

New Industrial Practice Form Data Structure

Gerald Barta

Email: gbarta@comcast.net

Datasheet Development Experience

First Generation Forms

- 1984-1985, 25 forms based upon Lotus123
- 1989-2008, 70+ forms for ISA SP20, **plus database schema**
- 1994-1996, 90+ forms for Bechtel application based on ISA schema

Second Generation Forms

- 2002-2004, 70 + forms for Bechtel (INtools 6.0)
- 2006-2007, 70 forms for ExxonMobil SEED (INtools 7.0)
- 2006, 4 Complex analyzer forms for Chevron SEED (INtools 7.75)

Third Generation Industrial Practice SPI2007+ forms

- 2007-2008, 94 forms for Intergraph SPI2007+

Data Column Usage Differences Between Original INtools forms and pending new Integrated Industrial Practice forms

Usage Description	Difference
Number Instrument Forms	+ 21
Unique pd columns	+ 90
Unique spec_udf_c* (text data type)	+ 520
Unique spec_udf_n* (numeric data type SPI2007)	+ 248
Total unique columns	+ 852
Unique Dropdown List	+ 3,260

GENERAL					LINE DATA				
1	Tag Number	SEE LIST[FLF444 E]			56	Line Number	Sample Stream 1		
2	P & ID Number	PID 4568			57	Inlet Line Size	2 in		
3	Equipment	CT1000			58	Outlet Line Size	in		
4	Service				59	Pipe Standard	ANSI	Pipe Spec	A1A
5	Location	FIELD			60	Line schedule	40S		
6	Area Classification	Class	Division/Zone		61	Material, Pipe	316 S.S.		
7		Group	Temp Class		62	Pipe Orientation / Flow Direction			
8	Certification Organization	*			63	Material, Insulation			
9	Instrument Function	SEE LIST			64	Insulation thickness			
10					65				
PROCESS CONDITIONS									
11	Case				66	Fluid Name			
12	Fluid State				67	Fluid Service			
13	Fluid Phase	Liquid			68	Corrosive Constituents			
14	Properties at Flow Conditions	@ Min Flow	@ Norm Flow	@ Max Flow	Units	69	Corrosive		
15	Flow				kg/h	70	Erosive		
16	Upstream Pressure				kPa gage	71	Toxic		
17	Temperature				°C	72	Build-up Tendency		
18	Viscosity				cP ---				
19	Velocity				m/s				
20	Density				kg/m³ -----				
21	Compressibility	NA	NA	NA	-----				
22	Specific Heats Ratio	NA	NA	NA	-----				
23	Vapor Pressure				kPa absolute				
24	Mass Fraction Vapor (% Flashing)				-----				
25	Critical Pressure	kPa absolute		73	Critical Temperature				
26	Molecular Weight			74	Limits on DP across flowmeter	mmH2O 4°C			
27	Design Pressure, Minimum (Vacuum)	kPa gage		75	Design Pressure, Maximum	kPa gage			
28	Design Temperature, Minimum	°C	Max	°C	76	Ambient Temperature, Minimum	°C	Max	°C
29	Base Pressure	kPa		77	Base Temperature	°C			
30	Density at Base Condition	kg/m³		78	Critical Exposure Temperature				
31	Compressibility at Base Conditions	NA		79					
32	Solids Quantity	g	Size	mm	80	Solid Component			
33	Full Scale Flow	kg/h		81	Differential Press @ Full Scale				
METERING ELEMENT					TRANSMITTER continued				
34	Sensor Housing/Containment Type				77	Material, enclosure			
35	End Connection Type				77	Damping	SEE LIST		
36	End Connection Size, Inlet		Rating		77	Digital Protocol	SEE LIST		
37	Flange Face Finish				78	Loop Power Supply			
38	Material, Wetted Body				79	Line Power Supply			
39	Material, Housing				80	Signal Isolation			
40	Material, Flange				81	Mounting Type			
41	Flow Tube Type				82	Failure Mode			
42	Flow Tube Pressure Rating				83	Output Characteristic	SEE LIST		
43	Material, Tube				84				
44					85				
CONNECTION HEAD					RANGE DATA				
46	Enclosure Type				87	Device Sensing Range Limits	SEE LIST	SEE LIST	SEE LIST
47	Type of Protection				88	Calibrated Range	SEE LIST	SEE LIST	SEE LIST
48	Enclosure Rating				89	Analog Output Signal Range	SEE LIST	SEE LIST	SEE LIST
49	Electrical Connection Type				90	Operator Console Display Range	SEE LIST	SEE LIST	SEE LIST
50	Material, enclosure				91				
TRANSMITTER					92	Rated Accuracy	SEE LIST	SEE LIST	
52	Enclosure Type				93	Reqd Total Accuracy	SEE LIST	SEE LIST	
53	Type of Protection				94	Low Flow Cut Off	SEE LIST	SEE LIST	
54	Enclosure Rating				95				
55	Electrical Connection Type				96				
					INSTRUMENT SPECIFICATION Coriolis				
					Plant: SPT				
					Area: F - SOP2 CE				
					Unit: FL - PGC/Caustuc/Dryers				
					Sheet 1 of 3				
No.	By	Chk	App	Date	Revision	Code: 2721	Doc. No.: FLF444 E-SP	Rev.:	

(HART) CONFIGURATION DATA

1	Primary Variable PV		9	Secondary Variable SV			
2	Tertiary Variable TV		10	Quarterly Variable QV			
3	Scaled Variable	To	SEE LIST	11	Low Flow Cut Off	SEE LIST	NA
4	Process Alert 1 Low	High	NA	12	Process Alert 1 Variable		
5	Process Alert 2 Low	High		13	Process Alert 2 Variable		
6	Local Display Scale	To		14	Device Temperature Units		
7	Device Characterization			15	Device Description Rev No		
8				16			

Notes:

						INSTRUMENT SPECIFICATION Coriolis		
No.	By	Chk	App	Date	Revision	Code: 2721	Doc. No.: FLF444 E-SP	Rev.:

Tag Number	Meas Range LRL Calibrated LRV Output Signal LRV Console Display LRV Low Flow Cut Off	Meas Range URL Calibrated URV Output Signal URV Console Display URV Low Flow Cut Off Uom	Meas Range Uom Calibrated Uom Output Signal Uom Console Display Uom Damping	Rated Accuracy Rated Accuracy Uom Reqd Total Accuracy Reqd Accuracy Uom Output Characteristic
FLD444 T density transmitter HART	0 50 50	100 80 80 NA	lb/ft3 lb/ft3 NA lb/ft3 2-36	0.1 % span 0.2 % span
FLF444 E mass flowmeter NA		NA	NA NA NA NA	NA NA
FLF444 T mass flow transmitter HART	0 0 4 0 25	1000 500 20 500 lb/h	lb/h lb/h mA lb/h 2-36	% span 1.0 % span
FLF444 T_A volumetric flow xmtr HART	0 0 0	300 150 150 NA	ft3/hr ft3/hr NA ft3/h 2-36	0.15 % reading 1.0 % reading
FLT444 T temperature transmitter HART	-100 -50 -50	800 300 300 NA	F F NA F 2-36	0.1 % span 1.0 % span

				INSTRUMENT SPECIFICATION Multiple Items List		
				Coriolis Calibration		
						Sheet 3 of 3
No.	By	Date	Description	Code: 2721	Dwg. No.:	FLF444 E-SP
						Rev.:

GENERAL					LINE DATA									
1	Tag Number	SEE LIST[TYV261 V]			56	Line Number	XX-UT1234							
2	P & ID Number	2551-8110-25-80UL-0002			57	Inlet Line Size	3 in							
3	Equipment	SP002			58	Outlet Line Size	3 in							
4	Service	Control Valve form test			59	Pipe Standard	ANSI	Pipe Spec	6E57					
5	Location	FIELD			60	Line schedule	40S							
6	Area Classification	Class	II	Division/Zone	2	61	Material, Pipe	316 S.S.						
7		Group	IIA/IIB	Temp Class	T2-300 C	62	Pipe Orientation / Flow Direction	horizontal left-to-right						
8	Certification Organization	ATEX			63	Material, Insulation	calcium silicate							
9	Instrument Type	SEE LIST			64	Insulation thickness	25 mm							
10	High Performance Control Valve	severe service			65	NA	NA							
11	NA	NA												
PROCESS CONDITIONS														
12	Case	Turndown			67	Fluid Name	AIR							
13	Fluid State	Single phase			68	Fluid Service	Air							
14	Fluid Phase	Gas/Vapor			69	Corrosive Constituents								
15	Properties at Flow Conditions	@ Min Flow	@ Norm Flow	@ Max Flow	Units	70	Corrosive	No						
16	Flow	1000	6000	7000	kg/h	71	Erosive	No						
17	Upstream Pressure	222	200	188	kPa gage	72	Toxic	No						
18	Pressure Drop	100	80	50	kPa									
19	Temperature	66	55	44	°C									
20	Viscosity	0.0196	0.0191	0.0186	cP									
21	Density	3.32	3.199	3.179	kg/m³									
22	Compressibility	1.	1.	1.	-----									
23	Specific Heats Ratio	1.396	1.396	1.396	-----									
24	Vapor Pressure	NA	NA	NA										
25	Mass Fraction Vapor	1.0	1.0	1.0	-----	Standard for Calculation								
26	Calculated Cv	24.1	160	224	-----	IEC 60534-2-1								
27	Travel	15	60	70	%	-----								
28	Allowable Noise Level	Noise Level	76.8	76.1	67.1	dBa	FISHER FIRSTVUE							
29	Critical Pressure	kPa absolute			73	Critical Temperature	°C							
30	Molecular Weight	28.96			74	Max Shut-off Press Differential	kPa							
31	Design Pressure, Minimum (Vacuum)	-5	kPa gage	75	Design Pressure, Maximum	10000	kPa gage							
32	Design Temperature, Minimum	-40	°C	Max	85	°C	76	Ambient Design Temperature, Min	-40	°C	Max	90	°C	
33	Base Pressure	NA			77	Base Temperature	NA							
34	Density at Base Condition	NA			78	Critical Exposure Temperature	-20 °C							
35	Compressibility at Base Conditions	1			79	NA	NA							
BODY & TRIM														
36	Body Type	split			80	Inherent Flow Characteristic	equal percentage							
37	Bonnet Type	bolted			81	Seat Ring Type	threaded in							
38	Body Size	2 in			82	Flow Direction	bottom-to-top							
38	End Connection Type	flanged, RF			83	Flow Force Tends To	flow-to-open							
40	Flange Facing Finish	ANSI B 16.5			84	Lubricator	tap and plug only							
41	End Connection Size, Inlet	2 in	Rating	cl 300	85	Isolation Valve	NA							
42	End Connection Size, Outlet	2 in	Rating	cl 300	86	Port / Orifice Diameter	75.7 mm							
43	Face-to-Face Standard	ISA S75.15			87	Rated Travel / Rotation	12.5 mm							
44	Stem/Shaft Seal/Packing Type	pressure energized			88	Shaft Blowout Prevention	NA							
45	Cooling Fins	radiating fins			89	Material, Bushing/Bearing	alloy 20							
46	Material, Body and Bonnet	316L SST			90	Material, Cage	416 SST							
47	Material, Bolting, Body and Bonnet	SA-193-B16/SA-194-7			91	Material, Closure Member	316L SST							
48	Material, Bolting, Packing Gland	alloy 20			92	Material, Guide or Retainer	410 SST							
49	Material, Body Gasket	316 SST/Grafoil			93	Material, Seal Ring	316 SST/CoCr-A							
50	Material, Packing	asbestos-free-packing			94	Material, Seat	316 SST							
51	Packing Gland Bolt Torque	80	N.m		95	Material, Stem/Shaft	hastelloy B							
52	Closure member Type	eccentric rotary plug			96	Hard Facing/Coating	stellite guide area							
53	Trim Type	soft seated			97	Rated Flow Coefficient Cv	500							
54	Balanced / Unbalanced Trim	balanced			98	Valve Coefficients	Fd	0.9	Xt	0.8	FI	0.8	Sigma mr	0.9
55	Closure Member Guides	stem guided			99	NA	NA							
					INSTRUMENT SPECIFICATION									
					Valve, Control									
					Plant: SPT									
					Area: U - SPT UT									
					Unit: Typical Loops									
					Sheet 1 of 3									
No.	By	Chk	App	Date	Revision	Code: 261	Doc. No.: TYV261 V-SP			Rev.:				

ACTUATOR					PURCHASE									
1	Actuator Type	diaphragm			53	Supplier	Local vendor							
2	Actuator Acting Style	direct Fluid-to-Retract			54	Purchase Order Number								
3	Failure Action	Close			55	Requisition Number								
4	Actuator nominal size	657	Effective Area	100 mm ²	56	Item Number	3							
5	Bench Set	3	To 15	psi gage	57	Manufacturer	SEE LIST							
6	Min Available Air Supply, Gage	800 psi	Max	1200 psi	58	Model	SEE LIST							
7	Min Required Air Supply	600	psi	gage	59	Serial Number	12345678901234567890							
8	Max Allowable Air Supply	1500	psi	gage	60	NA	NA							
9	Handwheel Type	declutchable			(HART) POSITIONER CONFIGURATION DATA									
10	Handwheel Mounting	yoke mounted			61	Primary Variable PV	analog input							
11	Travel Stop	close and open stop			63	Secondary Variable SV	device temperature							
12	Material, Casing/Cylinder	carbon steel			63	Tertiary Variable TV	scaled variable							
13	Material, Diaphragm / O ring	buna-N			64	Quarterly Variable QV	NA							
14	Material, Spring	cs, rust-resistant coating			65	Scaled Variable	0	To 100	%					
15	Manufacturer	VALTEK			66	Low Cut Off	NA	%						
16	Model	*			67	Device Alert 1 Variable	travel							
17	NA	NA			68	Device Alert 1 Low	3.6	High	22.5 mA					
POSITIONER / VALVE CONTROLLER					69	Device Alert 2 Variable	temperature							
18	Positioner Sensor Type	proximity sensor			70	Device Alert 2 Low	-10	High	50 °C					
19	Input Signal Range	4	To 20	mA	71	Local Display Scale	To NA							
20	Input / Output signal Action	SEE LIST			72	Device Temperature Units	°C							
21	Failure Mode	drive output low			73	Device Characterization	linear							
22	Mounting Position	SEE LIST			74	Diagnostic capabilities	advanced diagnostics							
23	Cam Characteristic	characterized			75	Device Description Rev No								
24	Enclosure Rating Standard		Rating	SEE LIST	76	NA	NA							
25	Type of Protection	SEE LIST			LIMIT SWITCHES									
26	Electrical Connection Type	SEE LIST			77	Position Sensor Type	mechanical micro switch							
27	Loop Power Supply	SEE LIST			78	Contacts Rating	.3	A	At Max 30 V dc					
28	Digital Protocol	SEE LIST			79	Contacts Arrangement	DPDT	Quantity	2					
29	Pressure Gauges	supply,output			80	Contacts Open Condition	abnormal condition							
30	By-pass Manifold	manifold with 3 gauges			81	Differential / Dead Band Type	fixed							
31	Material, Enclosure	SEE LIST			82	Load Type	non-inductive							
32	NA	NA			83	Diff / Dead Band Range-Limits	To	in						
AIR SET					84	Material, Contacts	gold plated							
33	Filter Type	air set			85	NA	NA							
34	Set Pressure	60	psi	gage	SOLENOID VALVE									
35	Pressure Gauges	output,supply			86	Body Type	3 way							
36	Tubing Size	3/8 in			87	Inlet Connection Size	3/8 in							
37	Material, Tubing , Fitting	316 SST			88	Coil Watt Rating	1.4	W						
38	Manufacturer	VALTEK			89	Coil Nominal Voltage Rating	24 V dc							
39	Model				90	Insulation Class	F							
PERFORMANCE					91	Manual Operator/Reset Type	free handle reset							
40	Leakage Class	ANSI IV (standard)			92	Type of Actuation	direct acting							
41	Valve Opening Travel Time	5	s	Overshoot %	93	Operation Style	normally closed							
42	Valve Closing Travel Time	1	s	Overshoot %	94	Pressure Port Orifice Size	3.3	mm						
43	Valve Travel Hysteresis	20	% Travel		95	Exhaust Port Orifice Size	5.6	mm						
44	Valve Travel Deadband	15	% Input signal		96	Material, Body	SEE LIST							
45	NA	NA			97									
OPTIONS / ACCESSORIES					POSITION TRANSMITTER									
46	Hydro Test Pressure	6000	kPa	gage	98	Sensor Type	proximity sensor							
47	Leakage Test	ANSI/FCI 70-2			99	Output signal Range	0	To 10	%					
48	Compliance Standard	NACE MR0175/ISO 15156			100	NA	NA							
49	Positive Material Identificaiton	NA			Notes:									
50	Volume Tank Size	NA												
51	Air Lock Valve Set Point	2000	kPa	gage										
52	NA	NA												
					INSTRUMENT SPECIFICATION Valve, Control Plant: SPT Area: U - SPT UT Unit: Typical Loops									
										Sheet 2 of 3				
										Code: 261 Doc. No.: TYV261 V-SP Rev.:				
No.	By	Chk	App	Date	Revision		Code: 261		Doc. No.: TYV261 V-SP		Rev.:			

Tag Number	Instrument Type Digital Protocol Type of Protection	Manufacturer Model Input / Output Action	Enclosure Rating Material, Enclosure Electrical Connection	Mounting Position Loop Power Supply
TYF261 XA	solenoid valve NA explosion proof	ASCO HEHB8308A40 NC	7 stainless steel 1/2-14 NPT	control module 24 V dc
TYF261 Y	positioner HART non-incendive	VALTEK Mark One direct	4X low-copper aluminum 1/2-14 NPT	yoke 10 to 30 V dc
TYV261 V	rotary mtn control valve NA NA	VALTEK MARK EIGHT UNBALANCE NA	NA NA NA	horizontal left-to-right NA

				INSTRUMENT SPECIFICATION Multiple Items List Valve, Control Manufacturer and Model		
						Sheet 3 of 3
No.	By	Date	Description	Code: 261	Dwg. No.: TYV261 V-SP	Rev.:

GENERAL					LINE DATA								
1	Tag Number	SEE LIST[TYF272 E]			54	Line Number	XX-UT1234						
2	P & ID Number	*			55	Inlet Line Size	3 in						
3	Equipment	*			56	Pipe Standard	ANSI	Pipe Spec	6E57				
4	Service				57	Line schedule	40S						
5	Location	FIELD			58	Material, Pipe	316 S.S.						
6	Area Classification	Class	II	Division/Zone	1	59	Pipe Orientation / Flow Direction						
7		Group	IIB+H2	Temp Class	T5-100 C	60	Material, Insulation	Xonotlite					
8	Certification Organization	*			61	Insulation thickness	mm						
9	Instrument Type	coriolis mass flowmeter			62	NA	NA						
10	NA	NA											
PROCESS CONDITIONS													
11	Case				64	Fluid Name	AIR						
12	Fluid State	Single phase			65	Fluid Service							
13	Fluid Phase	Gas/Vapor			66	Corrosive Constituents							
14	Properties at Flow Conditions	@ Min Flow	@ Norm Flow	@ Max Flow	Units	67	Corrosive	No					
15	Flow	1000	6000	7000	kg/h	68	Erosive	No					
16	Upstream Pressure	222	200	188	kPa gage	69	Toxic	No					
17	Temperature	66	55	44	°C	70	Build-up Tendency						
18	Viscosity	0.0196	0.0191	0.0186	cP								
19	Velocity	17.5	109	128	m/s								
20	Density	3.32	3.199	3.179	kg/m³								
21	Compressibility	1.	1.	1.	-----								
22	Specific Heats Ratio	1.396	1.396	1.396	-----								
23	Vapor Pressure	NA	NA	NA	-----								
24	Mass Fraction Vapor												
25	Critical Pressure	kPa absolute			71	Critical Temperature	°C						
26	Molecular Weight	28.96			72	Limits on DP across flowmeter	mmH2O 4°C						
27	Design Pressure, Minimum (Vacuum)	-5	kPa	gage	73	Design Pressure, Maximum	10000	kPa	gage				
28	Design Temperature, Minimum	-40	°C	Max	85	°C	74	Design Ambient Temperature, Min	-40	°C	Max	90	°C
29	Base Pressure	NA			75	Base Temperature	NA						
30	Density at Base Condition				76	Critical Exposure Temperature	°C						
31	Compressibility at Base Conditions				77	NA	NA						
32	Solids Quantity	g	Size	mm	78	Solid Component							
33	Full Scale Flow	kg/h			79	Press Drop / Loss @ Full Scale	psi						
METERING ELEMENT					TRANSMITTER continued								
34	Sensor Housing/Containment Type	in-line			80	Digital Protocol	HART						
35	End Connection Type	flanged, weld neck, RF			81	Loop Power Supply	12-30 V(dc)						
36	End Connection Size	3 in	Rating	cl 300	82	Line Power Supply	NA						
37	Flange Face Finish	ANSI B 16.5			83	Signal Isolation	fully isolated						
38	Material, Housing	304 SST			84	Failure Mode	drive output low						
39	Material, Flange / Fitting	316L SST			85	Output Characteristic	0						
40	Flow Tube Type	straight single tube			86	Material, enclosure	SEE LIST						
41	Flow Tube Pressure Rating	psi			87	NA	NA						
42	Material, Flow Tube / Sensor	316L SST			OPTIONS								
43	NA	NA			88	Compliance Standard	NACE MR0175/ISO 15156						
CONNECTION HEAD					89	Calibration Report	calibration report						
44	Configuration Type	junction box			90	Non-destructive Examination	hydrostatic test						
45	Type of Protection	non-incendive			91	Integral Meter Scale	0	To	100	%			
46	Enclosure Rating	4X			92	Rupture Disc Pressure Rating	psi						
47	Electrical Connection Type	1/2-14 NPT			93	Secondary Containment Rating	psi						
48	Material, enclosure	polyurethane painted aluminum			94	Custody Transfer Class							
TRANSMITTER					95	Custody Transfer Standard							
49	Mounting Type	2 in pipe bracket			96	Cable Type							
50	Type of Protection	SEE LIST			97	Cable Length							
51	Enclosure Rating Standard	Rating			98	Material, Mounting Hardware							
52	Electrical Connection Type	SEE LIST			99	Material, Secondary Containment	NA						
53	Damping				100								
					INSTRUMENT SPECIFICATION								
					Xmit/Sens, Flow, Coriolis Mass								
					Plant: SPT								
					Area: U - SPT UT								
					Unit: Typical Loops								
					Sheet 1 of 3								
No.	By	Chk	App	Date	Revision	Code: 272	Doc. No.: TYF272 E-SP	Rev.:					

Tag Number	Type of Protection	Enclosure Rating	Material, enclosure	Electrical Connection
Manufacturer Model	Calibrated Range LRV Frequency Range LRV Operator Display LRV	Calibrated Range URV Frequency Range URV Operator Display URV	Calibrated Range Units Frequency Range Units Operator Display Units	
TYD272 T * *	NA 0	NA 1000	NA kg/m ³ NA	NA
TYF272 E * *	hermitically sealed	4X	polyetherimide foam NA	1/2-14 NPT
TYF272 T EMERSON 3051	flameproof 0 0	IP 65 3000 1000	polyurethane painted aluminum kg/h NA kg/h	3/4 in NPT
TYF272 T1 * *	NA 0	NA 5000	NA ft ³ /min @b NA	NA
TYT272 T * *	NA -20	NA 100	NA °C NA	NA

				INSTRUMENT SPECIFICATION Multiple Items List Xmit/Sens, Flow, Coriolis Mass Range and Calibration		
No.	By	Date	Description	Code: 272	Dwg. No.:	TYF272 E-SP
					Sheet 3	of 3
					Rev.:	