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Commercial grade & mild environment nuclear pressure transmitters

July 2021

Agenda

Pressure Transmitter Comparison
Digital and Analog offering

Supplier	Emerson Rosemount®	Ultra ENERGY	Emerson Rosemount®	Ultra ENERGY
Model	3051C	N-IA Series (Foxboro IA/IG/IDP10S “S Series”)	1151	DTC3®

Digital electronics: HART® 4-20 mA
SIL-2 / SIL-3

Analog electronics: 4-20 mA
and 10-50 mA

Pressure Transmitter Comparison
Quick comparison

Supplier	Emerson Rosemount®	Ultra ENERGY	Emerson Rosemount®	Ultra ENERGY
Model	**3051C**	**N-IA Series (Foxboro IA/IG/IDP10S "S Series")**	**1151**	**DTC3®**
	Digital 4-20 mA HART "best in class" Introduced in 1988	Digital 4-20 mA HART "best in class" Introduced as I/A 1995, S Series in 2014.	Analog 4-20 mA Introduced in 1969 - Discontinued	Analog 4-20 mA Introduced in 2020
Sensor technology	The Rosemount 3051C utilizes Rosemount Inc. capacitance sensor technology for DP and GP measurements. Piezoresistive sensor technology is utilized in the 3051C AP measurements.	Piezoresistive micro machined strain gauge.	Capacitance cell.	Ultra stable sputtered thin-film strain gauge
Sensor geometry	Coplanar™ and Inline (3051T)	Biplanar and Direct connect	Traditional	Traditional
Flanges/manifolds	Coplanar or traditional	Traditional	Traditional	Traditional
Qualified According to	• SIL2/ SIL3 certified to IEC 61508 by an independent 3rd party	Class 1E Qualified per • IEEE Std 323™- 1974/1983/2003 • IEEE Std 344™-1975/1987/2004 Documented in Ultra report: 3077-I00715-003 • SIL2/ SIL3 certified to IEC 61508 by an independent 3rd party	N/A	N/A
Quality	Commercial grade	Nuclear grade: Per 10CFR50 Appendix B, 10CFR21, NQA-1, and ISO 9001:2008; chemical and physical certification of pressure retaining parts.	Commercial grade	Commercial grade
Reference Accuracy	Range 5 ±0.065% of span; Ranges 2–4 ± 0.04% of span; Range 1 ± 0.10% of span; Range 0 (CD) ± 0.10% of span. Installed total performance of ± 0.14% of span	±0.050% of reading digital ±0.060% of reading analog (Includes Linearity, Hysteresis, and Repeatability) Accuracy has been improved to the best level on the market with accuracy expressed as a percentage of reading.	Output Codes E, G, L, and M ±0.2% of calibrated span for Model 1151DP Ranges 3 through5. All other ranges and transmitters, ±0.25% of calibrated span.	±0.2% Span (includes combined effects of linearity, hysteresis + deadband, and settability + repeatability)
Rangedown	150 to 1	400 to 1	6 to 1	6 to 1
Calibration	Static factory trim and two-point calibration	Dynamic FoxCal™ technology 11 calibration curves in 1 transmitter with 10 times more data stored permanently in the sensor memory allows the pressure transmitter to transition automatically to the best calibration curve based on the transmitter's input.	Static factory trim and two-point calibration	Static factory trim and two-point calibration
Measurement Range	Up to 2000psi (137,89 bar) Differential, Up to 2000psig (137,89 bar) Gage, Up to 4000psia (275,79 bar) Absolute	Up to 3000 psi (207 bar) Differential, Up to 6000 psi (414 bar) Gauge, Up to 5000 psi (344 bar) Absolute.	Up to 1000 psi (69 bar) Differential, Up to 6000 psi (413.6 bar) Gauge, Up to 1000 psi (69 bar) Absolute	Up to 2770 inH20 100 psi (6.9 bar) Differential, Up to 6000 psi (414 bar) Gauge and Absolute.
Electrical Connections	½–14 NPT, G½, and M20 x 1.5 conduit.	1/2 NPT, M20, QDC, Souriau 8N45	1/2-14 NPT conduit with screw terminals	1/2-14 NPT conduit with screw terminals standard. Optional connector: QDC, Seal gland, Souriau/SAIB 8N45 Connector, Harting Connector
Warranty	Up to 5-year limited warranty	Up to 7-year limited warranty	N/A	Up to 2-year limited warranty

Pressure Transmitter Comparison
Summary

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Model	3051C	N-IA Series (Foxboro IA/IG/IDP10S “S Series”)	1151	DTC3®

- Commercial grade transmitter, wide range of configurations available to suit broad process and industrial markets. Product data sheet is 130 pages. Can be complex to configure.
- Pressure ranges are different than legacy 1150 series.
- Engineering change costs to convert.
- 150:1 Rangedown.
- Gauge pressure range: 2000 psi max.

- Simplified offering of common configurations for nuclear power.
- IEEE Class 1 E Seismic qualified.
- Nuclear grade quality.
- Unmatched 400:1 Rangedown with FoxCal provides 11 dynamic calibrations allows high rangedown without sacrificing accuracy.
- Saves money by reducing inventory; one range covers many applications; classified and non-classified for mild environments.
- Supply chain solution from specialists in nuclear pressure.
- Gauge pressure range: 5000 psi max.

- Obsolete but many used in non-safety nuclear applications.
- Remanufactured or existing stock run-out obsolescence concern for operating plants.
- Gauge pressure range: 6000 psi max.

- 100% analog drop-in replacement for 1151.
- Same ranges as 1151.
- Designed for the nuclear power market.
- Fits Rosemount or Ultra bracket.
- Traditional flanges fits existing installations.
- Saves engineering change costs.
- Big savings vs. buying nuclear safety related 3152 or DTN2070 transmitter to stay analog.
- Supply chain solution from specialists in nuclear pressure.
- Gauge pressure range: 6000 psi max.

Detailed Comparisons

Commercial grade & mild environment nuclear pressure transmitters

Pressure Transmitter Comparison

Nuclear Specifications

Supplier	Emerson Rosemount®	Ultra ENERGY	Emerson Rosemount®	Ultra ENERGY
Model	**3051C**	**N-IA Series (Foxboro S Series)**	**1151**	**DTC3**
Nuclear Specifications				
Qualified According to	• SIL2/ SIL3 certified to IEC 61508 by an independent 3rd party	• IEEE Std 323™- 1974/1983/2003 • IEEE Std 344™-1975/1987/2004 Documented in Ultra report: 3077-I00715-003 • SIL2/ SIL3 certified to IEC 61508 by an independent 3rd party	N/A	N/A
Radiation Applied	N/A	N/A	N/A	N/A
Radiation Effect	N/A	N/A	N/A	N/A
Seismic	N/A	• SSE: 25 g from 3 - 30 Hz (1% Damping) • OBE 12.5 g from 3 - 30 Hz (1% Damping) See Seismic Profile	N/A	N/A
Seismic Accuracy	N/A	Specifications listed reflect maximum acceptable error during seismic disturbance. Transmitters will return to within reference accuracy (±0.050%) after the event. T Electronics: All Ranges: ≤±5.0% URL	N/A	N/A
Steam Pressure/Temperature & Post DBA	N/A	N/A	N/A	N/A
Steam Pressure/Temperature & Post DBA Accuracy	N/A	N/A	N/A	N/A
Qualified Life	N/A	N/A	N/A	N/A
Nuclear Cleaning	N/A	• Non-halogenated	N/A	• Non-halogenated
Hydrostatic Testing	P1 Hydrostatic testing with certificate	• To 150% of maximum working pressure for DP transmitters • At overpressure limit for GP/AP transmitters	150% Maximum Working Pressure; Range 0, 125% maximum working pressure.	DP: 150% Maximum Working Pressure PA/PG: 150% of URL
Traceability	Q8 Material traceability certification per EN 10204:2004 3.1	Per 10CFR50 Appendix B, 10CFR21, NQA-1, and ISO 9001; chemical and physical certification of pressure retaining parts.	Optional Material Traceability per EN 10204 3.1.B for transmitter flange and adapters.	Optional Material Traceability per EN 10204 3.1.B for transmitter flange and adapters.

Pressure Transmitter Comparison

Performance Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Performance Specifications				
Reference Accuracy	Range 5 ±0.065% of span Ranges 2–4 ± 0.04% of span Range 1 ± 0.10% of span Range 0 (CD) ± 0.10% of span	±0.050% of span digital ±0.060% of span analog (Includes Linearity, Hysteresis, and Repeatability)	Output Codes E, G, L, and M ±0.2% of calibrated span for Model 1151DP Ranges 3 through 5. All other ranges and transmitters, ±0.25% of calibrated span.	±0.2% Span (includes combined effects of linearity, hysteresis + deadband, and settability + repeatability)
Drift	Ranges 2–5 ±0.2% of URL for 10 years ±50 °F (28 °C) temperature changes, and up to 1000 psi (68.95 bar) line pressure	< ±0.03% of URL/yr. for 10 years	±0.2% of URL for six months for Ranges 3 through 5. (±0.25 for all other ranges.)	±0.15% of URL for 12 months
Temperature Effects	Rosemount 3051C Ranges 2–5: • ±(0.0125% URL + 0.0625% span) from 1:1 to 5:1 • ±(0.025% URL + 0.125% span) from 5:1 to 150:1 Range 1: • ±(0.1% URL + 0.25% span) from 1:1 to 30:1 • ±(0.14% URL + 0.15% span) from 30:1 to 50:1 Range 0: • ±(0.25% URL + 0.05% span) from 1:1 to 30:1 Rosemount 3051CA Ranges 1–4: • ±(0.025% URL + 0.125% span) from 1:1 to 30:1 • ±(0.035% URL + 0.125% span) from 30:1 to 150:1	For direct connect AP/GP transmitters with Span Code C, D, E, or F, the total effect for a 28°C (50°F) change within normal operating conditions is ±(0.03% URL + 0.06% Span). For biplanar AP/GP transmitters with Span Code B, C, or D, the total effect for a 28°C (50°F) change within normal operating conditions is ±(0.04% URL + 0.050% Span). For biplanar AP/GP transmitters with Span Code E or F, the total effect for a 28°C (50°F) change within normal operating conditions is ±(0.08% URL + 0.025% Span). For DP transmitters (all Span Codes), the total effect for a 28°C (50°F) change within normal operating conditions is ±(0.04% URL + 0.050% Span).	Output Code E, G, L, and M [20 to 200 °F (29 to 93 °C)] Range Code 3: • ±(1.0% URL +1.0% span) per ambient temperature change of 100 °F (55.6 °C) Range Codes 4–9 and 0: • ±(0.5% URL +0.5% span) per ambient temperature change of 100 °F (55.6 °C)	40°F to 150°F (4.4°C to 65.5°C): • ± 0.50% URL Temperature Effect is per 50°F (27.8°C).
Overpressure Effects (DP)	Not specified	Not specified	Not specified	DP: Based on full overpressure limits: All Range Codes: • ±0.25% URL One-sided • ±1.0 % URL Two-sided sequential per 1,000 psi [6.89 MPa]

Pressure Transmitter Comparison

Performance Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Overpressure Effects (AP/GP)	Not specified	Not specified	Not specified	PA/PG: Based on full overpressure limits: All Range Codes: • ±0.25% URL
High Static Line Pressure Zero Effect (DP Transmitters ONLY)	Line pressure effect per 1000 psi (68.95 bar) up to 2000 psi (137.90 bar): Zero error Ranges 2–3: • ±0.05% of URL/1000 psi (68,95 bar) for line pressures from 0 to 2000 psi (0 to 137.90 bar) Range 1: • ±0.25% of URL/1000 psi (68,95 bar) for line pressures from 0 to 2000 psi (0 to 137.90 bar) Range 0: • ±0.125% of URL/100 psi (6,89 bar) for line pressures from 0 to 750 psi (0 to 51.71 bar)	The zero and span shift for a 1,000 psi (7 MPa) change in static pressure is described below. Zero shift can be calibrated out by zeroing at nominal line pressure. Zero Span Code B ±0.07% of URL Span Code C ±0.02% of URL Span Code D and E ±0.50% URL	Differential 1152DP: Per 2,000 psi (13.8 MPa) Range Codes 4&5: • ±0.25% of URL Range Code 3,6-8: • ±0.5% of URL Differential 1152HP: Per 4,500 psi (13.8 MPa) All Ranges: • ±2.0 of URL	DP: The High Static Line Pressure Zero Effect can be calibrated out by the customer*. If it is not calibrated out, the error associated with the High Static Line Pressure Zero Effect is as follows: • ±0.25% URL for 1,000 psi (6.89 MPa) static pressure change. This specification may be linearly interpolated. *Suppressed zero ranges (where LRV is greater than 0) cannot have their static pressure effect calibrated out.
High Static Line Pressure Span Effect (DP Transmitters ONLY)	Line pressure effect per 1000 psi (68.95 bar) up to 2000 psi (137.90 bar): Span error Ranges 2–3: • ±0.1% of reading/1000 psi (68.95 bar) Range 1: • ±0.4% of reading/1000 psi (68.95 bar) Range 0: • ±0.15% of reading/100 psi (6.895 bar)	Span shift for a 1,000 psi (7 MPa) change in static pressure is Span ±0.15% of reading	Effect is systematic and can be calibrated out for a particular pressure before installation. Correction uncertainty is: Range 3: • (±0.5% of reading/1,000 psi(6.89 MPa) All Other Ranges: • ±0.25% of reading/1,000 psi (6.89 MPa)	N/A
Electromagnetic Compatibility	Meets all industrial environment requirements of EN61326 and NAMUR NE-21. Maximum deviation <1 percent Span during EMC disturbance. During surge event, device with 4-20 mA (Transmitter output option code A) may exceed maximum EMC deviation limit or reset; however, device will self-recover and return to normal operation within specified start-up time.	Complies with electromagnetic compatibility requirements of European EMC Directive 2014/30/EU by conforming to following EN and IEC Standard: EN61326-1:2013	Satisfies requirements defined in: • EN 61326-1:2006 and EN 61326-2-3:2006	European EMC Directive 2014/30/EU by conforming to applicable EN and IEC Standards: Compliance testing to the EN 61000 Series standards, CE Marking, declaration of conformity.

Pressure Transmitter Comparison

Performance Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Transient Protection	Transient protection (option code T1) Tested in accordance with IEEE C62.41.2-2002, location category B 6 kV crest (0.5 µs - 100 kHz) 3 kA crest (8 x 20 µs) 6 kV crest (1.2 x 50 µs)	The transmitter can withstand a transient surge up to 2000 V (common mode) or 1000 V (normal mode) without permanent damage. The output shift is less than 1.0%. (Per ANSI/IEEE C62.41-1980 and IEC Std. 61000-4-5.)	Terminal Block Code R1 Option: IEEE Std 587, Category B, and IEEE Std 472, Surge Withstand Capability	IEC 61000-4-4: 1995, Electrical fast transient/burst immunity test: Power and I/O Line Burst: 2kV, 15/300 ms, 5kHz: • Meets Criteria A
Power Supply Effects	Less than ±0.005 percent of calibrated span per volt change.	Less than ±0.005 percent of calibrated span per volt change.	Less than 0.005% of span / volt	0.005% of calibration span/volt
Load Effect	Not specified	Not specified	No load effect other than the change in voltage supplied to the transmitter	Within limits set by the line voltage, the output current is independent of load resistance.
Mounting Position Effect	3051C Zero shifts up to ±1.25 in H2O (3.11 mbar), which can be calibrated out. No span effect. 3051CA, 3051T Zero shifts up to ±2.5 in H2O (6.22 mbar), which can be calibrated out. No span effect	You can mount the transmitter in any position. Any zero effect caused by the mounting position can be removed by rezeroing. There is no span effect.	No span effect; zero shift of up to 1.0 inH2O (0.249 kPa) which can be calibrated out.	No span effect; zero shift of up to 1.5 inH2O (0.249 kPa) which can be calibrated out.

Pressure Transmitter Comparison

Functional Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Functional Specifications				
Power Supply & Load Limits 4-20 mA	Standard transmitter (4–20 mA) operates on 10.5–42.4 Vdc with no load. For CSA approval, power supply must not exceed 42.4 V. Load limitations: Maximum loop resistance is determined by the voltage level of the external power supply described by: Max. loop resistance = 43.5 (power supply voltage - 10.5). Communication requires a minimum loop resistance of 250 ohms.	Operating Region: 4-20 mA: 12-44 VDC (0Ω-1450Ω) HART: 15.5-42 VDC (250Ω-1450Ω) see graph	Maximum supply voltage: • 45 VDC • 85 VDC for 10-50mA output	Operating Region: 4-20 mA: 12-48 VDC (0Ω-1650Ω) 10-50 mA: 30-85 VDC (0Ω-1100Ω) see graph
Span & Zero	Digital. If you order them to, you can use local Zero and Span buttons (option code D4) to rerange the transmitter with applied pressure. (10:1)	Digital. Ability to locally configure the device with pushbuttons on the optional local display (option code-L1). If you order them to, you can use external Zero button (option code -Z1) to zero the transmitter.	Continuously adjustable externally (6:1)	Continuously adjustable externally Field (6:1) External (2:1)
Zero Elevation, Zero Suppression	Not specified	• Zero elevation and suppression must be such that neither the calibrated span nor the upper or lower range value exceeds 100% of the URL	• Maximum zero elevation: 600% of calibrated span (DP, GP, and HP only) • Maximum zero suppression: 500% of calibrated span • Zero elevation and suppression must be such that neither the span nor the upper or lower range value exceeds 100% of the URL	• Zero elevation and suppression must be such that neither the calibrated span nor the upper or lower range value exceeds 100% of the URL
Rangedown	10 to 1	400:1	6 to 1	6 to1 (Min. span is 16.7% URL)
Output	Two-wire 4–20 mA, user selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to HART™ Protocol.	Two-wire 4–20 mA, user selectable for linear or square root output. Digital process variable superimposed on 4–20 mA signal, available to any host that conforms to HART™ Protocol.	4-20 mA & 10-50 mA (Output Code G discontinued between 2008-2010.)	4-20 mA Standard 10-50 mA Option

Pressure Transmitter Comparison

Functional Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Temperature Limits	• Ambient: -40 to 185 °F (-40 to 85 °C) With LCD display(1)(2): -40 to 176 °F (-40 to 80 °C) • Storage: –76 to 230 °F (–60 to 110 °C) With LCD display: -76 to 185 °F (-60 to 85 °C)	• Normal Operating Limits: Without or without display -40 and +85°C (-40 and +185°F) -20 to +50°C (-4 to +122°F) for biplanar AP transmitters -40 and +75°C (-40 and +167°F) for transmitters with ATEX flameproof classification • Storage and Transportation Limits -29 to +82°C (-20 to +180°F) -20 to +50°C (-4 to +122°F) for biplanar AP transmitters	• Electronics Operating: Code S: -40 to 185 °F (-40 to 85 °C) Code E: -40 to 200 °F (-40 to 93 °C) Code G, L, M: -20 to 200 °F (-29 to 93 °C) Code J: -20 to 150 °F (-29 to 66 °C) • Sensing Element Operating: Silicone fill: -40 to 220 °F (-40 to 104 °C) Inert fill: 0 to 160 °F (-18 to 71 °C) • Storage: Code S: -60 to 185 °F (-51 to 85 °C) Codes E, G, L, M: -60 to 250 °F (-51 to 121 °C) Code J: -60 to 180 °F (-51 to 82 °C)	• Normal Operating Limits: 40 to 150 °F (4.4 to 65.5 °C) Extended Range Optional • Storage Limits: 0 to 212 °F (-17.8 to 100 °C)
Volumetric Displacement	Less than 0.005 in3 (0.08 cm3)	Negligible	Less than 0.01 in3 (0.16 cm3)	Less than 0.005 in3 (0.082 cm3)
Enclosure Rating	NEMA 4X and IP66/67/68	NEMA 4X and IP66/67	NEMA 4X (IP 66)	NEMA 4X (IP 66)
Pressure Ranges DP	Differential (Rosemount 3051CD) Range Code 1: –25 to 25 inH2O (–62.16 to 62.16 mbar) Range Code 2: –250 to 250 inH2O (–621.60 to 621.60 mbar) Range Code 3: –1000 to 1000 inH2O (–2.48 to 2.48 bar) Range Code 4: –300 to 300 psi (–20.68 to 20.68 bar) Range Code 5: –2000 to 2000 psi (–137.89 to 137.89 bar) Range Code 0: –3 to 3 inH2O (-7.46 to 7.46 mbar)	IDP10S: Range Code B: -200 to 200 inH2O (-500 to 500 mbar) Range Code C: -1000 to 1000 inH2O (-2500 to 2500 mbar) Range Code D: -300 to 300 psi (-20.7 to 20.7 bar) Range Code E: -3000 to 3000 psi (-207 to 207 bar)	Rosemount 1151DP and 1151HP: Range Code 3: • 0–5 to 0–30 inH2O (D units only) (0–1.24 to 0–7.46 kPa) Range Code 4: • 0–25 to 0–150 inH2O (0 –6.22 to 37.3 kPa) Range Code 5: • 0–125 to 0–750 inH2O (0–31.08 to 186.4 kPa) Range Code 6: • 0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa) Range Code 7: • 0–50 to 0–300 psi (0–.34 to 0–2.07 MPa) Range Code 8: • 0–170 to 0–1,000 psi (D units only)(0–1.17 to 0–6.89 MPa)	DTC3 DP: Lower Range Limit (LRL) to Upper Range Limit (URL) / Minimum Span Range Code 200: • 0-40 inH2O / 7 inH2O (0-10 / 2 kPa) Range Code 300: • 0-100 inH2O / 17 inH2O (0-25 / 4 kPa) Range Code 400: • 0-250 inH2O / 42 inH2O (0-62 / 10 kPa) Range Code 600: • 0-650 inH2O / 108 inH2O (0-162 / 27 kPa) Range Code 800: • 0-800 inH2O / 133 inH2O (0-199 / 33 kPa) Range Code 900: • 0-1000 inH2O / 167 inH2O (0-249 / 41 kPa) Range Code 100: • 0-100 psid (0-2770 in H2O) / 16.7 psid (462 inH2O) (0-689 / 115 kPa)

Pressure Transmitter Comparison

Functional Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Pressure Ranges GP	Gage (Rosemount 3051CG) Range Code 1: –25 to 25 inH2O (–62.16 to 62.16 mbar) Range Code 2: –250 to 250 inH2O (–621.60 to 621.60 mbar) Range Code 3: –393 to 1000 inH2O (–0.97 to 2.48 bar) Range Code 4: –14.2 to 300 psi (–0.97 to 20.68 bar) Range Code 5: –14.2 to 2000 psi (–0.97 to 137.89 bar) Range Code 0: N/A	IGP10S: Direct Connect Structures Range Code D: 0 to 200 psi (0 to 1380 kPa) Range Code E: 0 to 2000 psi (0 to 13.8 MPa) Range Code F: 0 to 6000 psi (0 to 41.4 MPa) Biplanar Structures Range Code B: 0 to 200 inH2O (0 to 50 kPa) Range Code C: 0 to 1000 inH2O (0 to 250 kPa) Range Code D: 0 to 300 psi (0 to 2070 kPa) Range Code E: 0 to 3000 psi (0 to 20.7 MPa) Range Code F: 0 to 5000 psi (0 to 34.5 MPa)	Rosemount 1151GP: Range Code 3: • 0–5 to 0–30 in H2O (0–1.24 to 0–7.46 kPa) Range Code 4: • 0–25 to 0–150 in H2O (0–6.22 to 0–37.3 kPa) Range Code 5: • 0–125 to 0–750 inH2O (0–31.08 to 0–186.4 kPa) Range Code 6: • 0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa) Range Code 7: • 0–50 to 0–300 psi (0–.34 to 0–2.07 MPa) Range Code 8: • 0–170 to 0–1,000 psi (0–1.17 to 0–6.89 MPa) Range Code 9: • 0–500 to 0–3,000 psi (0–3.45 to 0–20.68 MPa) Range Code 0: • 0–1,000 to 0–6,000 psi (0–6.89 to 0–41.37 MPa)	DTC3 PG: Lower Range Limit (LRL) to Upper Range Limit (URL) / Minimum Span Range Code 240: • 0-50 psig / 8 psig (0 to 345 kPa / 57 kPa) Range Code 440: • 0-200 psig / 33 psig (0 to 1.38 MPa / 0.230 MPa) Range Code 540: • 0-500 psig / 83 psig (0 to 3.45 MPa / 0.575 MPa) Range Code 740: • 0-1500 psig / 250 psig (0 to 10.34 MPa / 1.724 MPa) Range Code 840: • 0-2500 psig / 417 psig (0 to 17.24 MPa / 2.873 MPa) Range Code 940: • 0-6000 psig / 1000 psig (0 to 41.37 MPa / 6.895 MPa)
Pressure Ranges AP	Absolute (Rosemount 3051CA) Range Code 1: 0 to 30 psia (0 to 2.06 bar) Range Code 2: 0 to 150 psia (0 to 10.34 bar) Range Code 3: 0 to 800 psia (0 to 55.15 bar Range Code 4: 0 to 4000 psia (0 to 275.79 bar) Range Code 5: N/A Range Code 0: N/A	IAP10S: Direct Connect Structures Range Code D: 0 to 200 psi (0 to 1380 kPa) Range Code E: 0 to 2000 psi (0 to 13.8 MPa) Biplanar Structures Range Code B: 0 to 200 inH2O (0 to 50 kPa) Range Code C: 0 to 1000 inH2O (0 to 250 kPa) Range Code D: 0 to 300 psi (0 to 2070 kPa) Range Code E: 0 to 3000 psi (0 to 20.7 MPa) Range Code F: 0 to 5000 psi (0 to 34.5 MPa)	Rosemount 1151AP: Range Code 4: • 0–25 to 0–150 in H2O (0–6.22 to 0–37.3 kPa) Range Code 5: • 0–125 to 0–750 inH2O (0–31.08 to 0–186.4 kPa) Range Code 6: • 0–17 to 0–100 psi (0–0.12 to 0–0.69 MPa) Range Code 7: • 0–50 to 0–300 psi (0–.34 to 0–2.07 MPa) Range Code 8: • 0–170 to 0–1,000 psi (0–1.17 to 0–6.89 MPa)	DTC3 PA: Lower Range Limit (LRL) to Upper Range Limit (URL) / Minimum Span Range Code 240: • 0-50 psia / 8 psia (0 to 345 kPa / 57 kPa) Range Code 440: • 0-200 psia / 33 psia (0 to 1.38 MPa / 0.230 MPa) Range Code 540: • 0-500 psia / 83 psia (0 to 3.45 MPa / 0.575 MPa) Range Code 740: • 0-1500 psia / 250 psia (0 to 10.34 MPa / 1.724 MPa) Range Code 840: • 0-2500 psia / 417 psia (0 to 17.24 MPa / 2.873 MPa) Range Code 940: • 0-6000 psia / 1000 psia (0 to 41.37 MPa / 6.895 MPa)

Pressure Transmitter Comparison

Functional Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Static Pressure & Overpressure Limits	Static Pressure Limits: Rosemount 3051CD only Operates within specifications between static line pressures of 0.5 psia and 3626 psig (4500 psig (310.26 bar) for option code P9). Range 0: 0.5 psia and 750 psig (0.03 bar and 51.71 bar) Range 1: 0.5 psia and 2000 psig (0.03 bar and 137.90 bar) Burst pressure limits: Rosemount 3051C, 3051CF coplanar or traditional transmitter flange 10081 psig (695,06 bar) Overpressure limits: Rosemount 3051CD/CG/CF Range 0: 750 psi (51.71 bar) Range 1: 2000 psig (137.90 bar) Ranges 2–5: 3626 psig (250.00 bar), 4500 psig (310.26 bar) for option code P9 Rosemount 3051CA Range 1: 750 psia (51.71 bar) Range 2: 1500 psia (103.42 bar) Range 3: 1600 psia (110.32 bar)	DP Transmitters and Biplanar AP and GP Transmitters: MWP/Maximum Static and Overrange Pressure: Standard (B7 steel) with Span Codes A to E, or with Option -B2 (17-4 PH ss): 3,626 psi (25 MPa) With Option -B1 (316 SS bolts): 2,175 psi (15 MPa). Standard with Span Code F: 5,800 psi (40 MPa) Pressure ratings may be affected by bolting options and other model code selections, not all options are listed here.	Rosemount Model 1151DP: 0 psia to 2,000 psig (0 to 13.79 MPa) on either side without damage to transmitter. Operates within specifications from static line pressures of 0.5 psia (3.45 kPa) to 2,000 psig (13.79 MPa). Rosemount Model 1151HP: 0 psia to 4,500 psig (0 to 31.02 MPa) on either side without damage to transmitter. Operates within specifications from 0.5 psia (3.45 kPa) to 4,500 psig (31.02 MPa). Rosemount Model 1151AP: 0 psia to 2,000 psia (0 to 13.79 MPa) without damage to transmitter. Operates within specifications from 0 psia to the upper range limit of the transmitter. Rosemount Model 1151GP: 0 psia to 2,000 psig (0 to 13.79 MPa) for ranges to 1,000 psig (6.90 MPa), 4,500 psig (31.02 MPa) for the 3,000 psig (20.68 MPa) range, and 7,500 psig (51.71 MPa) for the 6,000 psig (41.37 MPa) range, without damage to the transmitter. Operates within specifications from 0.5 psia (3.45 kPa) to the upper range limit of the transmitter.	PA/PG: Maximum Working Pressures: Range Code 240, 0-50 psia/g: • 75 psia/g (.52 MPa) Range Code 440, 0-200 psia/g: • 300 psia/g (2.07 MPa) Range Code 540, 0-500 psia/g: • 750 psia/g (5.17 MPa) Range Code 740, 0-1500 psia/g: • 2250 psia/g (15.5 MPa) Range Code 840, 0-2500 psia/g: • 3750 psia/g (25.8 MPa) Range Code 940, 0-6000 psia/g: • 8250 psia/g (56.9 MPa) DP: Static Pressure Limits: All Ranges: 0.5 psia to 2538 psig (3.45 kPa to 17.5 MPa) Over Pressure Limits: Maximum Working Pressure All Ranges: 2538 psig (17.5 MPa)

Pressure Transmitter Comparison

Functional Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Response Time	Nominal total response time (63%) at 75 °F (24 °C) reference conditions. 4 - 20 mA HART: Ranges 2-5: 100 ms Range 1: 255 ms Range 0: 700 ms	Direct Connect AP/GP response time: < 100 ms DP and Biplanar AP/GP response time: < 125 ms Damping is user-selectable to values of 0, 0.25, 0.5, 1, 2, 4, 8, 16, or 32 seconds. Selecting a value of DAMP 0 in the Damping menu provides the fastest response.	Time constant at 100 °F (37.8 °C) continuously adjustable from 0.2 seconds or less (0.4 seconds or less for Range Code 3) up to 1.67 seconds nominal	Time constant at 100 °F (37.8 °C) • Sensor response time to 50% with a 100% of span step change: PA/PG: 0.2 second DP: 40 inH2O, 2.5 seconds DP: 100 inH2O, 0.7 seconds DP: 250, 650, 800 inH2O, 0.4 seconds DP: 956 inH2O, 0.25 seconds • Electronic damping continuously adjustable from 0 to 2 seconds
Humidity Limits	0–100 percent relative humidity	0–100 percent relative humidity	0 to 100% relative humidity (NEMA 4X)	0 to 100% relative humidity (NEMA 4X)
Turn-On Time	Performance within specifications less than 2.0 seconds (20.0 seconds for PROFIBUS® PA and FOUNDATION™ Fieldbus Protocols) after power is applied to the transmitter.	Not specified	2 seconds maximum with minimum damping.	2 seconds maximum with minimum damping.

Pressure Transmitter Comparison

Physical Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Physical Specifications				
Isolating Diaphragms	316L SST (UNS S31603) Alloy C-276 (UNS N10276) Alloy 400 (UNS N04400) Tantalum (UNS R05440) Gold-plated alloy 400 Gold-plated 316L SST	316L SST (UNS S31603)	• 316L SST • Hastelloy C-276 • Tantalum	Hastelloy™ Alloy-C Stainless 17-7 PH
Drain Vent Valve	316 SST, alloy C-276, or alloy 400 material	316 SST	316L SST	316 SST
Process Flange	Plated CS; SST: CF-8M (Cast 316 SST) per ASTM A743; Cast C-276: CW-12MW per ASTM A494; Cast Alloy 400: M-30C per ASTM A494	316 SST	CF3M (Cast version of 316L SST)	316 SST
Process Seal	Glass-filled PTFE or graphite-filled PTFE	EPDM O-ring and gasket seal in between the process connector and the process cover	Standard: Viton® Buna-N Ethylene-Propylene Aflas Spring-loaded Teflon	EPDM
Electronics Housing O-ring	Buna-N	Not specified	Buna-N	EPDM
Fill Fluid	Coplanar: silicone or inert halocarbon. In-line: silicone or Fluorinert™ FC-43	Silicone	Silicone oil or inert fill	DP: Silicone Oil DC550 Standard DC200 Optional (faster response) PA/PG: Vacuum
Sensor Module Housing	SST: CF-3M (Cast 316L SST)	316 SST	N/A	316 SST
Flange Bolt	Plated CS per ASTM A449, Type 1; Austenitic 316 SST per ASTM F593; ASTM A193, Grade B7M alloy steel; Alloy K-500	ASTM A193, Grade B7 high strength alloy steel for bolts, and ASTM A194 Grade 2H high strength alloy steel for nuts are standard. Options include 17-4 ss bolting, and 316 ss bolting.	Plated carbon steel	Medium Carbon Alloy Steel, SAE J429, Grade 8, Zinc Yellow-Chromate Plated Finish Per ASTM B633
Electronics Housing	Low-copper aluminum or CF-8M (cast version of 316 SST)	The housing and covers are made from low copper (0.6% maximum) die-cast aluminum alloy with an epoxy finish, or from 316 ss	• Low-copper aluminum with polyurethane paint	• Low-copper aluminum with polyurethane paint

Pressure Transmitter Comparison

Physical Specifications

Model	3051C	N-IA Series (Foxboro S Series)	1151	DTC3
Mounting Bracket	• Carbon Steel • Stainless Steel	• Stainless Steel	• Carbon steel, AISI 1010 or JIS G3131 SPHC P/O with polyurethane paint • 316L SST	304 SST
Mounting Bolts	• Carbon Steel • Stainless Steel	• Stainless Steel	• Carbon Steel • Stainless Steel	300 Series Stainless Steel, ASTM F593
Process Connections	½-14 NPT female (range 1-5 only); many flange and manifold options	1/4 NPT 1/2 NPT	1/4-18 NPT	• 1/4-18 NPT • Optional: welded fittings
Electrical Connections	½–14 NPT, G½, and M20 x 1.5 conduit.	1/2 NPT, M20, QDC, Souriau 8N45	1/2-14 NPT conduit with screw terminals	• 1/2-14 NPT conduit with screw terminals standard • Optional Connector
Weight	6.0 lbs (2.7 kg) + Option weights	Direct Connect AP or GP, Aluminum Housing 1.4 kg (3.1 lb) Biplanar or Traditional DP Structure, Aluminum, without Process Connectors 3.5 kg (7.8 lb) Biplanar or Traditional DP Structure, Aluminum, with Process Connectors 4.2 kg (9.2 lb) Optional Display Add 0.2 kg (0.4 lb) Substitute 316 ss Housing Add 1.1 kg (2.4 lb)	• 12 lb (5.4 kg) (excluding bracket)	• 12 lb (5.4 kg) (excluding bracket)

Transmitter Accessories				
EGS QDC Gen. 3	N/A	Optional	N/A	Optional
Souriau or SAIB 8N45	N/A	Optional	N/A	Optional
Datasheet Reference	Rosemount™ 3051 Pressure Transmitter Product Data Sheet 00813-0100-4001, Rev WB April 2021	Schneider Electric Systems USA, Inc PSS 2A-1S10 A 2018 – 2020	Rosemount 1151 Pressure Transmitter Product Data Sheet 00813-0100-4360, Rev DB October 2003	Ultra DTC3® PDS on website

N-I/A Series Popular configurations

Nuclear Power

Ultra N-I/A nuclear smart transmitter popular configurations

N-I/A IEEE 323/344 qualified design is Traditional Biplanar structure with Ultra seismic bracket and Output T.

High runners: IDP10S-T22B03 DP 200 inH2O (ss hsg, cover, and diaphragms + seismic bracket)
IGP10S-T22D03 GP 200 psi (ss hsg, cover, and diaphragms + seismic bracket)

1. Sensor type and output

52% IDP10S Differential Pressure
DP Range B: 200 inH2O 70% of DP sales
40% IGP10S Gauge Pressure
GP Range D: 300 psi 65% of GP sales
8% IAP10S Absolute Pressure
AP Range D: 42% of AP sales

100% of sales are Output Code T 4-20 mA with HART

2. Structure

DP Structure 22: 99% of DP sales
GP Structure 22 61% + 52 flameproof 37%: 97% of GP sales
AP Structure 22: 65% of AP sales
99% of sales are: 316 ss Cover; 316L ss Diaphragm; Silicone Fill Fluid

Code	Description	Pop.
22	**DP Traditional** - 316 ss Cover; 316L ss Diaphragm; Silicone Fill; Max Static Pressure=25 MPa (3626 psi); **AP/GP Direct Connect** - 316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.	81%
52	**DP Low Profile LP2 or Direct Mount** - 316 ss Cover; 316L ss Diaphragm; Silicone Fill. **AP/GP Direct Connect Flameproof** - 316L ss Process Sensor; 316L ss Diaphragm; Silicone Fill; 1/2 NPT Ext. Conn.; 1/4 NPT Int. Conn.	18%

3. Conduit Connection and Housing Material

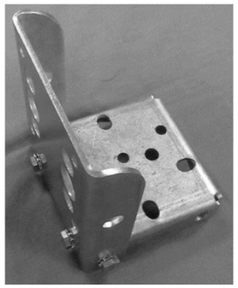
Housing
Code 3: ½" NPT 316 ss Housing is 85% of sales.
Code 1: ½" NPT Aluminum is 15% of sales

Process Connection
Code 0 - None is 92% of sales

Process connection and housing selection
Codes 03: Process Connection "none" and ½" NPT Conduit 316 ss Housing is 83% of sales.

4. Optional Mounting Bracket Sets

100% of N-I/A sales
Wall Mount Seismic Mounting Kit
Ultra code M9, Item: 1000-520-0015T



N-I/A Users

Ultra Energy has been the exclusive provider of Foxboro™ smart pressure transmitters to the nuclear market since 2001.

Partial reference listing

- Southern Company Georgia Power's Plant Vogtle units 3 and 4.
- Westinghouse Electric V.C. Summer 2&3 (cancelled)
- Dominion North Anna Power Station
- KHNP YGN 1
- KHNP YGN 3
- KHNP YGN 5
- KHNP YGN 6
- Fairbanks Morse Engine (OEM)
- Asiam international (Taiwan), Inc. (exports)