

Canada I&E Technical User Forum

SPI Calibration Module and Fluke integration

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Discussion topics

- Calibration Module role and position
- Integration with Fluke Documenting Calibrators

- Calibration module re-design

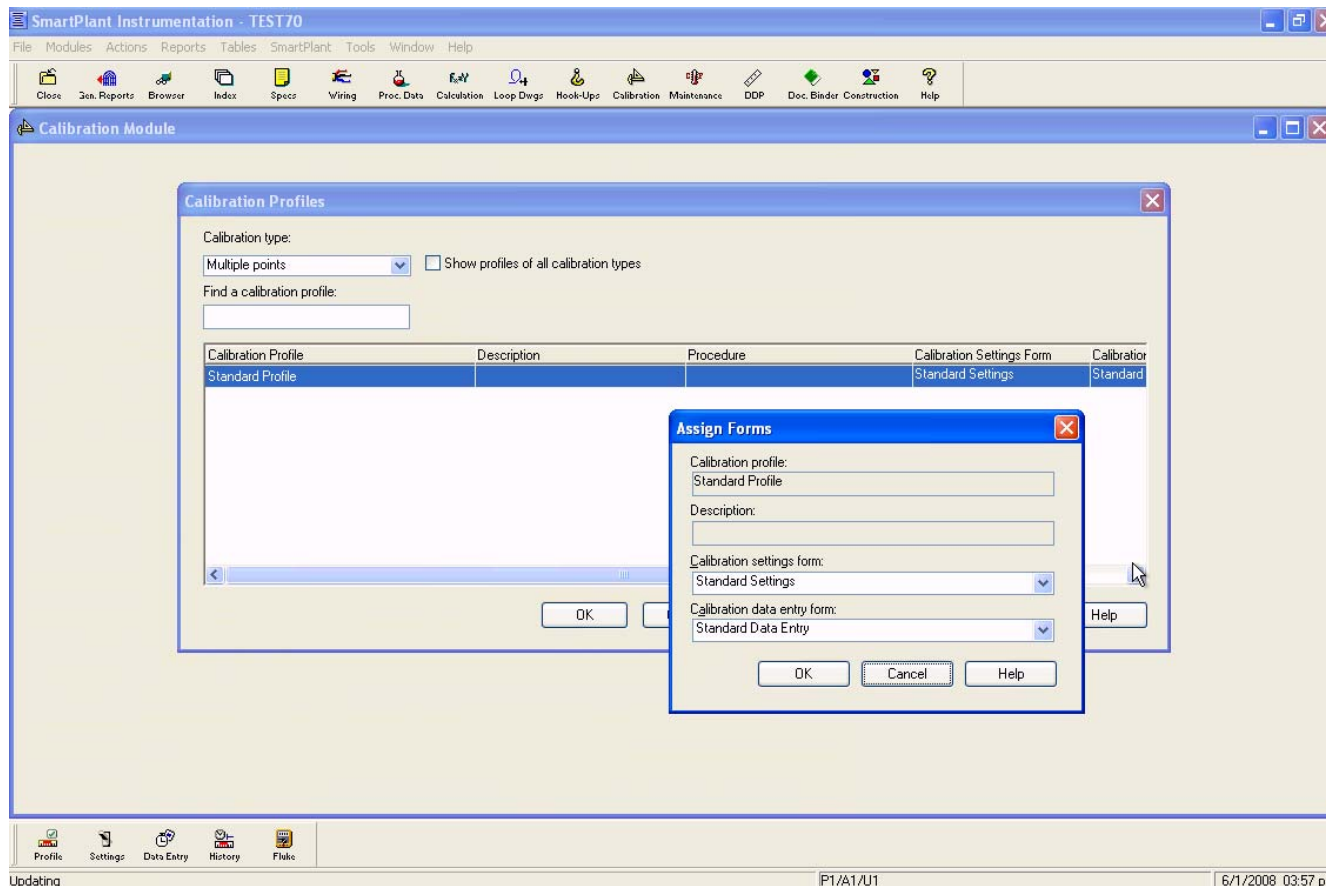
- Increasing availability of SPI data at the operating facilities
- Desire to have plant instrument management functionality included in SPI rather than integrated with additional systems
- ERP and CMMS systems are not very well fit to handle specifics and quantities of the instrumentation
- Requirement to provide traceable/auditable Calibration history

All of this creates market demand and business opportunity

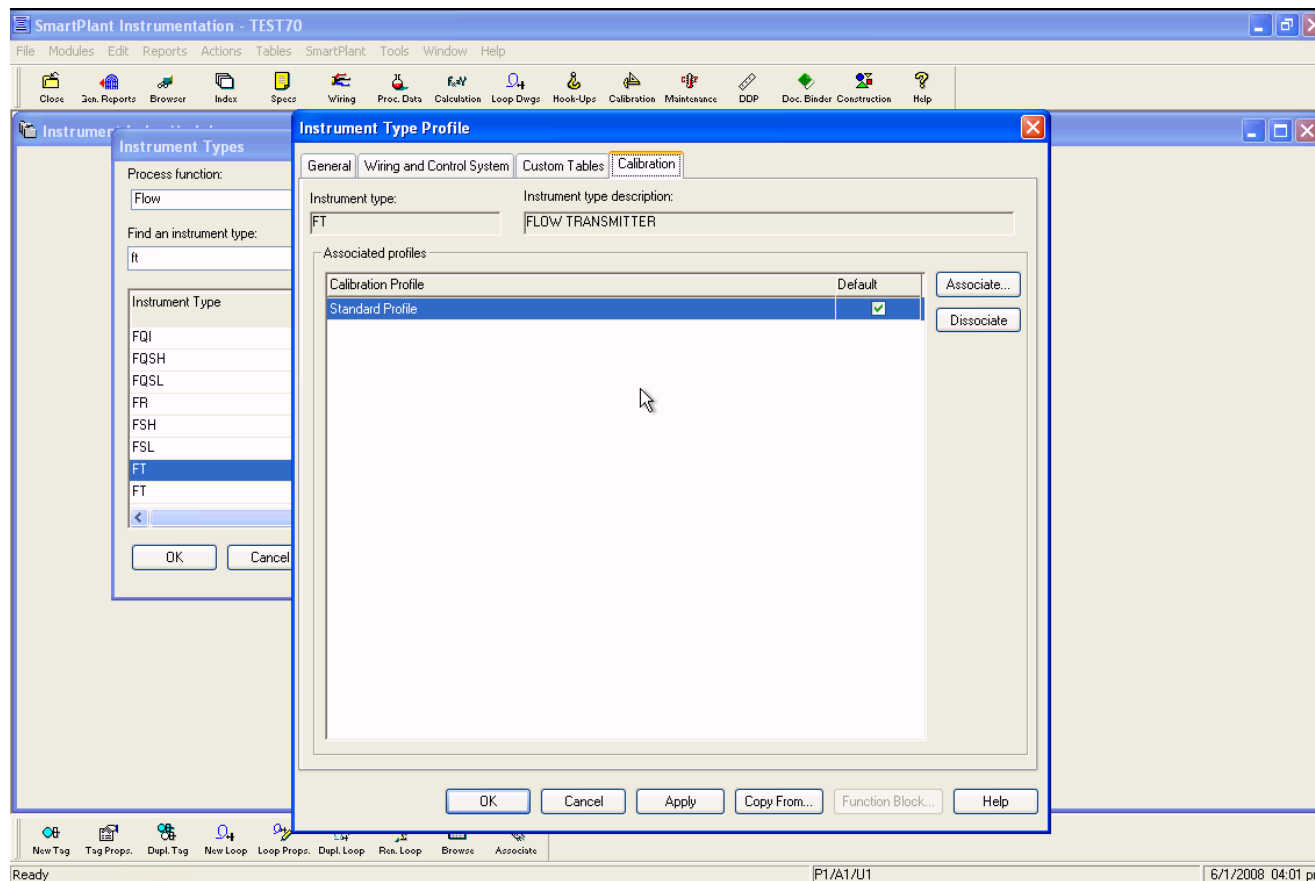
- Key changes:

- Customizable calibration forms – settings and results
- Multiple profiles available for instrument – set in the instrument type profile
- Test equipment is now part of the instrument index and allows tracking and calibration of test equipment.
- Calibration certificate – snapshot of the calibration results
- Errors per each calibration point are now explicitly recorded in the database (and not recalculated as before for reports) allowing for better analysis
- Increased intuitiveness of the work flow and individual operations

- Calibration module re-design – Calibration profiles
 - Calibration forms are now customizable (InfoMaker) and allow selection of 2 forms – Calibration settings and Calibration Data entry



- Calibration module re-design – Instrument type profiles
 - When multiple profiles are enabled on the instrument type, specific instrument can have **different** types of calibration as needed by maintenance



- Calibration module re-design – Standard Profile
 - Similar to the default specifications a standard profile can be defined to reduce time to create individual instrument calibration settings.

SmartPlant Instrumentation - TEST70

File Modules Actions Reports SmartPlant Tools Window Help

Close Gen. Reports Browser Index Specs Wiring Proc. Data Calculation Loop Dwg's Hook-Ups Calibration Maintenance DDP Doc. Binder Construction Help

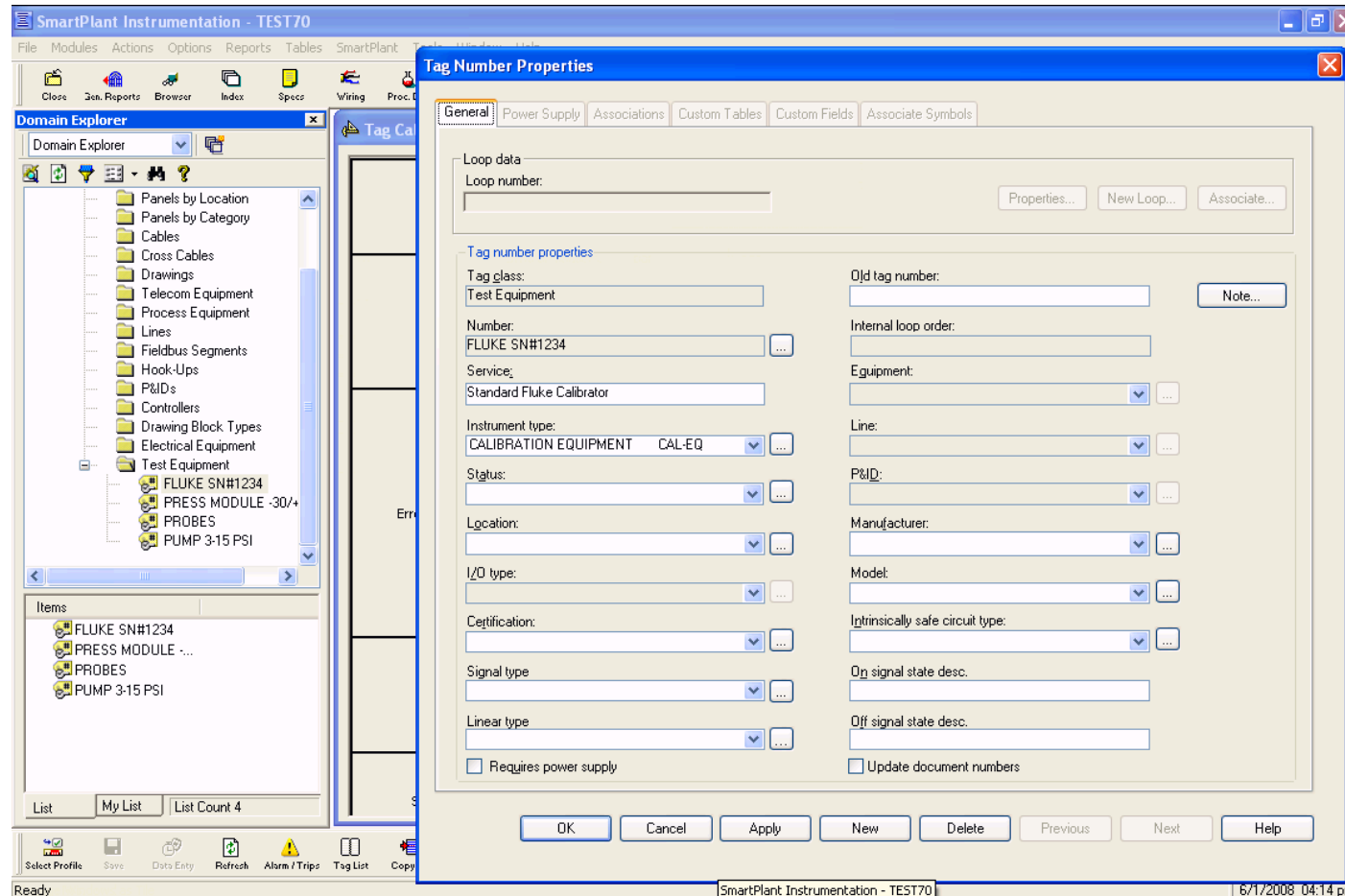
Calibration Profile Settings - Standard Profile

General	Tag number			
	Service			
	Serial number			
	Function			
	Location			
Ranges	Variable min.		Units of measure	
	Variable max.		Units of measure	
	Output signal min.	4		
	Output signal max.	20		
	Output signal UOM	mA		
	Output type	Linear		
	Allowed leak rate		Units of measure	
Errors / Points	Calibration type	Multiple points		
	Number of points	5	Measuring point	
	Direction	Increase		
	Error type	% of Reading		
	Upper tolerance	1	Intermediate upper	1
	Lower tolerance	-1	Intermediate lower	-1
	Tolerance units of measure	%		
	Set value 1		Direction	
	Set value 2		Direction	
	Set value 3		Direction	
Set value 4		Direction		
Scales	Display scale 1	Minimum		
		Maximum		
		UOM		
	Display scale 2	Minimum		
	Maximum			
	UOM			
Set Point:	Point	None		
	Description			
	Direction			

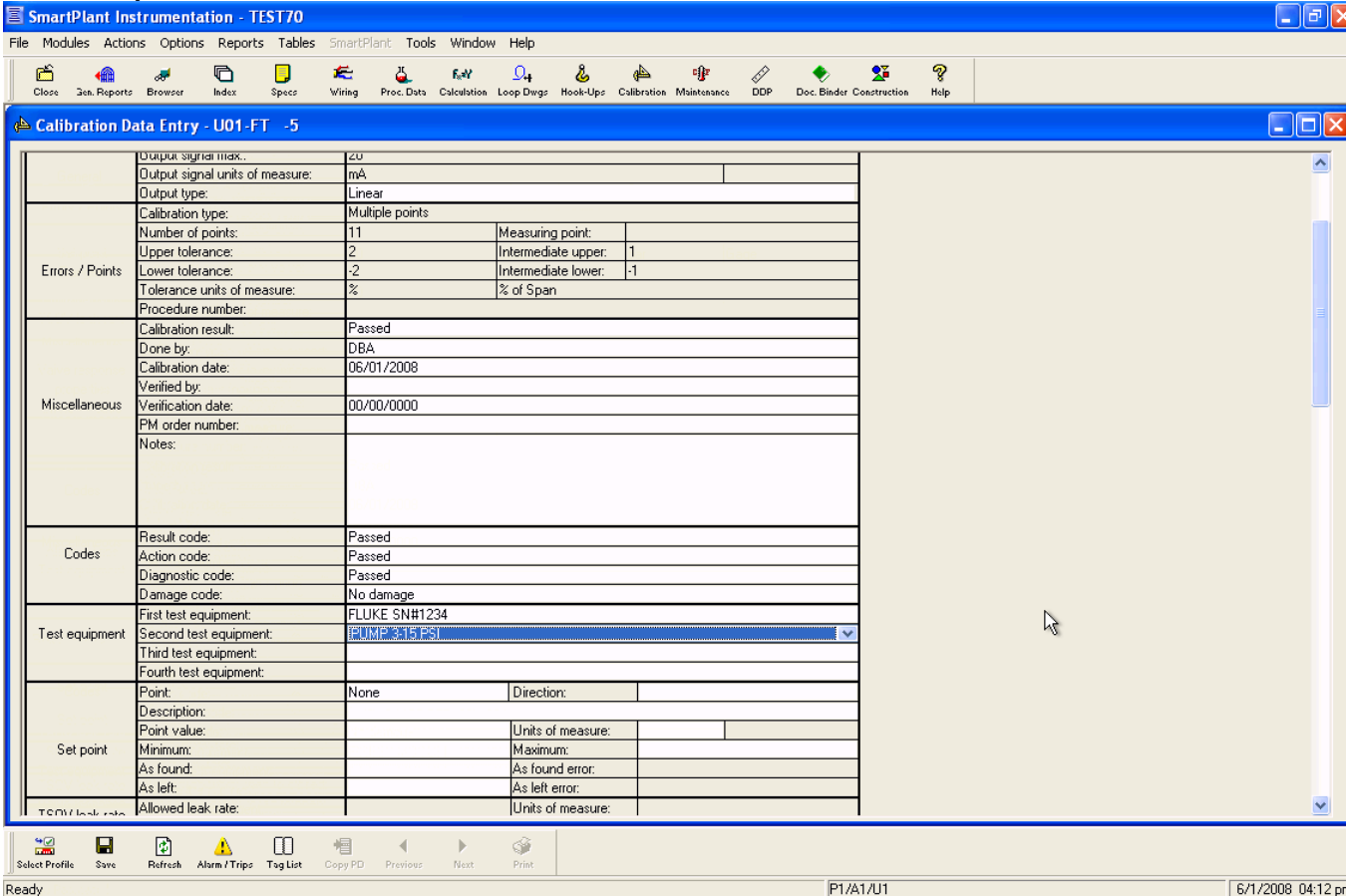
Save Refresh Print

Ready P1/A1/U1 6/1/2008 03:59 pm

- Calibration module re-design – Test Equipment
 - New Tag class added to the instruments (tags) – **Test Equipment**



- Calibration module re-design – Recording results
 - Codes, test equipment and result points are all available in one data entry form
 - Result points data is now vertical



The screenshot shows a software window titled "SmartPlant Instrumentation - TEST70" with a menu bar (File, Modules, Actions, Options, Reports, Tables, SmartPlant, Tools, Window, Help) and a toolbar. The main window is "Calibration Data Entry - U01-FT -5". It contains a data entry form with the following sections:

	Output signal max.:	20		
	Output signal units of measure:	mA		
	Output type:	Linear		
Errors / Points	Calibration type:	Multiple points		
	Number of points:	11	Measuring point:	
	Upper tolerance:	2	Intermediate upper:	-1
	Lower tolerance:	-2	Intermediate lower:	-1
	Tolerance units of measure:	%	% of Span	
	Procedure number:			
Miscellaneous	Calibration result:	Passed		
	Done by:	DBA		
	Calibration date:	06/01/2008		
	Verified by:			
	Verification date:	00/00/0000		
	PM order number:			
	Notes:			
Codes	Result code:	Passed		
	Action code:	Passed		
	Diagnostic code:	Passed		
	Damage code:	No damage		
Test equipment	First test equipment:	FLUKE SN#1234		
	Second test equipment:	FLUKE SN#1234		
	Third test equipment:			
	Fourth test equipment:			
Set point	Point:	None	Direction:	
	Description:			
	Point value:		Units of measure:	
	Minimum:		Maximum:	
	As found:		As found error:	
	As left:		As left error:	
	Allowed leak rate:		Units of measure:	

The bottom of the window shows a status bar with "Ready", "P1/A1/U1", and "6/1/2008 04:12 pm". A toolbar at the bottom contains icons for Select Profile, Save, Refresh, Alarm / Trips, Tag List, Copy PD, Previous, Next, and Print.

- Calibration module re-design – Calibration certificate
 - Similar to the MER results, calibration results are now recorded in 2 forms – data and BLOB snapshot for permanent recording and reported as Calibration certificate

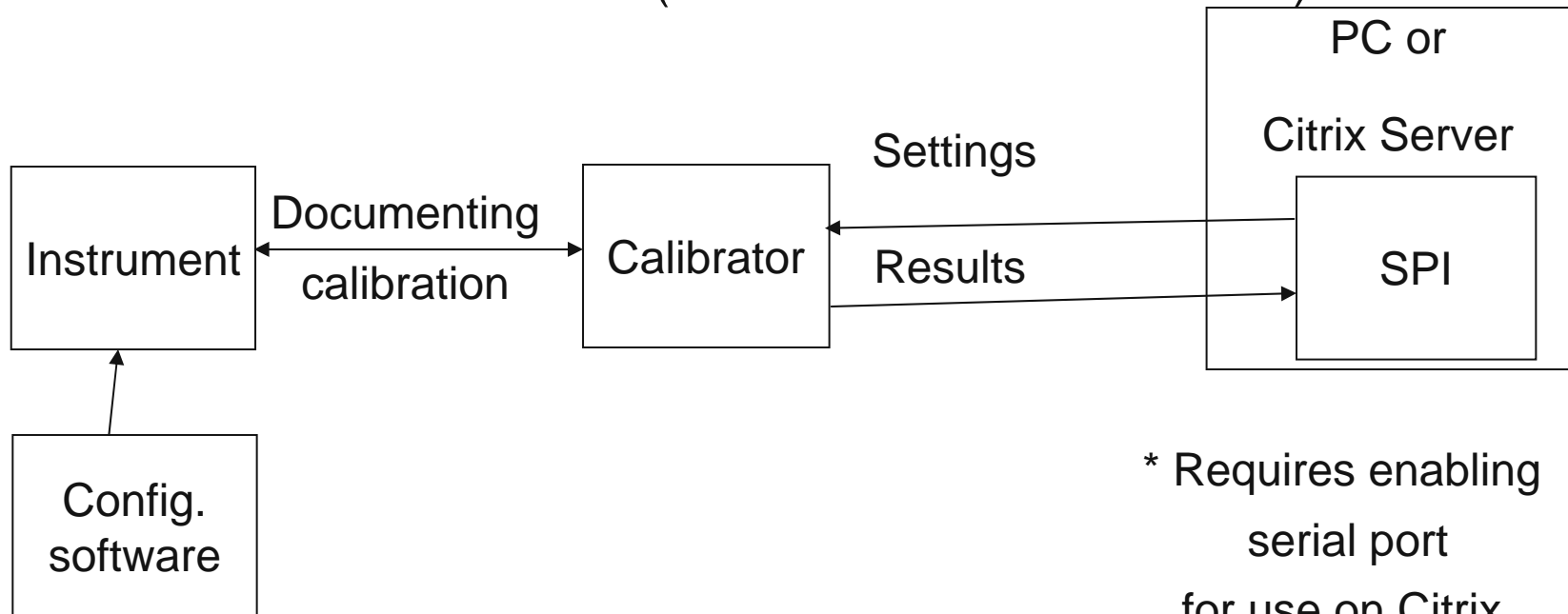
Print Preview - Calibration Certificate Report

General	Tag number:	U01-FT -5			
	Service:				
	Serial number:				
	Function:	FLOW TRANSMITTER			
	Location:				
Ranges	Variable min.:	3	Units of measure:	bar	Gage
	Variable max.:	10	Units of measure:	bar	Gage
	Output signal min.:	4			
	Output signal max.:	20			
	Output signal units of measure:	mA			
	Output type:	Linear			
Errors / Points	Calibration type:	Multiple points			
	Number of points:	10	Measuring point:		
	Upper tolerance:	2	Intermediate upper:	1	
	Lower tolerance:	-2	Intermediate lower:	-1	
	Tolerance units of measure:	%	% of Span		
	Procedure number:				
Miscellaneous	Calibration result:	Failed			
	Done by:	DBA			
	Calibration date:	05/28/2008			
	Verified by:	joe			
	Verification date:	00/00/0000			
	PM order number:				
Codes	Notes:	no damage found.			
	Result code:	Bad Result			
	Action code:	Passed			
	Diagnostic code:	Passed			
	Damage code:	No damage			
	First test equipment:	FLUKE SN#1234			

- Intergraph had been long approached by the owners interested to automate the data gathering, recording and analysis of the calibration results
- Fluke is one of the manufacturers of advanced Calibration solutions
- Resulted in the development project early in v.7 release cycle creating early integration solution seen as a prototype
- Within the last year serious interest arose among leading operating owner companies like Exxon, BP, ConocoPhillips, BASF, etc resulting in accelerated development
- Important fixes and additional functionality in v.7 SP8/SP9
- Transitioning into more functional enhancements in v.2007 SP6 and SP7

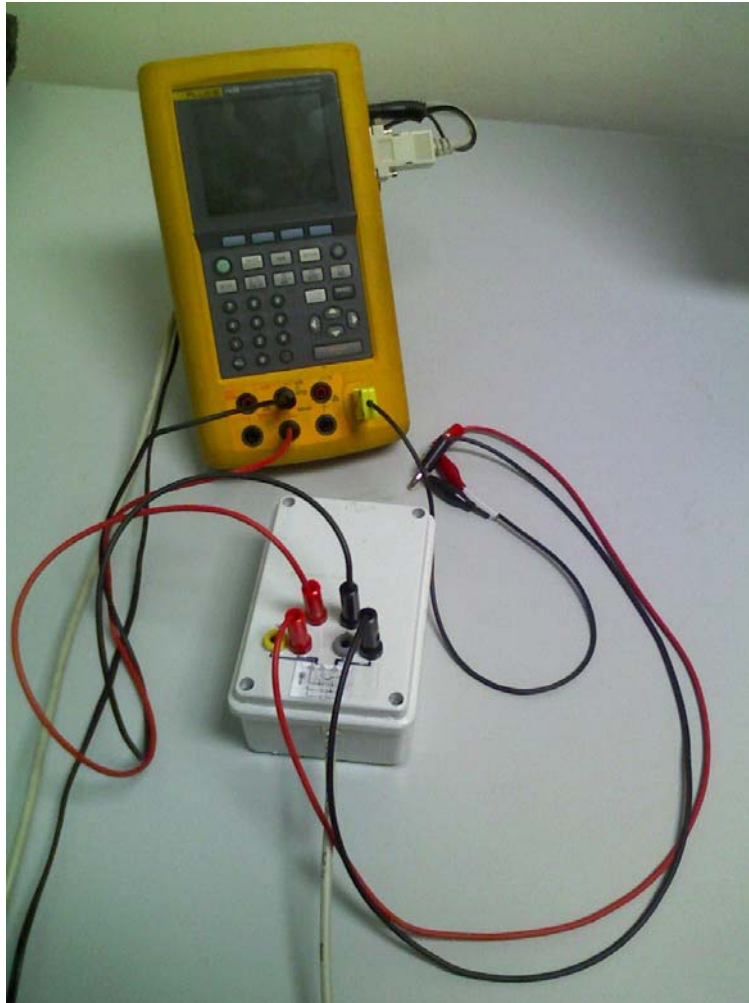
System architecture

- Fluke Documenting Calibrator
- Calibration attachments (optional)
- Transmitter or switch (future)
- Transmitter configuration software
- SmartPlant Instrumentation (v.7 SP8/SP9 or v.2007 SP6)



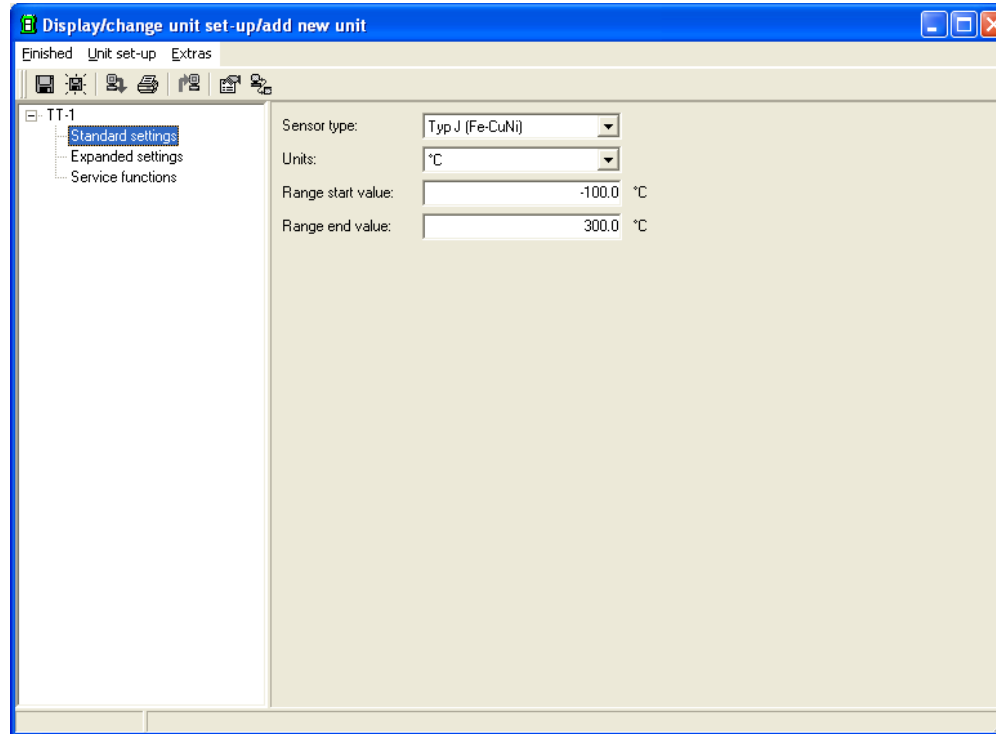
* Requires enabling serial port for use on Citrix

Fluke documenting calibrators integration



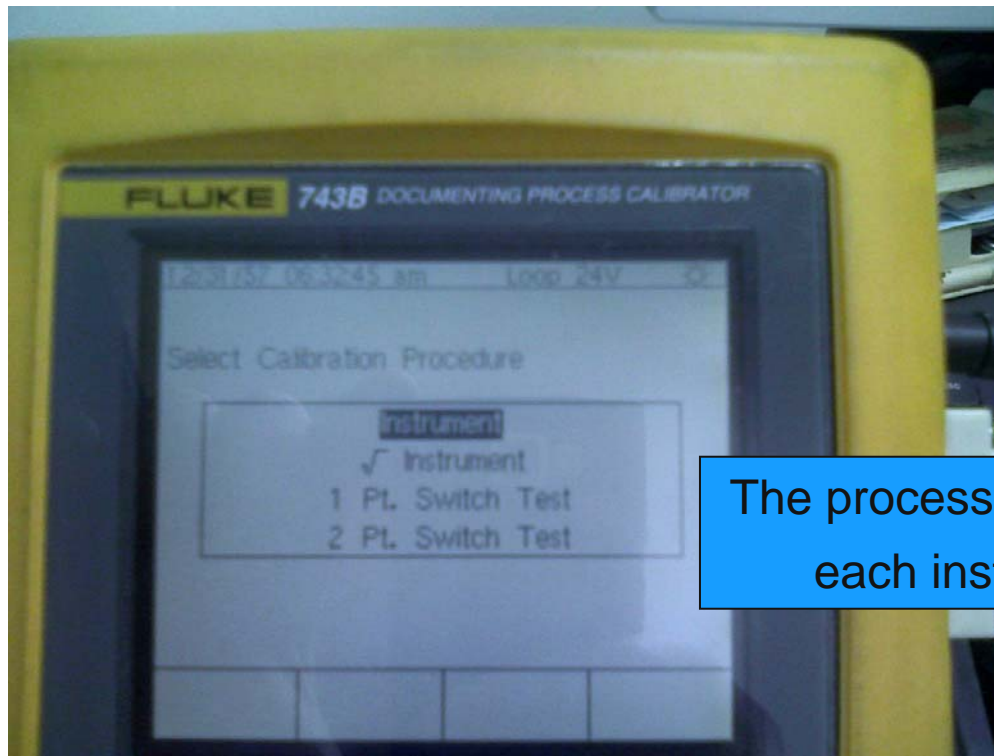
Calibrator and
Temperature
transmitter

Transmitter configuration



Transmitter and
vendor configuration
Software (via serial
port)

Manual Calibration process



The process has to be repeated for each instrument one by one

SPI Calibration settings

The screenshot displays the SmartPlant Instrumentation software interface. The main window is titled "SmartPlant Instrumentation - TEST70". The "Domain Explorer" on the left shows a tree of loops, including U01-F-1 through U01-T-62. The "Calibration Settings" window is open, showing the configuration for instrument "U01-TT-61".

The "Calibration Settings" tree includes:

- General
- Ranges
- Errors/Points
- Custom
- Scales
- Alarm/Trips
 - First Point
 - Second Point
 - Third Point
 - Fourth Point
 - Fifth Point
 - Sixth Point
 - Set Point

The "Ranges" configuration panel shows the following settings:

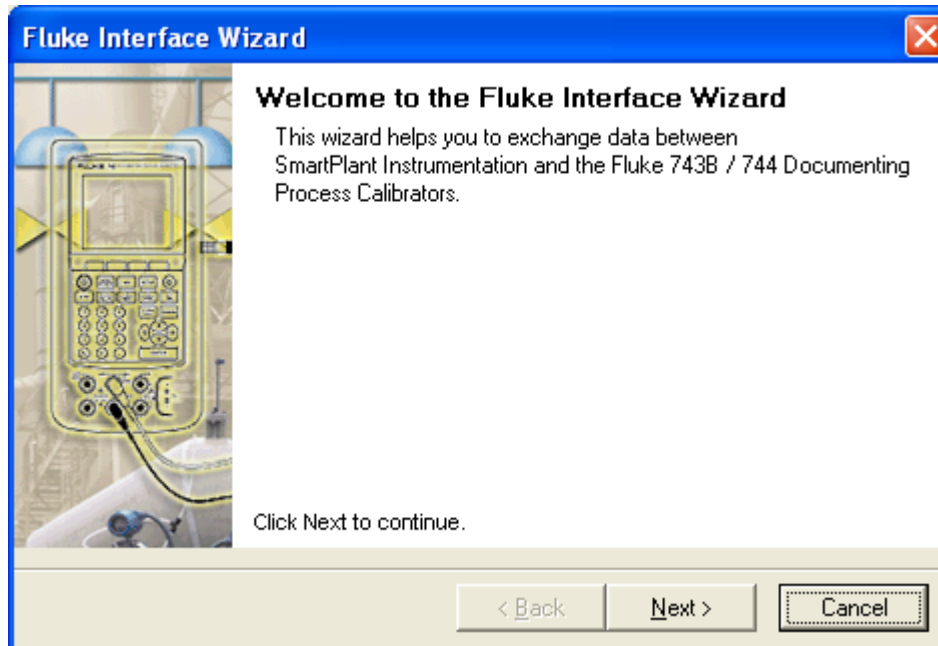
- Variable min: -100. Variable min UOM: °C
- Variable max: 300. Variable max UOM: °C
- Output signal min: 4 Output signal max: 20
- Output signal UOM: mA Output type: (empty)

The "Alarm/Trips" panel contains a table with the following columns: Type, Level, Description, Point, Direction, Min, Max. The table is currently empty, with "None" listed in the Type column for all rows.

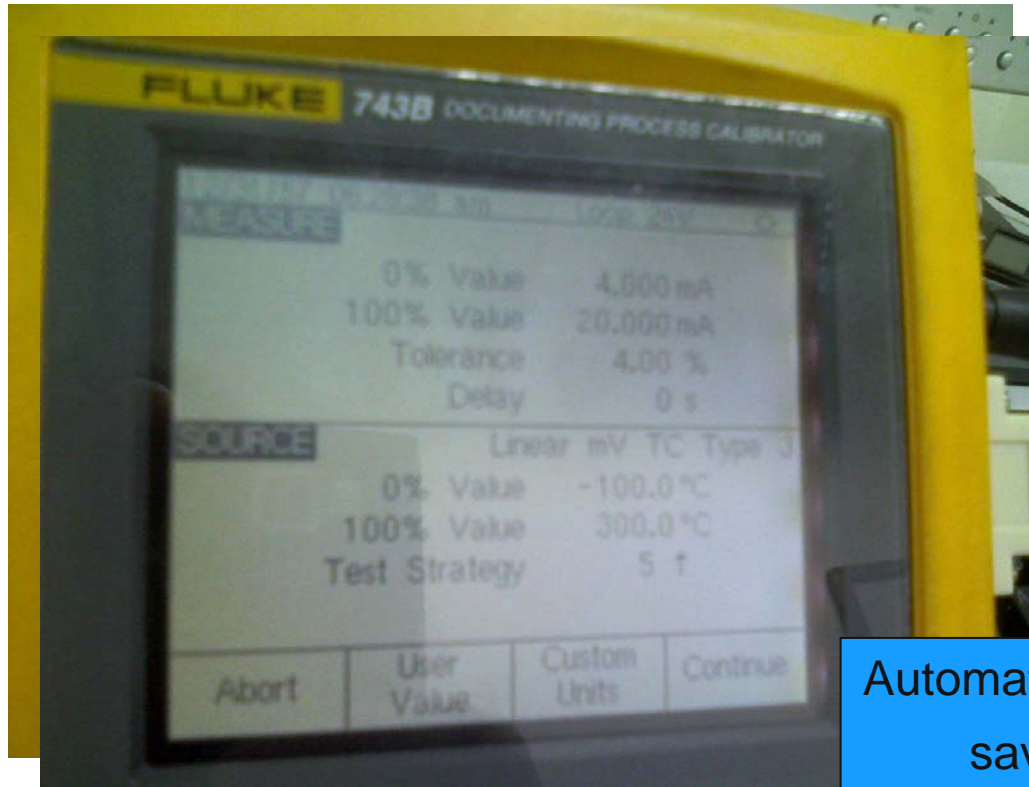
Type	Level	Description	Point	Direction	Min	Max
None						
None						
None						
None						
None						
None						

The status bar at the bottom shows "Ready", "P1/A1/U1", and the date/time "15/09/08 03:17 pm".

Automatic Calibration – download settings

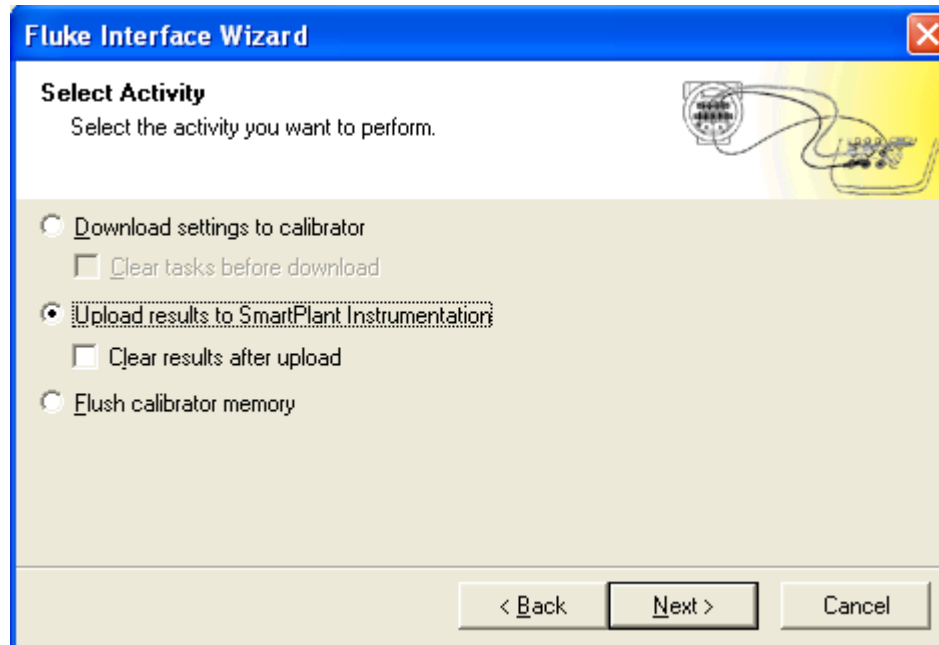


Automatic Calibration process



Automatic calibration and saving the data

Automatic Calibration – upload results



SPI tracking

1. History
2. Test equip. tracking
3. Reporting

The screenshot displays the SmartPlant Instrumentation interface for instrument U01-TT -61. The main window is titled 'Calibration History' and contains a table of calibration records. Below this, a 'Result Points' table shows the instrument's performance at various input levels.

PM Order Number	Calibration Date	Result Code	Diagnostic Code	Action Code	Damage Code	User Name	Calibration Points	Output Type	Upper Tolerance (%)	Intermediate upper error	Lower Tolerance (%)	Inter low
31/12/57	06:39:06	Passed	None	None		DBA	5	Linear	4	4	-4	
15/09/08	15:38:17	Passed	None	None		DBA	5	Linear	4	4	-4	
14/07/08	12:15:00	None	None	None		DBA	5	Linear	1	0.5	-1	
07/07/08	08:47:43	Failed	None	None		DBA	5	Linear	1	1	-1	
06/07/08	17:12:16	None	None	None		DBA	5	Linear	1	0.5	-1	
06/07/08	14:57:27	Failed	None	None		DBA	5	Linear	1	1	-1	

%	Input [°C]	Expected Output [mA]	As Found [mA]	AF Error (% of Span)	%	Input [°C]	Expected Output [mA]	As Left [mA]	AL E
0.	-100	4	4.167	1.0437	0.	-100	4		0.
25.	0	8	8.601	3.7562	25.	0	8		0.
50.	100	12	12.529	3.3062	50.	100	12		0.
75.	200	16	16.315	1.9688	75.	200	16		0.
100.	300	20	20.091	0.5687	100.	300	20		0.