

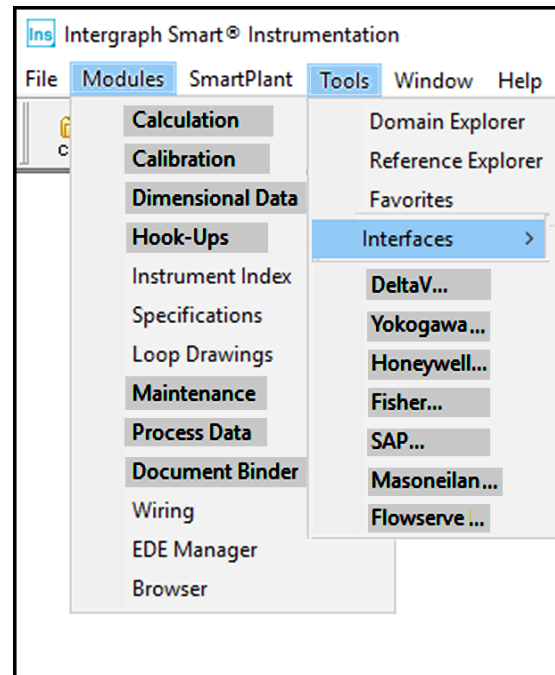
Underused Smart Instrumentation Modules



If you don't use it – you can lose it!

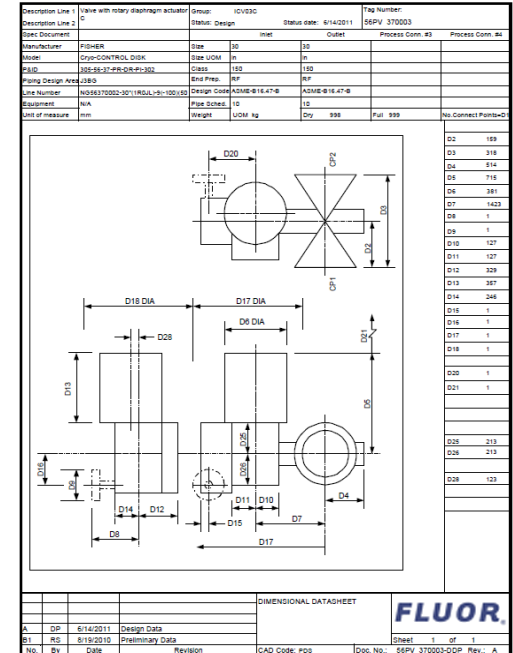
Underused Smart Instrumentation Modules

- Underused Smart Instrumentation Modules and Interfaces
 - Dimensional Data for Piping Module
 - Vendor Interfaces
 - SAP interface
 - Process Module
 - Calculation Module
 - Calibration Module
 - Hookup Module
 - Maintenance Module
 - Telecom Module
 - Import Module



Dimensional Data for Piping Module

- Domain Administrator imports the DDP Library Data with DDP Groups that match groups in Smart 3D
- Designers add Groups and Piping End Connection and Piping Classes to the inline tags
- After sizing the Vendor Dimensional Data is imported and added to the DDP datasheet
- The DDP data is Published to SmartPlant Foundation (SPF) for S3D to Retrieve into the 3D Model with Tag Numbers
- The Piping Designer selects the Valve Tag and places the Fully Dimensioned Valve into the Model



Dimensional Data for Piping Module

- DDP data workflow allows early placement of inline devices in the 3D Model
- Most Valve and some Flowmeter Vendors have interfaces with the DDP Module

Process Conditions



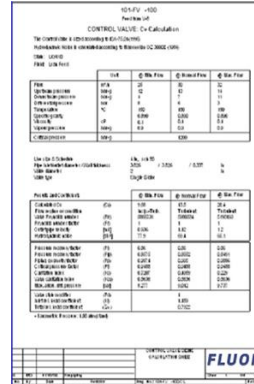
A detailed data sheet for process conditions, including fields for fluid type, temperature, pressure, flow rate, and material specifications. It includes a table for material properties and a section for material selection.

Specification Sheet



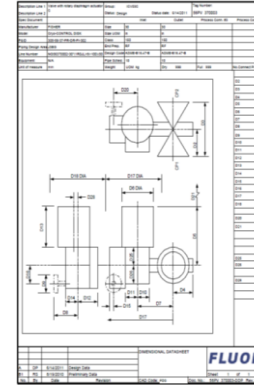
A detailed data sheet for specifications, including fields for material, dimensions, and performance requirements. It includes a table for material properties and a section for material selection.

Sizing Calculations



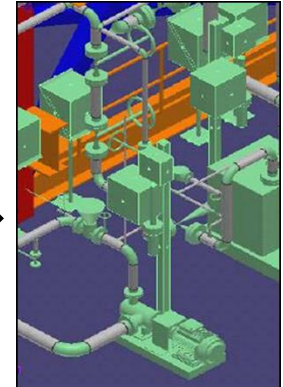
A detailed data sheet for sizing calculations, including fields for flow rate, pressure drop, and material properties. It includes a table for material properties and a section for material selection.

DDP Datasheet



A detailed data sheet for DDP (Data Data Product) data, including fields for dimensions, material properties, and performance requirements. It includes a table for material properties and a section for material selection.

Piping 3D Model



Dimensional Data for Piping Module

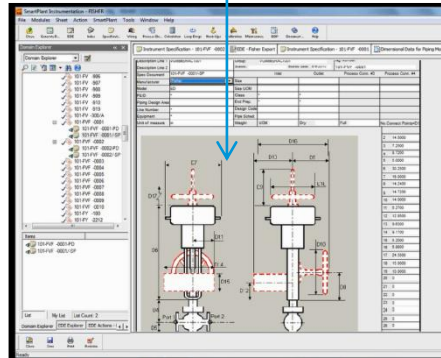
- Vendors can provide a simple CSV file that can be loaded into Smart Instrumentation

OD	OE	OF	OH	OI	OP	OQ	OR	OS	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM	PN	PO	PP	PQ	PR	PS	PT
TagNumber	Item	Rev	Type	Model	Weight	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	D13	D14	D15	D16	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29	D30
101-PCV-1001	1	A	VGlobeSRACT001	E 2 IN 667 SZ 45 300 RF	167	0	11	5.3	6.5	3.1	30	16	0	0	0	6.3	13	9.6	9.2	5.2	6.9	18	0	10	0	0	0	0	0	0	5	0	0	0	0
101-PCV-1002	4	A	VGlobeSRACT001	E 3 IN 667 SZ 60 300 RF	215	0	13	6.3	7.5	3.8	23	13	0	0	0	6.3	10	9.2	9.2	5.2	6.9	16	0	10	0	0	0	0	0	0	5	0	0	0	0
101-PCV-1003	5	A	VRotarySRACT001	8580 6 IN 2002 SZ 3 300 SGL FLG	384	0	2.2	1	3.6	3.6	7.3	7.3	4.4	10	15	2.5	23	20	0	0	0	0	6.3	9.2	5.2	20	0	5	5	15	5	0	0	0	
101-PCV-1004	8	A	VGlobeSRACT001	E 3 IN 667 SZ 40 300 RF	215	0	13	6.3	7.5	3.8	23	13	0	0	0	6.3	10	9.2	9.2	5.2	6.9	16	0	10	0	0	0	0	0	5	0	0	0	0	
101-PCV-1005	9	A	VRotarySRACT001	8580 8 IN 2002 SZ 3 150 SGL FLG	420	0	2.4	1.1	3.6	3.6	7.3	7.3	4.4	10	17	2.5	23	20	0	0	0	0	6.3	9.2	5.2	20	0	5	5	15	5	0	0	0	

Tags

Standard DDP 3D Groups

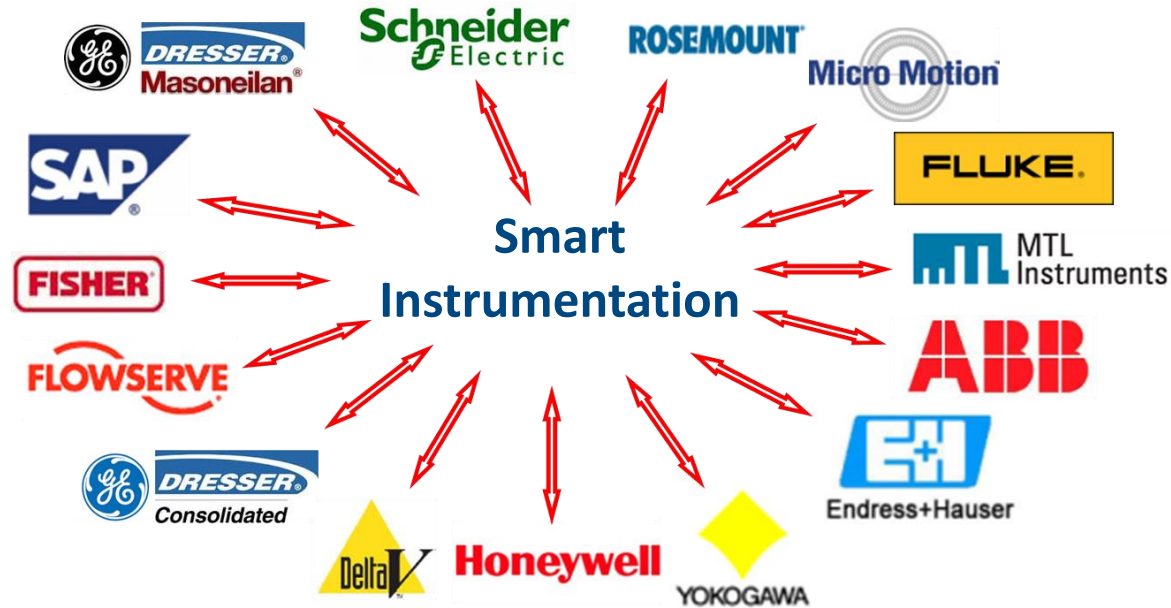
Up to 30 dimensions per DDP Group



Most Valve Vendors have interfaces for providing DDP data and many Instrument vendors are developing Data Centric DDP Interfaces

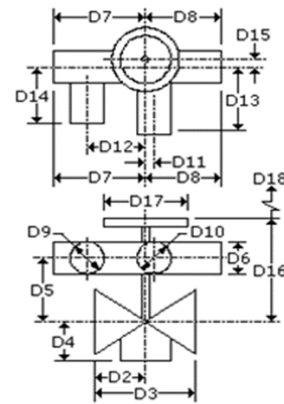
Smart Instrumentation Vendor Interfaces

- Smart Instrumentation has more Vendor interfaces than any other Process Controls Engineering Automation tool



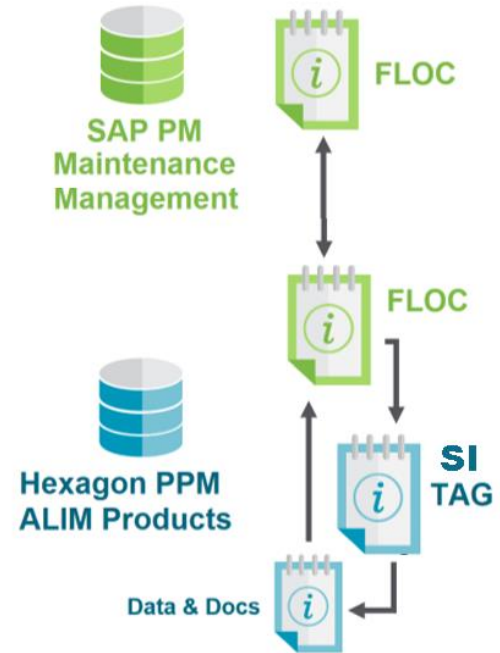
Smart Instrumentation Vendor Interfaces

- Some Vendor Interfaces with Smart Instrumentation are underutilized and may soon be discontinued
- Types of Vendor Interfaces:
 - Control Valve Interface (Vendor Data for Control Valves, Regulators, Relief valves)
 - Instrument Interface (Vendor Data for Flowmeters, Pressure, Level, and Temperature Devices)
 - DCS Interface (Vendor Data for I/O Card terminal configuration and model numbers)
 - DDP Interface (Vendor Data for inlet/outlet Sizes, Lengths, Rotations and Weights of Inline Devices)



Smart Instrumentation SAP Interface

- Smart Instrumentation (SI) can export data that includes tags, loops, services, manufacturers, models, fluids, and material data to SAP PM for Asset and Maintenance Management
- The SAPSyn utility is configured from the SAP Export Wizard
- The SI Tag and the SAP FLOC (Functional Location) are synchronized in a predefined EDE SAP View
- The SAP Export Wizard selects the export data from the predefined EDE SAP Views
- The SAPSyn can run it as required by a scheduler to synchronize data to SAP at predetermined times



Smart Instrumentation Process Modules

- Process Date can be defined for multiple Process Cases
- Fluid properties lookup tables from internal database of chemical compounds or API 2540
- Process Data may be entered by Tag or Line Number
- Changing Unit of Measure will convert the process variable
- Process data may be Copied between instrument Tags
- Enter Additional Properties, Design and Base conditions
- Tag Alarm / Trip Settings are defined in the Process Module
- Process Workflow between Instruments and Process

The screenshot displays the 'GENERAL' and 'PROPERTIES' tabs of the Smart Instrumentation Process Module. The 'GENERAL' tab includes fields for Case (CASE 1), Service (Feed from V-1), Location, Line number (4101001-1104), Fluid state (Liquid), Fluid phase, Fluid name source (User defined), Line size (8), Line schedule (30), and Fluid name (Lean Feed). The 'PROPERTIES' tab shows a table of properties with columns for Property Name, Value, Units, and a 'Show' button. The table includes properties like Specific Gravity, Density, Molecular Mass, Volume flow, Mass flow, Temperature, Viscosity, Velocity, Density, Specific gravity, Compressibility, Specific heat ratio, Vapour pressure, Critical pressure, and Molecular mass. The 'ADDITIONAL PROPERTIES' section includes Design pressure minimum, Design pressure maximum, Design temperature minimum, Design temperature maximum, Estimated gas, Angle of repose, Required range, and Units on process drop across flowmeter. The 'BASE CONDITIONS' section includes Pressure, Temperature, Density, and Compressibility. The 'ALARM' section includes Low Low, Low, High, High High, and High High High. The 'API 2540 STANDARD' section includes Density at reference temperature, Specific gravity at reference temperature, API settings for reference temperature, and Reference temperature. A 'NOTE' section is at the bottom.

Smart Instrumentation Process Modules

- Value Added by Process Engineers entering data directly into SmartPlant Instrumentation
 - Timely Access to Process Data by Control Systems and ownership of Process Data by Process
 - Data Centric Control of Process Data without the need to manually reload process data from spreadsheets
 - Real Time Process Data Becomes a deliverable to Control Systems via the Instrument Spec Sheets
 - Process Engineering can Generate Process Datasheets with Revision management

[illegible]

Smart Instrumentation Calculation Module

- The Calculation Module is a subset of the Process Module
- Before running a calculation, the Process Data needs to be complete with the fluid and fluid state
- The calculation will alert of missing data to complete the calculation
- Perform a Batch Calculation on multiple tags
- Calculate Multiple Process Cases for sizing
- Create a Hybrid Case so different Cases can be combined in a single calculation

The screenshot shows a 'Control Valve Calculation' dialog box with various input fields and buttons. The fields are organized into sections: Calculation method (ISA), Noise calculation method (Masonellian), Flow coefficient (Cv), Body type (Single Seat Globe), Critical flow factor (F_lC_f), Pressure drop ratio factor (X_t), Valve style modifier (F_d), Valve size, Relative capacity (C_v/d²), Outlet pipe diameter, Number of flow passages, Characteristic pressure ratio (X_{fz}), Density of pipe material (R_{op}), Acoustical efficiency factor (E_f), Bulk Modulus, Correction value (Dell.f), Speed of sound in the pipe wall (C_p), and a table for Cv, Regime, and Noise. The 'Calculate' button is highlighted.

	@Minimum	@Normal	@Maximum
Critical flow factor (F _l C _f):	0.86	0.86	0.86
Pressure drop ratio factor (X _t):			
Valve style modifier (F _d):	1		
Relative capacity (C _v /d ²):	12.3		
Number of flow passages:	1		
Characteristic pressure ratio (X _{fz}):			
Acoustical efficiency factor (E _f):			
Correction value (Dell.f):			
Speed of sound in the pipe wall (C _p):			
Cv			
Regime			
Noise	N/A	N/A	N/A

Smart Instrumentation Calculation Module

- Generates Calculation Reports with Revisions

- Instrument Calculation Basis:

- Control Valve Sizing**

- ISA S75.01 (1995)
- IEC 60534-2-1 (1998)

- Relief Valve Sizing**

- API RP 520, (2000)

- Flow Meter Sizing**

- ISO / Miller

- Thermowell Wake Frequency**

- ASME PTC 19.3TW (2010)(2016)

101-FV -100
Feedline V-6

CONTROL VALVE: Cv Calculation

The Control Valve is sized according to ISA-75.01(1995)
Hydrostatic Noise is calculated according to Macdonald 02.3000E (1994)

Code: LUCI00
First: Leak Feed

	Unit	@ Min. Flow	@ Normal Flow	@ Max. Flow
Flow	m ³ /h	25	30	32
Upstream pressure	bar-g	12	13	14
Downstream pressure	bar-g	4	7	11
Operating pressure	bar	8	6	3
Temperature	°C	100	100	100
Specific gravity		0.800	0.800	0.800
Viscosity	cP	0.1	0.1	0.1
Vapor pressure	bar-g	0.9	0.9	0.9
Critical pressure	bar-g			1200

Line size & Schedule 4 in., SCH 80
Pipe inner/outer diam / wall thickness 3.826 / 3.826 / 0.337 in
Valve diameter 2
Valve type Single Globe

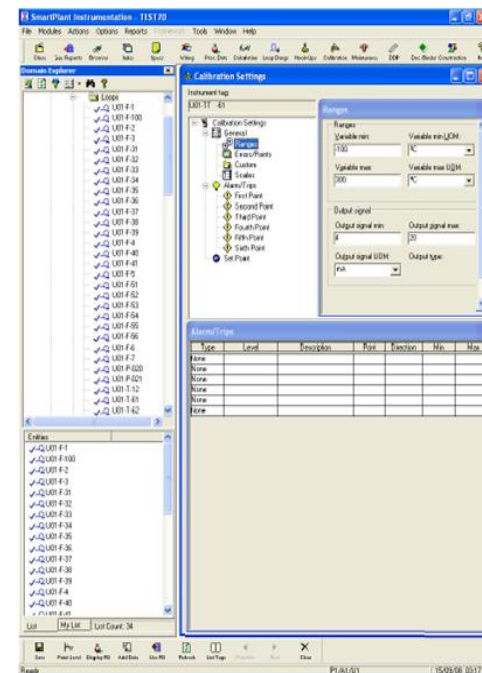
Pressure and Coefficient		@ Min. Flow	@ Normal Flow	@ Max. Flow
Calculated Cv	(Cv)	9.68	13.5	20.4
Flow regime of coefficient	Reynolds No.	1066731	1466634	2003193
Valve Pressure recovery factor	(F _P)	1	1	1
Pressure recovery factor	(F _P)	0.906	1.12	1.2
Orifice type velocity	(F _V)	77.9	69.4	65.1
Hydrostatic noise	(dB)			
Pressure recovery factor	(F _P)	0.86	0.86	0.86
Pressure recovery factor	(F _P)	0.8575	0.8582	0.8491
Pressure recovery factor	(F _P)	0.9074	0.906	0.8986
Critical pressure factor	(F _P)	0.9488	0.9488	0.9488
Correction factor	(F _C)	0.7207	0.4869	0.229
Valve coefficient factor	(F _C)	0.9536	0.9536	0.9536
Max. allowed pressure	(F _C)	8.277	9.012	9.737
Valve size modifier	(F _S)		1	
Isentropic head coefficient	(F _S)		1.189	
Total head coefficient	(F _S)		0.7922	

- Maximum Pressure: 100 atm (gauge)

CONTROL VALVE SIZING CALCULATION SHEET		FLUOR
Rev	By	Date
0	MD	11/1/2016
1	MD	11/1/2016
2	MD	11/1/2016
3	MD	11/1/2016
4	MD	11/1/2016
5	MD	11/1/2016
6	MD	11/1/2016
7	MD	11/1/2016
8	MD	11/1/2016
9	MD	11/1/2016
10	MD	11/1/2016
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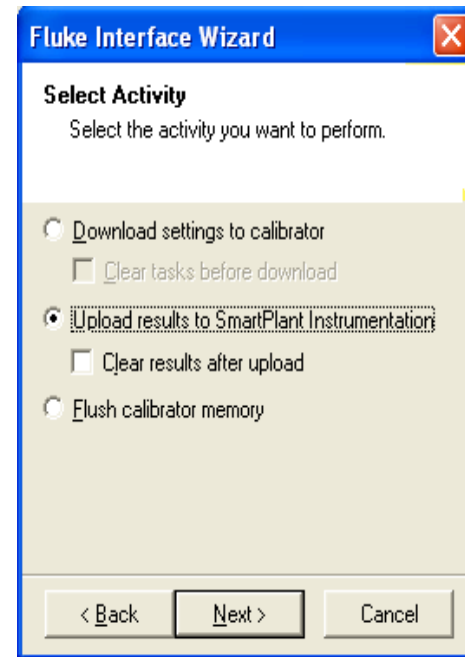
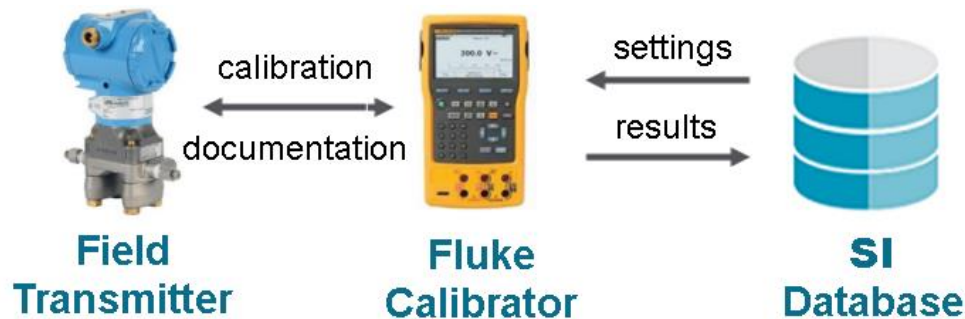
Smart Instrumentation Calibration Module

- Provides traceable and auditable Calibration history
- “As found - As left” calibration is recorded in the database
- Customizable calibration forms for settings and results
- Multiple profiles available for instruments
- Test equipment can be indexed for tracking and calibration
- Calibration certificate (snapshot of the calibration results)
- Errors per each calibration point are explicitly recorded in the Smart Instrumentation database



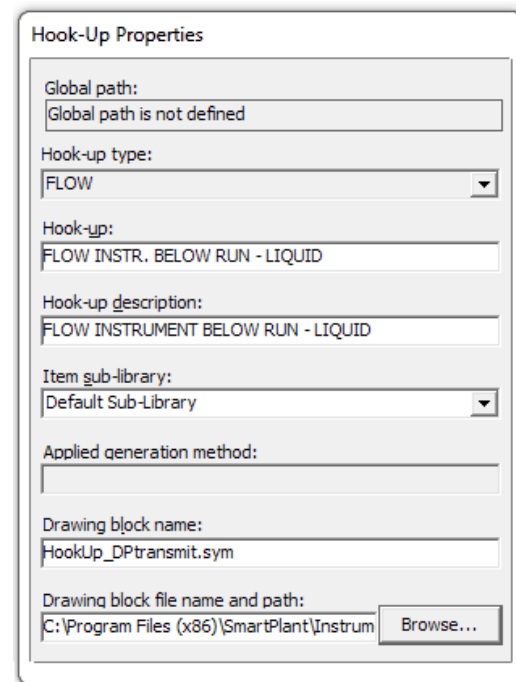
Smart Instrumentation Calibration Module

- The calibration module Interfaces with FLUKE Calibrators
- A Fluke Interface Wizard performs the following activities:
 - Download calibration settings to the calibrator
 - Upload the Calibration results to the database
 - Flush the calibrator memory for new download



Smart Instrumentation Hookup Module

- Hook-up Libraries and Sub-Libraries are located in the Reference Explorer
- Default hook-ups can be assigned to Instrument types
- Create Bill of Material and Library Items Reports
- The Hook-Up Properties defines the following:
 - Configure Paths for Existing Drawings and Blocks
 - The Hook-Up Type, Name and Description
 - Drawing block Names and Paths if the Hook-Up Drawings are being generated by Smart Instrumentation

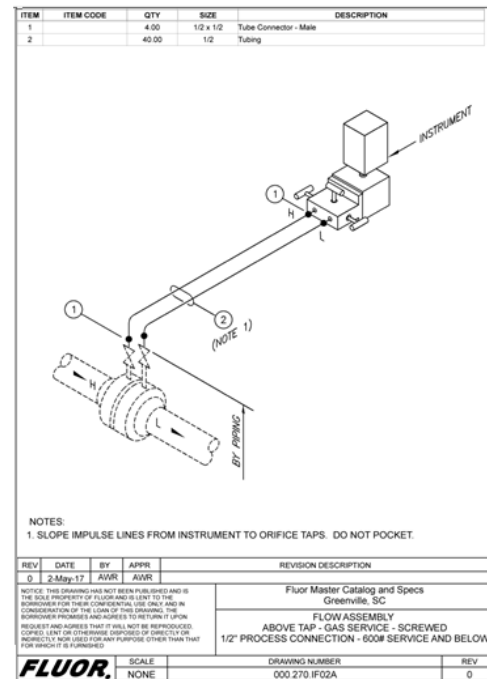


The screenshot shows the 'Hook-Up Properties' dialog box with the following fields and values:

- Global path:** Global path is not defined
- Hook-up type:** FLOW (selected in a dropdown menu)
- Hook-up:** FLOW INSTR. BELOW RUN - LIQUID
- Hook-up description:** FLOW INSTRUMENT BELOW RUN - LIQUID
- Item sub-library:** Default Sub-Library (selected in a dropdown menu)
- Applied generation method:** (empty field)
- Drawing block name:** HookUp_DPtransmit.sym
- Drawing block file name and path:** C:\Program Files (x86)\SmartPlant\Instrum (with a 'Browse...' button)

Smart Instrumentation Hookup Module

- Hook-up Details may be Automatically or Manually associated to Tags Numbers
- Multiple Details may be assigned to each Tag Number
- Commodity Catalog may be Default or Custom and can be modified by user
- Can generate AutoCAD, MicroStation or Enhanced Hook-up Detail Drawing
- Material List and Tag Numbers show on each Generated Hook-up Detail
- Bill of Materials generated for export to Material Managers



Smart Instrumentation Maintenance Module

- Define Preventive Maintenance Activities
- Schedule Preventive Maintenance Events
- Extend Existing Preventive Maintenance Scheduling
- Enter Preventive Maintenance Details:
 - PM code
 - Priority
 - Created by
 - Creation Date
 - Last preventive maintenance
 - Interval and Frequency

The screenshot shows a software window titled "Preventive Maintenance Activities" with a close button (X) in the top right corner. The window is divided into several sections:

- Associate preventive maintenance code:** This section contains a table with three columns: "PM Code", "Typical Instrument", and "Description". The first row is highlighted in blue and contains the text "New PM", "*", and an empty space respectively. Below the table is a horizontal scrollbar.
- Buttons:** Below the table are four buttons: "Save", "New", "Delete", and "Typical Instrument".
- Default scheduling:** This section contains three dropdown menus: "Interval:" set to "Month(s)", "Frequency:" set to "1", and "Priority:" set to "High". There is also a checkbox labeled "Calibration required" which is currently unchecked.
- Estimated maintenance time:** This section contains two time input fields: "Down time:" and "Repair time:", each with a spinner and "[Hrs]" label.
- Associated preventive maintenance tasks:** This section contains a table with three columns: "Sequence", "Task", and "Attachment". The table is currently empty.
- Buttons:** At the bottom right of the window are three buttons: "Add", "Delete", and "Tasks...". At the very bottom are "Close" and "Help" buttons.

Smart Instrumentation Maintenance Module

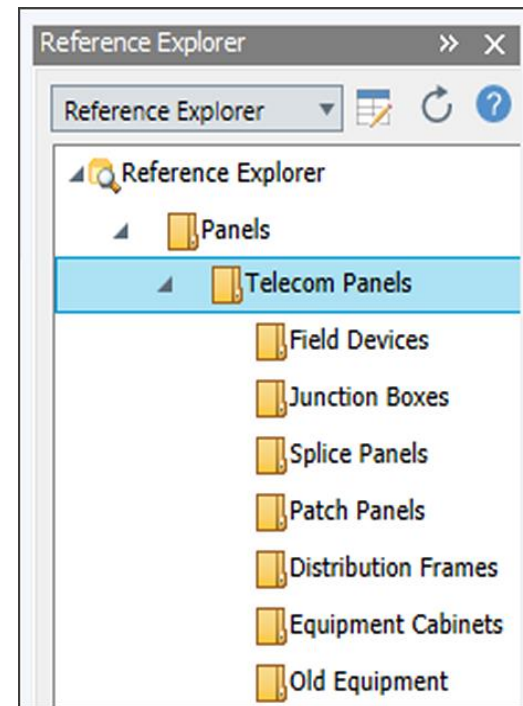
- Generate Maintenance Repair forms
- Generate Maintenance Work requests
- Generate Maintenance Reports:
 - Scheduled Preventive Maintenance Report
 - Summary of Failure Reason Report
 - Summary of Repair Action Report
 - Summary of Outcome Report
 - Repair Details Report
- Create Maintenance Event Records – Domain Explorer

Actions	Reports	Tables	SmartPlant	Tools
Open...				
Delete				
Extend				
Refresh				
Schedule Preventive Maintenance Event				
Create Work Request				
Create Repair Form				

Reports	Tables	SmartPlant	Tools	Window
Scheduled Preventive Maintenance				
Summary of Failure Reason				
Summary of Repair Action				
Summary of Outcome				
Repair Details				

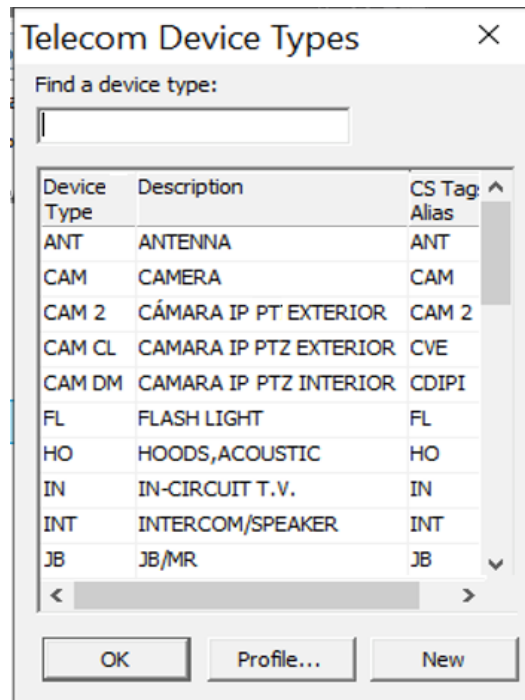
Smart Instrumentation Telecom Module

- The Telecom module is becoming more important as Instrument systems become more computerized and relying on networking communications
- Typical Telecom Equipment :
 - Field equipment (intercoms, telephones)
 - Public announcement (speakers and amplifiers)
 - Wiring (coax, fiber optic and network cables)
 - Network equipment (hubs, switches and routers)
 - Security equipment (cameras and access monitors)
 - HMI Equipment (monitors. consoles and handsets)



Smart Instrumentation Telecom Module

- Typical Telecom Activities:
 - Define Telecon Naming Conventions
 - Create Reference Telecom Equipment
 - Define Telecom Device types and Profiles
 - Create Define Telecom Device Spec forms
 - Build Telecom Instrument Index
 - Define Telecom Cable types
 - Do Interconnection Wiring
 - Generate Telecom Reports



Smart Instrumentation Import Module

- Activities for Importing Data into Smart Instrumentation:
 - Define an Import Source File or Database
 - Create a Link Group - If data is from several sources
 - Create an Import Link to the target table or module
 - Define Import Link Properties
 - Map Source and Target Fields
 - Use Comparison Options
 - Import Data into Smart Instrumentation

The screenshot shows the 'Link Definitions' dialog box. It has a title bar with a close button. The 'Link' field contains 'DDPTAGIMPORTCOMPONENT1'. Under 'Import method', 'Single table' is selected. The 'Name of module or table' dropdown shows 'COMPONENT'. The 'Source' section includes 'Database type' (ODBC), 'ODBC profile' (Excel Files=Microsoft Excel Driver (*.xls)), 'User name' (empty), 'Password' (empty), and 'File name and path' (U:\Reliance\SPINDTA DDP Export Files\DDPTAGI). There are 'Browse...' and 'View...' buttons next to the file path. At the bottom, there is a 'Save as new link' checkbox and 'Apply', 'Close', and 'Help' buttons.

Smart Instrumentation Import Module

- Recommend exporting data from Smart Instrumentation then modify externally and Import back in for **Existing Tags**
- Minimum data for importing **New Tags** from Excel:
 - Tag Number, Instrument Type, Instrument Type Desc., Process Function, and Tag Category ID.
 - If importing to multiple units, then include the Plant Name, Area Name, and Unit Name or Unit No.
 - If the Tag Number has a loop, then include the Loop Name and the Loop Measure Variable.
 - If the Tag Category ID is not included, all tags will be imported as Conventional Tags.

	A	B	C	D
1	TAG_NUMBER	INSTR_TYPE	INSTRUMENT_TYPE_DESC	PROCESS_FUNC
3	310-FT-0286	FT	Flow, Transmitter, Diff Pressure	1
4	310-FT-0287	FT	Flow, Transmitter, Diff Pressure	1
5	310-FT-1036	FT	Flow, Transmitter, Magnetic	1
6	310-FE-1083	FE	Flow, Element, Orifice Plate	1
7	310-FT-1083	FT	Flow, Transmitter, Diff Pressure	1
8	310-FE-1084	FE	Flow, Element, Orifice Plate	1
9	310-FT-1084	FT	Flow, Transmitter, Diff Pressure	1
10	310-FT-2036	FT	Flow, Transmitter, Magnetic	1
11	310-FE-2083	FE	Flow, Element, Orifice Plate	1
12	310-FT-2083	FT	Flow, Transmitter, Diff Pressure	1
13	310-FE-2084	FE	Flow, Element, Orifice Plate	1
14	310-FT-2084	FT	Flow, Transmitter, Diff Pressure	1
15	310-FE-3084	FE	Flow, Element, Orifice Plate	1
16	310-FT-3084	FT	Flow, Transmitter, Diff Pressure	1
17	310-FI-9002	FI	Flow, Rotameter	1
18	310-FO-9027	FO	Flow, Orifice, Restriction	1
19	310-FO-9028	FO	Flow, Orifice, Restriction	1
20	310-FO-9101	FO	Flow, Orifice, Restriction	1
21	310-FO-9103	FO	Flow, Orifice, Restriction	1
22	310-FI-9135	FI	Flow, Rotameter	1
23	310-FI-9136	FI	Flow, Rotameter	1
24	310-FO-9201	FO	Flow, Orifice, Restriction	1
25	310-FO-9203	FO	Flow, Orifice, Restriction	1
26	310-FI-9235	FI	Flow, Rotameter	1
27	310-FI-9236	FI	Flow, Rotameter	1
28	310-XV-0042A	XV	On/Off Valve	6
29	310-XY-0042A	XY	Solenoid Valve	6
30	310-XZSC-0042A	XZSC	Position Switch, Close	0
31	310-XZSO-0042A	XZSO	Position Switch, Open	0
32	310-XV-0042B	XV	On/Off Valve	6
33	310-XY-0042B	XY	Solenoid Valve	6
34	310-XZSC-0042B	XZSC	Position Switch, Close	0

QUESTIONS?



“Use it or lose it”

~ Jimmy Connors