number, Manufacturer, Model, Description, S/N, and Default Calibration Procedure Name. It lists two items: 1-1 (Fluke, 87, DMM, 432234, DMM 87-1.00) and 1-2 (Fluke, 87, DMM, 32112, DMM 87-1.00). The 'Datasheet to use...' section has a text field containing 'DMM 87-1.00' and buttons for 'Select DS' and 'Update DB'. The 'Calibration Standards to be used...' section has a table with columns: Asset Number, Manufacturer, Model, Description, S/N, Cal Date, and Due Date. It lists one item: 1010 (Fluke, 5520A, Multiproduct Cal., 3963145, 6/9/2008, 9/5/2008). There are also 'Select' and 'Last' buttons in this section. A 'PLUKE' logo is in the top right corner.

Asset Number	Manufacturer	Model	Description	S/N	Default Calibration Procedure Name
1-1	Fluke	87	DMM	432234	DMM 87-1.00
1-2	Fluke	87	DMM	32112	DMM 87-1.00

Asset Number	Manufacturer	Model	Description	S/N	Cal Date	Due Date
1010	Fluke	5520A	Multiproduct Cal.	3963145	6/9/2008	9/5/2008

ggl026.bmp

Use this screen to select the items to calibrate, the datasheet to follow, and the calibration standards to use.

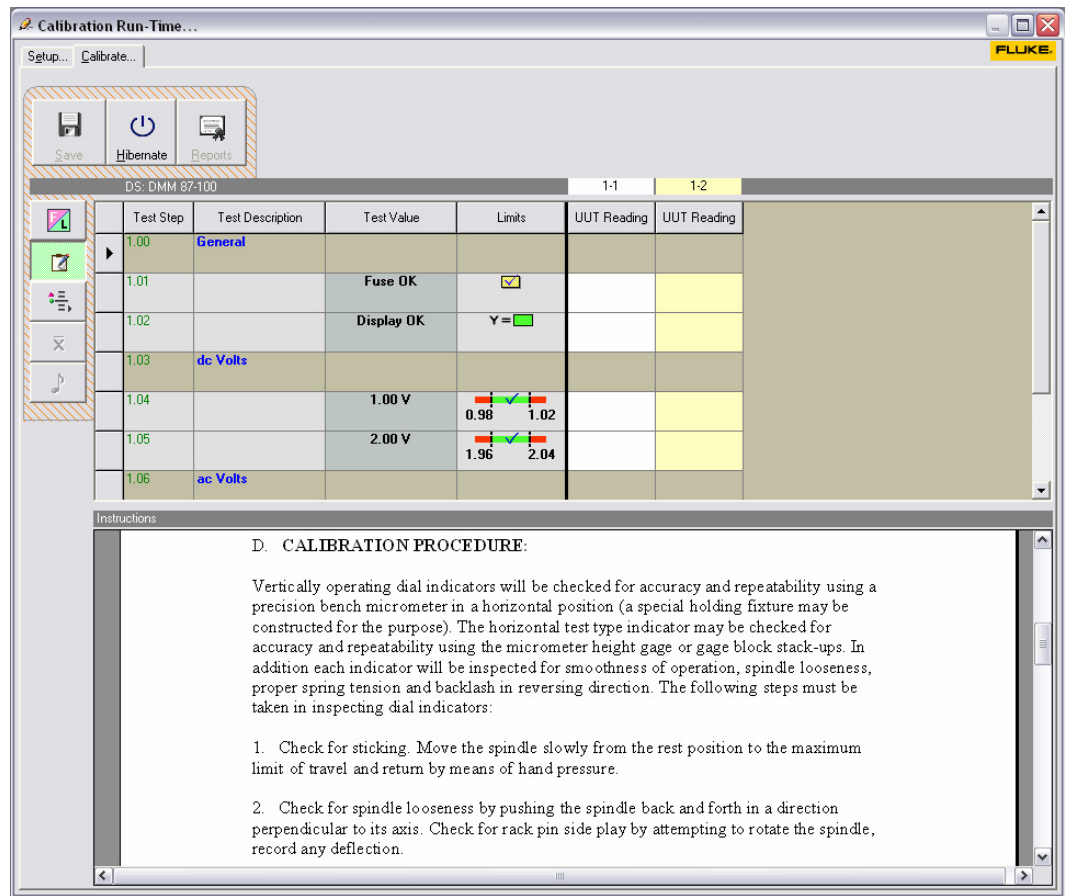
Items to be Calibrated – Asset numbers are typed or scanned from a bar-code reader. After entering the item's asset number, push **Enter** or click the **Check** button. You can select assets from a drop down asset list also. In this example, two Fluke model 87s are ready for calibration.

Datasheet to Use – Once you select an item for calibration, the Default Calibration name displays in the **Datasheet to Use** window if the datasheet is valid. If the procedure name for the default calibration has not been assigned to the item, click **Select DS** to select a datasheet. To make this the permanent calibration datasheet, click **Update DB**. This will update the Default calibration field for this asset in the database.

Calibration Standards – To select the Calibration standards to use, type or scan the asset number or select from a dropdown list.

How to Start a Calibration

After selecting the calibration items, the datasheet, and the calibration standards, click the **Calibrate** tab to start the calibration. The screen that follows shows a simple item that is ready for calibration data entry as each test is complete. Once complete, the **Save** button enables and you can save the results. With the **Reports** button, you can view and print reports. This example shows two calibration items. Each has its own column for calibration data. Readings outside of the limits show in red, and if enabled, the optional out-of-tolerance beeper sounds.



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Numeric Test Types – When the Test Type is **Between the limits passes, Less than passes, or Greater than Passes**, the data is limited to numeric input. After you complete the data input, push **Enter**.

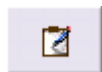
Check Test Types – Push the keyboard spacebar or the letter **C** to toggle the reading.

Yes/No Test Types – Push either the keyboard spacebar, the letter **Y**, or the letter **N** to toggle the reading.

Test Entry Test Type – Any combination of letters and numbers is acceptable.

Viewing Calibration Instructions

The software attaches calibration instructions to a datasheet. To open attached instructions, click the **Instructions** button on the left of the window. This button is disabled if the datasheet does not have instructions attached. You also can toggle the instruction display on and off with this button.



The run-time screen with instructions is split vertically. The datasheet is on the top and the instructions below. You can read the instructions as you do your work and complete the calibration data input in the datasheet. The horizontal splitter bar between the instructions and the datasheet resizes the window height.

External instructions display in the native application environment. For example, an MS Word document displays in MS Word, not in the datasheet. You can toggle or hot key between the worksheet and MS Word to view the instructions.

Note

Be sure to close the external application after saving the calibration results.

The screenshot shows the 'Calibration Run-Time...' window. At the top, there are buttons for 'Save', 'Hibernate', and 'Reports'. Below these is a table with columns for 'Test Step', 'Test Description', 'Test Value', 'Limits', 'UUT Reading', and 'UUT Reading'. The table is divided into sections: 'General' (steps 1.00-1.02), 'dc Volts' (steps 1.03-1.05), and 'ac Volts' (step 1.06). The 'Limits' column shows values like 'Fuse OK', 'Display OK', '1.00 V', '2.00 V', and '0.98', '1.02', '1.96', '2.04'. The 'Instructions' section at the bottom contains the text 'D. CALIBRATION PROCEDURE:' followed by a paragraph and two numbered steps.

Test Step	Test Description	Test Value	Limits	UUT Reading	UUT Reading
1.00	General				
1.01		Fuse OK	✓		
1.02		Display OK	Y = ✓		
1.03	dc Volts				
1.04		1.00 V	0.98 ✓ 1.02		
1.05		2.00 V	1.96 ✓ 2.04		
1.06	ac Volts				

D. CALIBRATION PROCEDURE:

Vertically operating dial indicators will be checked for accuracy and repeatability using a precision bench micrometer in a horizontal position (a special holding fixture may be constructed for the purpose). The horizontal test type indicator may be checked for accuracy and repeatability using the micrometer height gage or gage block stack-ups. In addition each indicator will be inspected for smoothness of operation, spindle looseness, proper spring tension and backlash in reversing direction. The following steps must be taken in inspecting dial indicators:

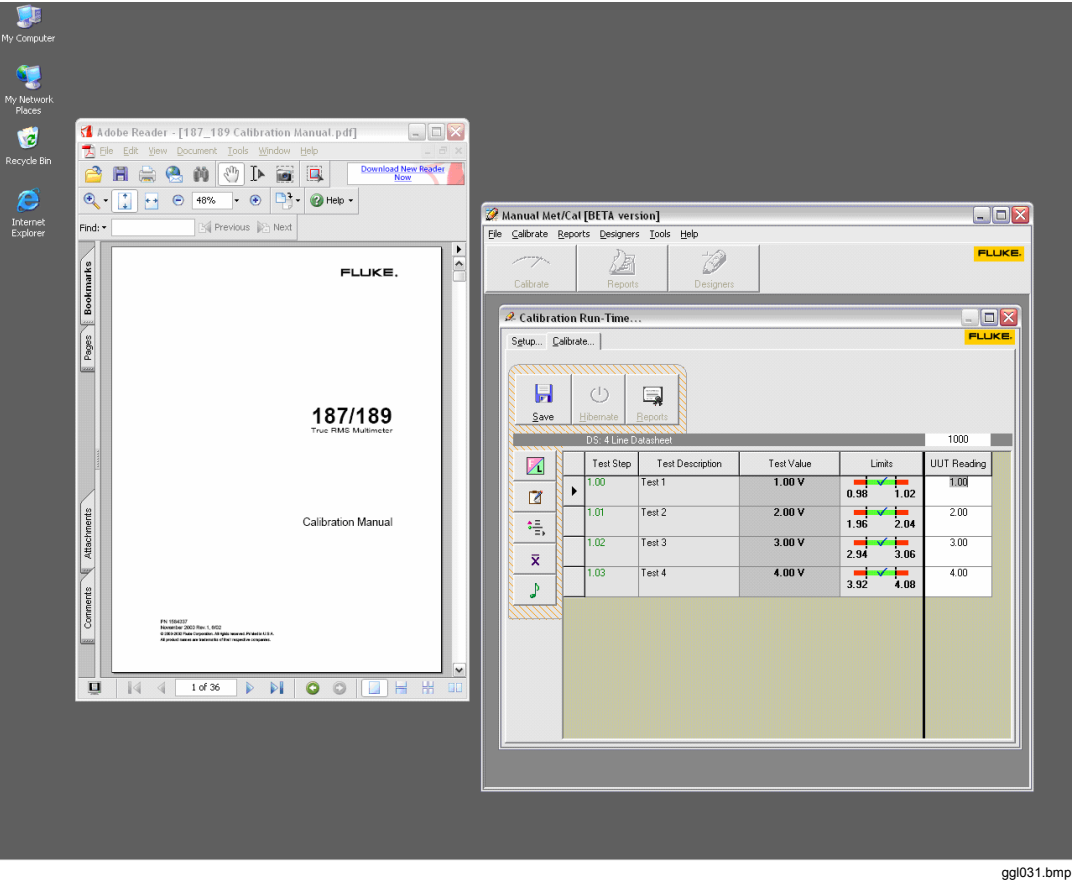
1. Check for sticking. Move the spindle slowly from the rest position to the maximum limit of travel and return by means of hand pressure.
2. Check for spindle looseness by pushing the spindle back and forth in a direction perpendicular to its axis. Check for rack pin side play by attempting to rotate the spindle, record any deflection.

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Viewing External Calibration Instructions

Some instruction files such as a PDF or a Word document, cannot display directly in software. At the beginning of a calibration, these instruction documents are loaded in their native application for viewing. For example, both the Manual MET/CAL software and Microsoft Word can be open at the same time. To view the instructions in Word during a calibration, toggle the display between Word and the Manual MET/CAL software.

The screen shot below shows that the calibration window is available for data input and the instructions show in a separate Adobe Acrobat window.



Note

The workstation must have the document's native application in order to view external documents during calibration.

Advanced Run-Time Features

The buttons on the left side of the run-time screen allow access to additional features:

- Found-Left Button
- Set Actual Readings
- Average Readings Button
- Add Notes Button

Capturing As-Left Data



An out-of-tolerance reading displays in red. If you can correct the problem during calibration, the software can capture the as-left data. In this example, test 1.05 is out of tolerance and displays in red.

Calibration Run-Time...

Setup... Calibrate...

FLUKE

Save Hibernate Reports

DS: DMM 87-100

	Test Step	Test Description	Test Value	Limits	As-Found	As Left	UUT Reading
1.00	General						
1.01		Fuse OK		✓	Checked		Checked
1.02		Display OK		Y =	Y		Y
1.03	dc Volts						
1.04		1.00 V	0.98 1.02	✓	1.01		1.01
1.05		2.00 V	1.96 2.04	✗	2.05	1.99	1.97
1.06	ac Volts						
1.07	1Khz	1.00 V	0.98 1.02	✓	1.00		1.01
1.08	10Khz	1.00 V	0.94 1.06	✓	1.02		1.05

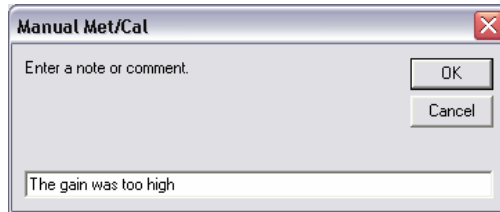
ggl033.bmp

After you adjust an item into correct operation, click the **Found-Left** button. This opens an As-Left column for the item. This example shows the in-tolerance as-left reading.

Adding Notes



To record a note or comment about a test, click the **Note** button. Cells containing a note have a blue background. In test 1.05, Asset 1-1 has an attached note.

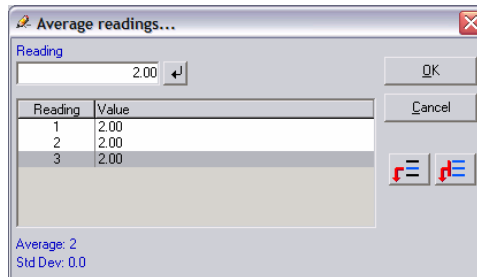


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Averaging Readings



Use averaging to capture noisy or non-repeatable readings. Input each test reading, and then push **Enter**. Readings can be entered from the keyboard or slewed up and down using the keyboard arrow keys. The software adds each reading to the list. After you enter all values, click **OK**. The software pastes the average value into the test cell. The number of readings and the standard deviation record with the calibration results.



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Setting a Test to N/A

If you are unable to perform a test, set the test to N/A. Include a note with an explanation. This will not affect the pass/fail status of the calibration.

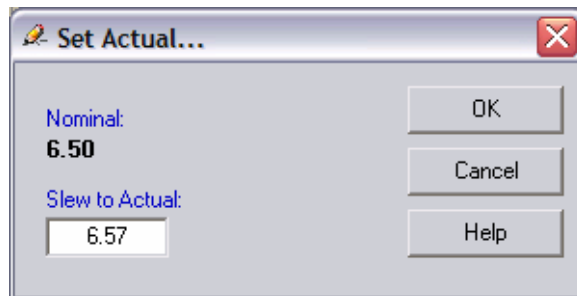
Setting the Actual Test Value

You can set the actual test value when the true value of the calibration standard is not equal to the nominal. For example, when you weigh a 10-pound weight and find that it is actually 9.8 pounds. Or, when using a hand pump, the pressure cannot be set to exactly 100 PSI. Instead, the closest pressure setting is 100.4 PSI.

To set the Actual Test Value of a single test:

1. Hold the mouse over the Test Value to change.
2. Right-click the mouse.

3. Select **Set Actual**.
4. Use the arrow keys to slew to the actual value of the calibration standard.
5. Click **OK**.



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After the actual value is set, the software displays the actual value in blue preceded by the @ symbol. The limits shift an equal amount.



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If several actual values are to be set, click the **Set Actual** button and choose **Set All**. A column labeled, Actual, displays. You can change the nominal values as needed. Again, click the **Set Actual** button again to hide this column.

Hibernating a Calibration



The Hibernate function stops a calibration before it is complete. When you save the datasheet, the hibernate function is available as option.

When a calibration is hibernated, the software saves all of the input data to the database. Later, you can reload this data and resume the calibration.

Hibernation Rules

When a calibration is hibernated, the software creates a new calibration record, updates the standards list, and saves the calibration results as a complete record. What makes a hibernated calibration unique is the following:

- Pass/Fail field C2323 is set to **I** to indicate that the calibration is incomplete.
- Found/Left field C2308 is blank to anticipate what may happen when the calibration is resumed.
- The due-Date field C2303 is set to the date of calibration.
- Hibernation items appear in the calibration recall reports.

Resuming a Hibernated Calibration



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When a Manual MET/CAL calibration session starts, any calibration records in hibernation display on the calibration screen. To select an item and resume the calibration, click the button next to the item.

Note

Only one hibernated calibration can be loaded at a time.

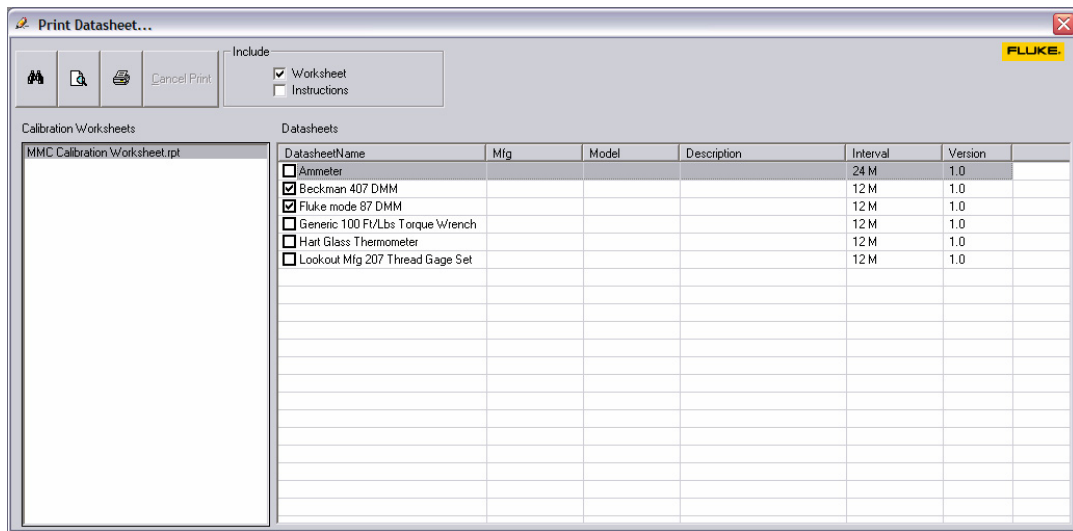
When the resumed calibration is complete and saved, the software creates the new calibration record.

Remote Calibration

If you do calibrations away from a computer, you can print the datasheet as a form for use in the field. Later, after you return and have access to the computer, you can manually enter the data into Manual MET/CAL.

To print a datasheet:

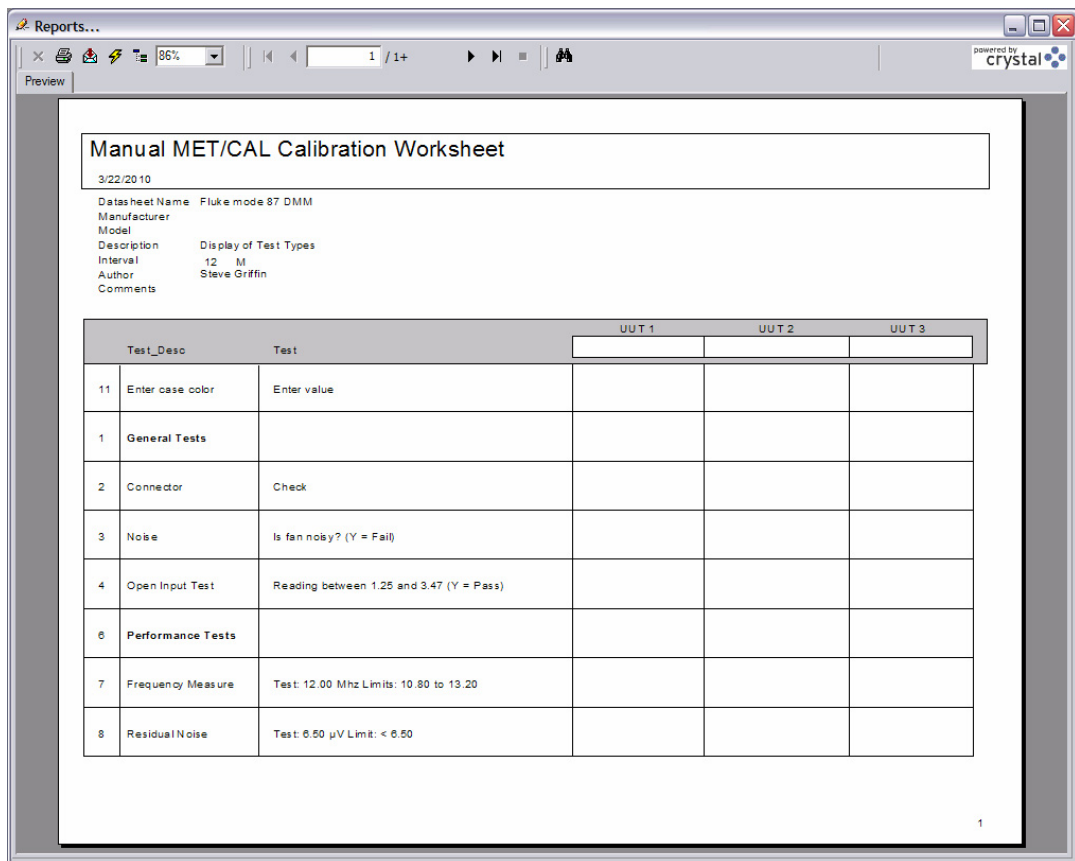
1. From the **Calibrate** menu, select **Print Datasheet**.
2. Check the datasheets to print.
3. Preview or print the datasheet.



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The Calibration Worksheet is a Crystal report. This report may be modified in Crystal Reports. New versions of this report must always have a name that begins with "MMC

Calibration Worksheet." MMC Calibration Worksheet_2.rpt or MMC Calibration Worksheet new.rpt are valid names. The worksheet has a calibration data column for up to three items.



Reports...

Preview

Manual MET/CAL Calibration Worksheet

3/22/2010

Datasheet Name: Fluke mode 87 DMM

Manufacturer

Model

Description Display of Test Types

Interval 12 M

Author Steve Griffin

Comments

	Test_Desc	Test	UUT 1	UUT 2	UUT 3
11	Enter case color	Enter value			
1	General Tests				
2	Connector	Check			
3	Noise	Is fan noisy? (Y = Fail)			
4	Open Input Test	Reading between 1.25 and 3.47 (Y = Pass)			
6	Performance Tests				
7	Frequency Measure	Test: 12.00 Mhz Limits: 10.80 to 13.20			
8	Residual Noise	Test: 0.50 μ V Limit: < 0.50			

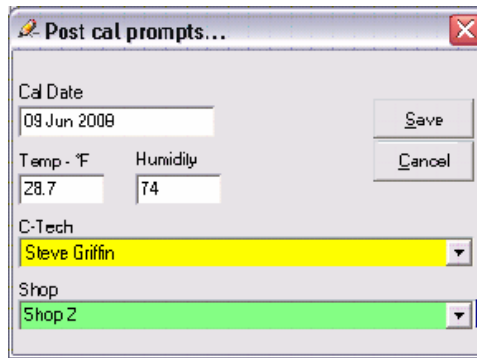
1

powered by crystal

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Saving Calibration Results

After you input all readings and click the **Save** button, the Post Cal dialog box displays. Use this form to include additional information in the calibration record.



The 'Post cal prompts...' dialog box contains the following fields and controls:

- Cal Date:** A text box containing '09 Jun 2008'.
- Temp - °F:** A text box containing '28.7'.
- Humidity:** A text box containing '74'.
- C-Tech:** A dropdown menu with 'Steve Griffin' selected.
- Shop:** A dropdown menu with 'Shop 2' selected.
- Buttons:** 'Save' and 'Cancel' buttons are located on the right side.

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For each item passing calibration, the due date is set to the calibration date plus the calibration interval. For failing items, the due date is set to the calibration date.

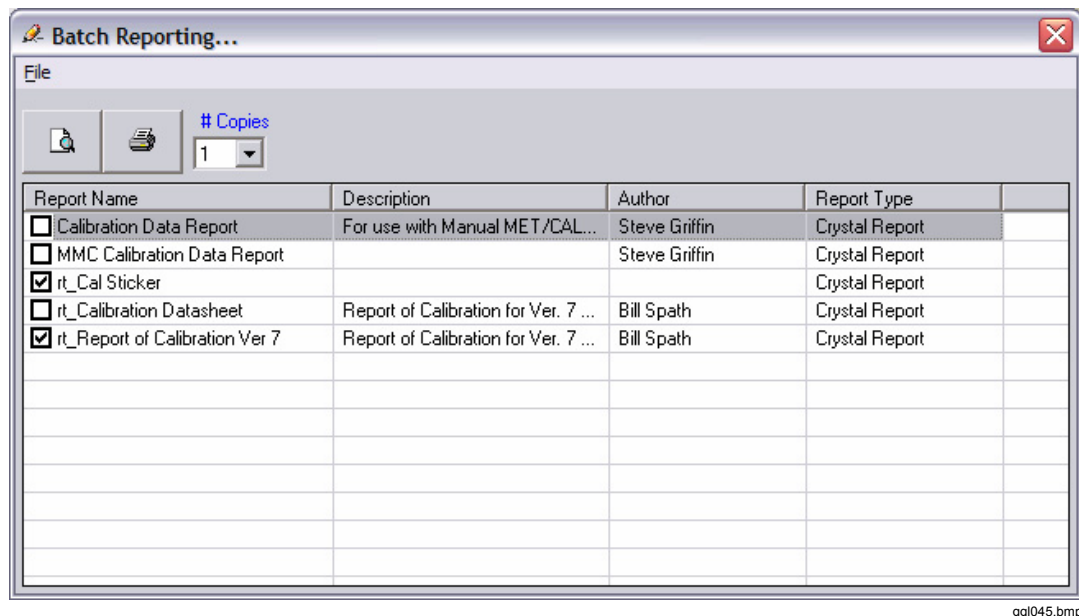
Click the **Save** button to create a new calibration record for each item. The calibration records include the calibration standards used results data.

Running Calibration Reports



After saving the calibration results, the **Report** button enables. To use the report functions:

1. Click the **Reports** button. This action opens the Batch Reporting screen.
2. Check the reports to run.
3. Click **Preview** or **Print**. The selected report prints for each calibration item.



Evaluation of Calibration Results

When a calibration is complete and you save the results, the software creates a new calibration record. The following scenarios describe how the software evaluates the results from a simple four-line datasheet and what is written to the database.

Scenario A

As-Found only - All tests pass

Test	Test Results	Data Field	Recorded Value
1	Pass	C2323	Y (pass)
2	Pass	C2308	FOUND-LEFT
3	Pass	Manual MET/CAL As-Found	Pass
4	Pass	Manual MET/CAL As-Left	Left blank

Scenario B

As-Found data only - One test failed

Test	Test Results	Data Field	Recorded Value
1	Pass	C2323	N (fail)
2	Fail	C2308	AS-FOUND
3	Pass	C2303	Cal Date
4	Pass	Manual MET/CAL As-Found	Fail
		Manual MET/CAL As-Left	Left blank

Scenario C

As-Found: Fail, As-Left: Pass

Test	As-Found	As-Left	Data Field	Recorded Value
1	Pass		C2323	Y (pass)
2	Fail	Pass	C2308	AS-LEFT
3	Pass		C2303	Cal Date + Interval
4	Pass		Manual MET/CAL As-Found	Fail
			Manual MET/CAL As-Left	Pass

Scenario D

As-Found: Fail, As-Left: Fail

Test	As-Found	As-Left	Data Field	Recorded Value
1	Pass		C2323	Y (pass)
2	Fail	Pass	C2308	AS-LEFT
3	Pass		C2303	Cal Date + Interval
4	Pass		Manual MET/CAL As-Found	Fail
			Manual MET/CAL As-Left	Pass

Reports



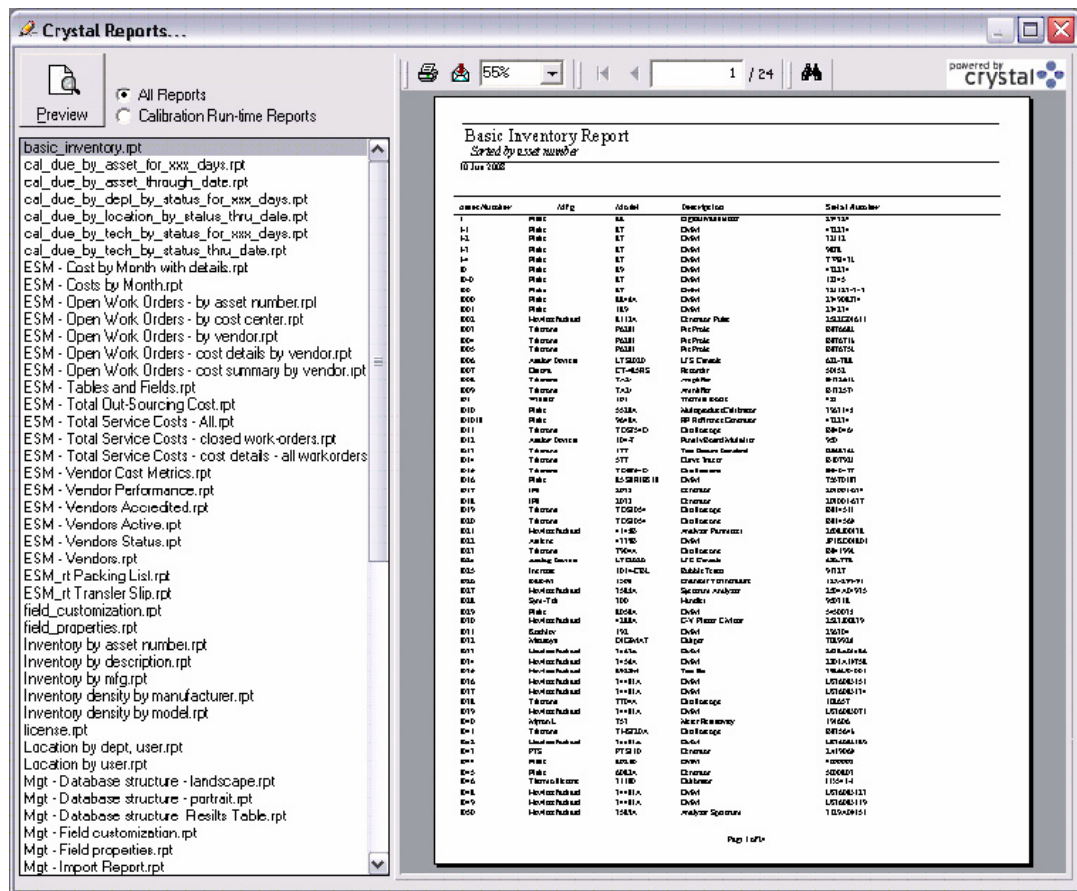
Manual MET/CAL software supports Crystal Reports the same as MET/TRACK software.

Crystal Reports

To run a Crystal Report:

1. Click the **Reports** button on the Toolbar.
2. Select **Crystal Reports**. All MET/TRACK reports display in the left window.
3. Click a report with the mouse to select it.
4. Push **Enter** or click the **Preview** button. Once a report shows in the right panel, it is ready to print or export.

Calibration report, also known as run-time reports, report on a single defined calibration event. These report names begin with the letters “rt_”. To filter the report list to view run-time reports only, click the **Calibration Run-time Reports** radio button.



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The Results Viewer

With the Manual MET/CAL software you have a tool that views and compares calibration results data. To open the Results Viewer:

1. Select the **Custom Results Viewer** from the Tools menu, or push **CTRL+R**.
2. Enter an asset number.
3. Select the calibration date of interest.
4. Push **Enter** or click the refresh button to update the display.

Several data views are available. To select a view, click the view name in the left panel.

Note

*Only Manual MET/CAL software calibrations support this format.
 MET/CAL software writes to the Full-Results table only.*

Cal Results Viewer...

View: Calibration results, Basic view, Meas Uncert view, All columns, Transducer view

Asset Number: 1010, Cal Date: Most Recent

Calibration Results Data

test_step	remark	test_desc	nominal	sys_actual	uut_ind	test_status	condition	lower_limit	upper_limit
1.00	General Tests								
1.01		Connector	Check - Threads are OK		Checked				
1.02		Noise	Fan noisy?		N	Pass			
1.03		Open Input Test	Reading between 1.25 and 3.47		Y	Pass			
1.04									
1.05	Performance Tests								
1.06		Frequency Measure	12.00 Mhz	12.00 Mhz	12.00 Mhz	Pass		10.80 Mhz	13.20 Mhz
1.07		Residual Noise	6.50 μ V	6.50 μ V	3.00 μ V	Pass		6.50 μ V	
1.08		Minimum Power	13.50 dbm	13.50 dbm	44.00 dbm	Pass		13.50 dbm	
1.09									
1.10		Fudge factor			343				

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This button adds additional viewers so you can compare the results of different instruments or different calibration dates.



Cascade, stack, and tile multiple results viewers.

To re-order the columns of a view temporarily, drag the columns left or right. You can also re-name, hide, sort, or re-size a column. Right click a column to select a task.

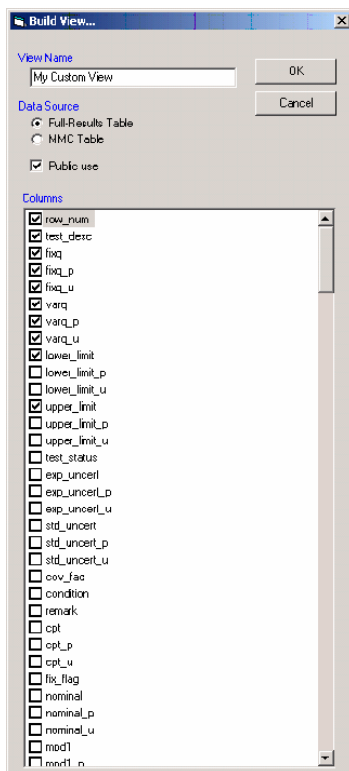
Push **CTRL+C** to send a copy of the information in the viewer to the Windows clipboard. Once on the clipboard, you can send a copy to other applications such as Microsoft Excel.

Customizing Views

The standard views in the Custom Results Viewer are generally adequate for most reports. However, you can create your own custom view of calibration results data. To create a custom view:



1. Click the **New** button.
2. Enter a name for the view.
3. Select if the data will come from the **Full-results Table** or the **MMC Table** (Manual MET/CAL software results table).
4. To share the view with other MET/CAL[®] users, check the **Public use** box.



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5. Check the results columns that you want to include in the custom view.
6. To set the column order, click and hold the left mouse button on the column description and then drag the column up or down in the list.
7. To change the name of a results column, push **F2** to enable the label editor.
8. Right-mouse click the field list for sorting options.
9. Click **OK** to save the custom view.

After returning to the Custom Results Viewer, the new custom view name shows in the list. Click to select the new custom view.

Note

You can rename or delete Custom views at any time.

Column order and column names may be changed for custom views. To save any changes to the custom view, click the **Save** button. Custom views must be saved to make them permanent.

Information and Reporting

This section of the manual is about how the Manual MET/CAL software writes calibration information to the database. The software uses this information to create new calibration certificates and results reports.

Note

Manual MET/CAL software uses existing run-time calibration reports without modification. The report, Ver_7_Certificates, remains the source of this data.

Existing Reports

Manual MET/CAL software saves calibration results the same as MET/CAL software to insure that existing calibration reports will look the same. Best practice is to read and understand the “ResultsTable7.pdf” document before you create a calibration results report. It describes each database results field, purpose, and use. This document is usually located at C:\METCAL\MANUALS.

New Reports

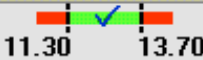
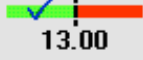
To create a new report for use with Manual MET/CAL software, especially to use the label features, it is best to begin by modifying an existing report.

Included Reports

Manual MET/CAL version 2.0 software includes multiple reports. It is suggested that you create a dummy datasheet using the Test-Types example datasheet. Then print then reports to see how to use the reporting features.

Results Reporting

In the following example, the Test-Types example datasheet is used to perform a calibration, enter results, and save results to the database.

Test Step	Test Description	Test Value	Limits	UUT Reading
1.00	General			
1.01	Connector	Threads OK		Checked
1.02	Y = Pass	Display OK?	Y = 	Y
1.03	Y = Fail	Fan noisy?	Y = 	N/A
1.04				
1.05	Performance Tests			
1.06	Frequency Measure	@12.50 Mhz		11.306
1.07	Residual Noise	6.50 µV		7.30
1.08	Minimum Power	13.50 dbm		12.50
1.09	<i>User entered</i>			
1.10	Fudge factor			A=44.8

ggl056.bmp

Note

- Tests 1.00 and 1.05 are bold labels.
- Test 1.04 is a blank line. Test 1.09 is a blank line with a label.
- Test 1.03 has been set to N/A as the test is not relevant, and a comment added.
- Test 1.06 has had the Actual value of the standard entered – see the @ symbol. The reading is at the limit and is probably marginal. The reading is an average – note the bold blue color
- The reading for test 1.10 can contain any type of text.

Viewing Results

Once a calibration is done and the results are written to the database, it is available for reporting and viewing.

Custom Results Viewer

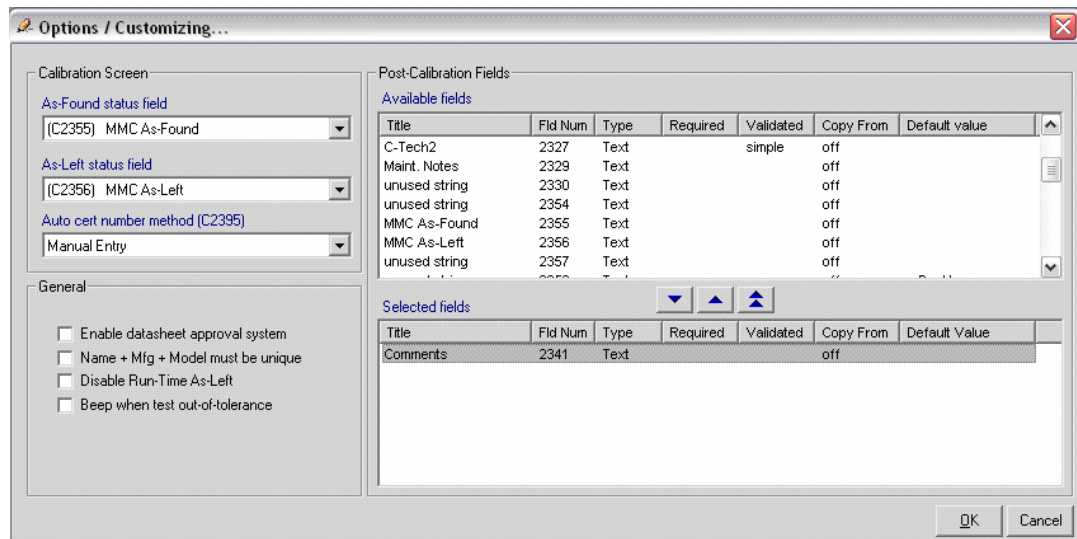
The Custom Results Viewer is available from the Tools menu to display the calibration data from the results table in the calibration database. When viewing the results, you can see how the data from the run-time screen is written to the database.

test_step	remark	test_desc	nominal	sys_actual	uut_ind	test_status	condition
1.00	General						
1.01		Threads OK			Checked		
1.02		Display OK?			Y	Pass	
1.03		0				N/A	
1.03	Fan not installed						
1.04							
1.05	Performance Tests						
1.06		12.00 Mhz	12.00 Mhz	12.50 Mhz	11.306 Mhz	Pass	Marginal
1.06	Std Dev of 10 readings is 0.0143						
1.07		6.50 μ V	6.50 μ V	6.50 μ V	7.30 μ V	Pass	
1.08		13.50 dbm	13.50 dbm	13.50 dbm	12.50 dbm	Pass	
1.09							
1.10		Fudge factor			A=44.8		

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Options and Customizing

The options screen is available from the Tools menu. To access this screen you must log-in as the System Manager.



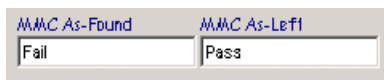
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As-Found, As-Left Status Field

MET/TRACK field C2323 displays the pass/fail status and field C2308 displays the Found/Left status of a calibration. Manual MET/CAL software captures both as-found and

as-left readings at the same time. To clearly indicate the as-found and as-left Pass/Fail status, the software is configurable to save this status information in user-designated fields independent of the traditional pass/save field.

In this example, unused fields C2364 will be used for the As-Found results and C2365 for the As-Left results. The MET/CAL System Manager can configure the MET/TRACK software calibration screen to display these fields.



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Auto Cert Number Method

Manual MET/CAL software can enter a certification number for each calibration:

Manual – Entered manually at run-time.

Auto Number – Inserts an incrementing number in MET/TRACK field C2395. The initial number is 1000 and increments each time the software saves a calibration record.

Enable Datasheet Approval System

If checked, the approval system enables. When enabled, both new and updated datasheets are set to un-approved and are unavailable. If disabled, all datasheets are available for use in a calibration.

Name + Mfg + Model Must Be Unique

When unchecked, datasheet names cannot be duplicated. This eliminates the confusion caused by two datasheets that have the same name. It also permits the Manufacturer, Model, and Description fields to be left blank.

When checked, the software insures the combination of datasheet name plus manufacturer name and model is not duplicated. As shown with the following two datasheet names, a generic datasheet name can be assigned to a datasheet if the manufacturer and model names are different.

Name	Manufacturer	Model
DATASHEET 123456	Starrett	100-1
DATASHEET 123456	Starrett	100-2

Disable Run-Time As-Left

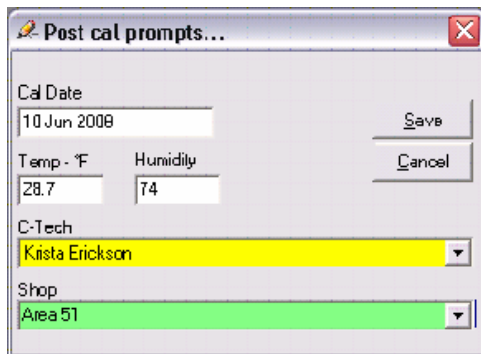
Check this option if your organization prefers not to allow the technician to enter As-Left calibration.

Beep When Out of Tolerance

When checked, the software makes a sound when the technician enters an out-of-tolerance value at run-time.

Customizing the Post Cal Screen

When a datasheet is complete and you click the **Save** button, the **Post cal prompts** screen displays. This screen is customized to include data fields for information you want to record with the calibration record.



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The calibration date, temperature, and humidity fields are required. The additional fields added by customization will inherit all MET/TRACK software characteristics, including validation, default values, and colors.

The list of allowed data fields displays in the top window. To select these fields, use the down arrow button and push **Enter**. Selected fields show as a list in the bottom window. Notice that the list includes a field's custom information.

Post-Calibration Fields

Available fields

Title	Fld Num	Type	Required	Validated	Copy From	Default value
Unused Integer	2304	Text			off	
User defined Date	2306	Date			off	
unused string	2314	Text			off	
Receive Date	2316	Date			4224	
Seals OK	2322	Text		fixed	off	
C-Tech2	2327	Text			off	
Maint. Notes	2329	Text			off	

Selected fields

Title	Fld Num	Type	Required	Validated	Copy From	Default Value
C-Tech	2307	Text	Y	simple	off	< Users full name >
Shop	2313	Text		pick	off	

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Copy From / Copy To

The Copy From function is set up by the MET/TRACK system manager. In the following example, calibration field C2335 has been placed in the calibration screen, and renamed Current User. The Source (copy from) has been set to L2801. When a new calibration record is created in the MET/TRACK or Manual MET/CAL software, the name of the user is added to the calibration record.

Note

Copy From fields cannot be used on the post-cal screen.

Field Properties

Field: (2355) Current User

Field Title: Current User Tool Tip Text: unused string

Display Length: _____ Max: 64
Entry Length: _____

Adding | Updating | Validation/Merge

☐ Required

Allow Levels: 123 Default Value: _____

Source (copy from): 2801 - User Name Destination (copy to): Off

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Learning and Experimenting

When getting started with Manual MET/CAL software, create some sample assets. Keep the asset numbers simple and sequential. For example, create four assets with asset numbers 1-1, 1-2, 1-3 and 1-4. Set their state to inactive so they will not show up in recall and overdue reports. It is also suggested that you have several sample dummy calibration standards – Standard 1, Standard 2, Standard 3 and Standard 4. Be sure that these standards have calibration records and current calibration dates.

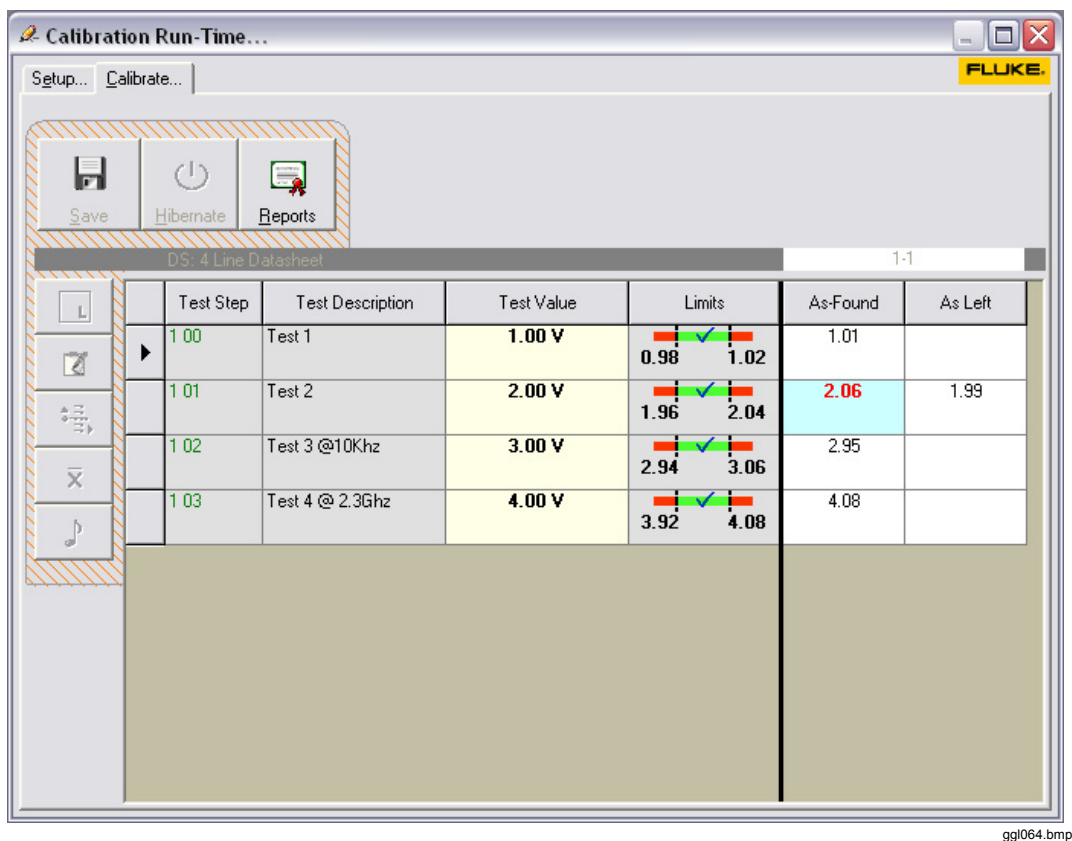
Initially, the software cannot calibrate without any datasheets. The first step is to create a simple datasheet. See, *Creating a Datasheet*, on page 5 for details. The examples provided in the Datasheet Designer are good learning tools.

It is suggested that you create two datasheets while getting started. Use the examples to create the 4 Line datasheet and then the Test-Types datasheet.

Test Step	Test Description	Test Type	Test Value	Units	Low Limit	High Limit	Resolution	TUR	Uncertainty
1.001	Test 1		1.00	V	0.98	1.02	2	18	1.1 mv
1.002	Test 2		2.00	V	1.96	2.04	2	16	1.25 mv
1.003	Test 3		3.00	V	2.94	3.06	2	22	909 µv
1.004	Test 4		4.00	V	3.92	4.08	2	28	714 µv

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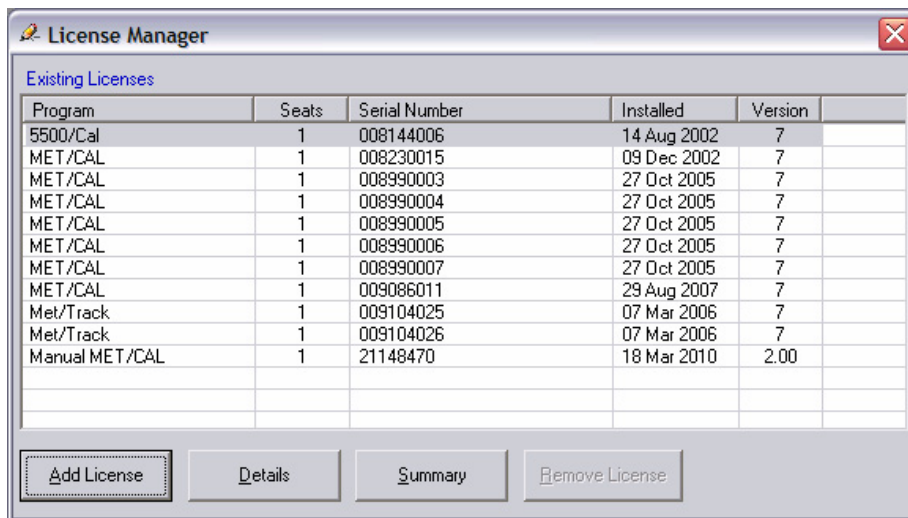
After creating and saving, calibrate an asset using this datasheet. With the following example, notice that Test Step 1.01 is out of tolerance as indicated by the reading shown in red. The As-Left column has a data entry for the As-Left in tolerance reading after a calibration adjustment. The blue cell background identifies that the out-of-tolerance reading includes a note.



After a calibration is complete and saved, you can view the calibration details by running a Crystal Report from the Report menu. The Full Results viewer is also available from the Tools Menu.

Installing a License

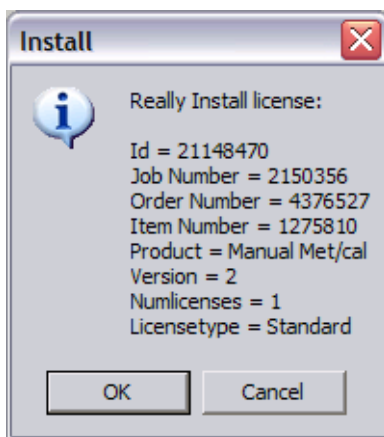
You must have an installed license to use Manual MET/CAL. The license is a small data file with the “LIC” extension. This license ships on the USB Flash Drive with the installer program. The license manager below shows that a five-seat concurrent license is installed.



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To install a license:

1. Click the **Add License** button.
2. Navigate to the license. The license is a small data file with a ".LIC" extension.
3. Click **OK**.



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After installation, the new license is in effect. This is a one-time task. The **Details** button describes each license.

How to Customize MET/CAL and MET/TRACK

To list Manual MET/CAL on the MET/CAL or MET/TRACK tool bar, contact the Fluke MET/SUPPORT group for details.

