37 Reasons why smart switches of United Electric Controls (UE) makes more sense for plant upgrades

Pressure / Diff. Pressure

Sr. no.	Description	Mechanical switch	ONE - smart switch (UE)	Smart Transmitter
1	Solid state design	No	Yes	Yes
2	Sensing element	Bellows, Diaphragm or piston	Welded Diaphragm	Welded Diaphragm
3	Diaphragm material	Various	316L	316L
4	Wetted parts	Various	SS316	SS316
5	Sensor	Moving mechanism	Piezoresistive	Piezoresistive
6	Process connection	Various	Bottom	Bottom
7	Process connection size	Various	1/2" NPTF single	1/2"NPTF single
8	Weatherproof class	IP66	IP66	IP66
9	Intrinsically safe for Zone 0	Yes	Yes	Yes
10	Dampening time	Not applicable	adjustable	adjustable
11	SIL rating	Not as on now	SIL1	SIL1
12	Pressure / Diff. Pressure / Temperature	Yes	Yes	Yes
13	Remote Seal	Yes	Yes	Yes
14	Local Display	Not applicable	Large LCD display	Relatively small
15	Diagnostics	Not applicable	Clear message on display	Error codes only
16	Plugged port indication	Not applicable	Yes	Not available
17	Minimum and Maximum process values	Not stored	Stored	Not stored
18	NO/NC contacts from the field	Yes	Yes	N.A
19	Response time	4 msec	60 msec (Full switching)	100 msec / 145 msec
20	DCS / PLC scan time	-	-	250 msec
20	Set point Range Adjustment	As specified	0-100% on line.	Not applicable
21	Dead Band adjustment	Limited as specified	0-100% on line.	Not applicable
22	Set point adjustable in field	On source	Yes online	No (Thro' host only)
23	Dead band adjustable in field	Yes (optional)	Yes online	Dead band not applicable
24	Continuous health status on local display	No	Yes	No
25	Programming	No	Front key pad	Hand held communicator
26	Auto / Manual reset	No	User selectable	Manual reset not possible.
27	Multiple switching	Yes	Yes	Thro' host
28	Min. / Max. Process value	Not stored	Stored on local display	Not stored
	Temperature Switching (all above features of ONE series remain same except plugged port)			
29	Sensing element	Filled system	RTD input pt100, 4-wire	Thermocouple / RTD
30	Max. Temperature.	370 Deg.C	538 Deg.C	sensor dependent
	Plant upgrades replacing mechanical switches !			
31	**Modifications in the system**	-	Drop in replacement to old mechanical switch !	Replacing Digitial input cards with costlier analog input cards
		-	-	Replacement of control cables with analog cables
		-	-	Probable re-routing of the cable.
32	maximum input channels per card	-	32 channel DI-card	16 channel AI card
33	Man hours	-	Few minutes	Higher man hours
34	Instrument Price comparison (Approx.)	-	X	1.5X
35	Cost of input card in the PLC / DCS	-	-	1.5X
36	cost of modifications as per above	-	-	> 2X
37	**Cost of ownership per tag**	-	X	> 5X

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FAQ's – smart ONE Series pressure / temp. switch from UE

How do I wire the One Series 2-Wire electronic switch?

Power to and switched output from the One Series 2-Wire is provided over the same wire pair. Only two wires are required for both power and output. The electronic switch derives its operating power from the load circuit it is driving (PLC or DCS discrete input), much like a proximity switch. Model 2W2D draws about 400 µA from the input when the internal switch is open and a maximum of 40 mA when the switch closes. Model 2W3A draws about 1 mA from the input when the internal switch is open and a maximum of 100 mA when the switch closes.

Is the One Series 2-Wire a "loop powered" device?

Models 2W2D and 2W3A are discrete input powered devices. They utilize a small amount of leakage current derived from the discrete input of a PLC or DCS. Model 2W**LP** is, in fact, a true loop-powered version of the One Series. This model connects to the analog input of a PLC or DCS, where a small amount of current is derived to provide power and return a 4-20 mA proportional signal.

How does it work?

The One Series 2-Wire requires very little current to operate, down in the micro-amp range. This enables the electronics to derive power from the residual current of a typical PLC digital input or other load (e.g., a relay coil or DCS input) without triggering the input circuit. When the switch contact closes, only then does the input detect a closed switch condition. By virtue of its extremely low power requirement, the One Series 2-Wire is able to take advantage the on-off input thresholds associated with discrete input PLCs and DCSs.

Can I use the One Series to switch AC voltage loads?

Yes. Model 2W3A is designed to work with 115 VAC discrete PLC or DCS inputs. Just like the 2W2D (24 VDC) model, the 2W3A gets its power from the 115 VAC input and provides a switch to the same input over a 2 wire connection. This model can sink or source up to 100 mA. The input voltage range for One Series model 2W3A is 90-

130 VAC or VDC, so it can operate in DC circuits in addition to AC circuits. Model 4W3A is a high-capacity version of the 2W3A, but requires an external power source of 90-130 VAC. The integral solid-state relay can handle 24-280 VAC @ 10 A!

What happens when the set point is reached and the switch output changes state?

This depends on how the One Series was programmed during installation. The One Series can be set in a 2-state (on-off) or a 3-state (on-pulse-off) mode. In a 2-state mode, the One Series internal switch will change from normally closed (on) to open (off) at set point. This is the default mode when the One Series is shipped. The switch action can be reversed so that the change is from normally open to closed at set point. This normally open mode is not recommended because the One Series is a fail-safe open design, so there would be no difference between normally open and One Series failure. In a 3-state mode, the One Series is normally closed to indicate that the switch is functioning properly and the set point has not been reached. At set point, rather than opening the switch, the One Series pulses the switch (on-off rapidly) to indicate a properly functioning switch that is alarming. If a failure occurs or a wire connection is broken, only then will the One Series switch open. It may be necessary to program the PLC to accept the One Series pulses and the ladder logic code is supplied in the One Series I&M.

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Will the One Series 2-Wire only work with PLCs?

While PLC applications are proving to be the most popular, the One Series 2W2D and 2W3A will work with many DCS or PC discrete inputs, interposing relays, solenoids, enunciator panels and other devices where a switch closure is providing an alarm signal. Care must be taken to avoid exceeding the maximum switch ratings when using loads other than the PLC or DCS discrete input.

Which applications provide the best fit for the One Series 2-Wire?

The One Series 2-Wire is intended for plant upgrade applications by replacing mechanical switches and analog transmitters with the latest digital switch technology, utilizing existing wiring and discrete input channels. In most cases, the One Series 2-Wire will be a direct, drop-in replacement for existing pressure and temperature instrumentation, providing a very easy and cost-effective means to upgrade field instrumentation within a plant.

Will the One Series 2-Wire fit into Intrinsically Safe (IS) applications? What about explosion proof applications?

Yes. By virtue of its extremely low power consumption, the One Series 2-Wire is approved for Class I, Division 1 Intrinsic Safety (IS)

applications when used with an appropriate IS barrier. In many applications, IS instruments satisfy the need for explosion proof environments when used with a barrier. The One Series 2-Wire does not incorporate an explosion proof enclosure or certification at this time. The same will be available in mid-2007.

Does UE provide an IS barrier for the One Series 2-Wire?

Yes. Product option M036 provides a transformer-isolated safety barrier designed specifically for the One Series 2-Wire (model 2W2D only) in the same shipping carton or from UE and its distributors using UE part number 62169-29. The barrier is also available directly from MTL (the manufacturer) and its distributors as part number MTL 5012S. Regardless of where the barrier is sourced, the list price is $198 (USD).

What happened to the bright red IAW→ LED from the front of the One Series?

The popular I Am Working (IAW→) self-diagnostics technology is included in the One Series 2-Wire, but is implemented differently. Due to power restrictions in Intrinsically Safe designs, the LED (light emitting diode) was replaced by a LCD (liquid crystal display) for local indication, which requires much less current. Additionally, the remote IAW→ signal is incorporated into the switched output using a pulsed pattern, providing switch and health validity and integrity information over the same 2 wires. No additional wiring is necessary. The One Series D1 and D2 models still include the red IAW→ LED.

What other features have been added to the One Series product line?

The One Series 2-Wire models include a large, easy-to-read LCD readout for display of the process variable, switch settings, health and process extremes values. Programming is accomplished with a 2-button keypad. New programmable features include Plugged Port Detection, Zero Offset and Span Adjust, Latching Output and Event Filtering. The 2WLP model adds field-scaling capability for the 4-20 mA output. The keypad incorporates a key sequence to enable saving programming changes, providing tamper resistance. The One Series 2-Wire sensors incorporate an all stainless steel and welded diaphragms for excellent media compatibility.

If I need a 4-20 mA output, can I get it with the One Series 2-Wire?

Yes. Model 2WLP provides a loop-powered transmitter version of the One Series. With a simple 2-wire connection to the analog input of a PLC or DCS, model 2WLP provides a field-scalable digital indicating 4-20 mA signal with 0.5% accuracy. Model 2WLP also incorporates an auxiliary solid-state relay that requires 2 additional wires, if used. Power for the transmitter and the switch is provided by the analog loop.

Can I use an external power supply with the One Series 2-Wire?

No. The One Series 2-Wire is intended for the input of a PLC or DCS where it derives its power and provides a switch. The One Series 4W3A model accepts 115 VAC as its power supply and provides a 24-280 VAC @ 10 A solid-state relay switch. This model requires a 4-wire connection.

How does the Plugged Port feature work?

The One Series 2-Wire can be programmed to sense media fluctuations over a period of time. If these “normal” media fluctuations cease in the time allotted, it is assumed that the sensor is clogged and unable to sense any pressure changes. The local LCD display will read “PLUG” and the switched output will open, indicating this fault condition remotely.

Can the One Series be calibrated in the field?

Yes. Adjustments for Offset and Span are included in the Advanced Features section of the software. These commands provide ±10% adjustability over of the sensor's range. When used, the LCD display shows an "OFFSET" icon as a warning that significant pressure may be present even though the display is reading zero. Entering zeros in the Offset and Span commands returns the unit to factory settings and calibration.

Is the 4-20 mA output on model 2WLP and 8W2D field scalable?

Yes. There are two independent commands used to scale the 4-20 mA output in the field - 4mA and 20mA. By entering values using the calibrated units of measure, the 4 mA portion of the signal can be adjusted over a range of -3% to 25%. The 20 mA portion of the signal can be adjusted over a range of 50 to 110%. Scaling the 4-20 mA signal to cover a smaller (<100%) portion of the sensor's range does not increase the accuracy of the 4-20 mA signal.