Ultra Energy
www.ultraelectronicsenergy.com

Phone: (512) 434-2800
Email: CustomerCare@ultra-nspi.com

Product Data Sheet
N-I/A Series Pressure Transmitters

The N-I/A Series are nuclear qualified Foxboro™ IA/IG/IDP10S pressure transmitters that measure absolute, gauge, and differential pressures. Designed by experience for robustness and reliability. Considered the one transmitter that can do it all, the N-I/A pressure transmitters cover most of your application needs with a single range. These transmitters include FoxCal™ technology and multiple points of calibration, which allow you to benefit from wide rangeability and one of the best reference accuracy turndowns on the market. Advanced performance transmitters provide an accuracy of ±0.05% of reading from 100% up to 4% of upper range limit (URL) making the selection of sensor range very easy. This wide accuracy helps to standardize on one pressure transmitter, eliminating erroneous sensor selection, reducing inventory, and allowing fast replacement with less downtime.

Ultra is the exclusive distributor for Schneider/Foxboro™ pressure transmitters to the nuclear power industry in USA. The nuclear qualified versions are available exclusively from Ultra worldwide.

Features

- Simplified selection of standard configurations that are popular in nuclear power plants: Loop powered 4-20 mA/HART output, Stainless Steel or Aluminum enclosures; 316/316L stainless steel wetted parts, EPDM process seals. Teflon® (PTFE) is not used as a sealant per reactor OEM General Design Equipment Specifications and NRC Information Notice 2014-04.
- IEEE Class 1E mild environment in accordance with IEEE 323-1974/1983/2003, IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations, IEEE 344-1975/1987/2004, IEEE Recommended Practices for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations.
- Nuclear grade quality (NQA-1, 10CRF50 App. B, 10CFR21).
- Best in-class accuracy as a % of reading.
- Unmatched 400:1 Rangedown with Patented FoxCal™ provides 11 dynamic calibrations allowing high Rangedown without sacrificing accuracy.
- Gauge pressures up to 5000 psi.
- Fast Response Time: < 125 ms
- TÜV SIL 2 Safety Certification Standard (4-20 mA/HART).
- Stability: < ±0.03% of URL/year for 10 years.
- In-service time tracking.
- 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.

Specifications

NAME	DESCRIPTION
Performance Specifications	
Reference Accuracy	±0.050% of span digital, ±0.060% of span analog (Includes Linearity, Hysteresis, and Repeatability).
Drift	< ±0.03% of URL/year for 10 years.
Temperature Effects	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).
Overpressure Effects (DP)	Not specified.
Overpressure Effects (AP/GP)	Not specified.
High Static Line Pressure Zero Effect (DP Transmitters ONLY)	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.
High Static Line Pressure Span Effect (DP Transmitters ONLY)	Span shift for a 1,000 psi (7 MPa) change in static pressure is ±0.15% of reading.
Electromagnetic Compatibility	Complies with electromagnetic compatibility requirements of European EMC Directive 2014/30/EU by conforming to following EN and IEC Standard: EN61326-1:2013.

NAME	DESCRIPTION
Transient Protection	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.)
Power Supply Effects	Less than ±0.005 percent of calibrated span per volt change.
Load Effect	Not specified
Mounting Position 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.
Functional Specifications	
Power Supply & Load Limits 4-20 mA	Operating Region: 4-20 mA: 12-44 VDC (0Ω-1450Ω); HART: 15.5-42 VDC (250Ω-1450Ω)
Span & Zero	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.
Zero Elevation, Zero Suppression	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	400:1
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.

NAME	DESCRIPTION
Temperature Limits	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.
Volumetric Displacement	Negligible
Enclosure Rating	NEMA 4X and IP66/67
Pressure Ranges DP	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).
Pressure Ranges GP	IGP10S: 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).
Pressure Ranges AP	IAP10S: 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).
Static Pressure & Overpressure Limits	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.

NAME	DESCRIPTION
Response Time	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.
Humidity Limits	0–100 percent relative humidity.
Turn-On Time	Not specified
Physical Specifications	
Isolating Diaphragms	316L SST (UNS S31603)
Drain Vent Valve	316 SST
Process Flange	316 SST
Process Seal	EPDM
Electronics Housing O-ring	Not specified
Fill Fluid	Silicone
Sensor Module Housing	316 SST
Flange Bolt	316 ss Bolts and Nuts (MWP derated to 2175 psi); or 17-4 PH ss Bolts and Nuts (no pressure derating).
Electronics Housing	The housing and covers are made from low copper (0.6% maximum) die-cast aluminum alloy with an epoxy finish, or from 316 ss.
Mounting Bracket	Stainless Steel
Mounting Bolts	Stainless Steel

NAME	DESCRIPTION
Process Connections	1/4 NPT
Electrical Connections	1/2" NPT, Aluminum Housing; 1/2" NPT, 316 ss Housing.
Weight	Biplanar or Traditional DP Structure, Aluminum, without Process Connectors 3.5 kg (7.8 lb); Optional Display Add 0.2 kg (0.4 lb); Substitute 316 ss Housing Add 1.1 kg (2.4 lb).
Datasheet Reference	Schneider Electric Systems USA, Inc.; PSS 2A-1S10 A 2018 – 2020

Nuclear Qualifications

Qualified According to

Class 1E qualification per IEEE 323- 1974/1983/2003 and IEEE 344-1975/1987/2004
Documented in Ultra report: 3077-I00715-003
SIL2/ SIL3 certified to IEC 61508 by an independent 3rd party

IEEE 323-1974/1983/2003

Both Regulatory Guide 1.89, "Environmental Qualification of Certain Electric Equipment Important to Safety for Nuclear Power Plants" issued November 1974, and Revision 1 of Regulatory Guide 1.89, issued June 1984 endorses IEEE Std. 323-1974. Regulatory Guide 1.89 focuses on the environmental qualification of equipment intended for use in harsh environments that are subject to design-basis accidents. Regulatory Guide 1.89 limits its scope to equipment intended for application in harsh environments; additional guidance is warranted to address qualification for mild environmental conditions, as needed for computer-based technologies. IEEE revised the industry guidance for qualification, IEEE Std. 323, in 2003. A particular distinction between IEEE Std. 323-2003, and IEEE Std. 323-1974, is that the 2003 version does not require age conditioning to an end-of-installed-life condition for equipment in mild environments where significant aging mechanisms are not present. The NRC regulatory guide 1.209 endorses IEEE Std. 323-2003. The practices in IEEE Std. 323-2003 are sufficiently comprehensive to address qualification for the less severe environmental conditions of typical plant locations where safety-related computer-based I&C systems are generally located. These plant areas are unaffected by design-basis accidents and the most severe conditions to which the equipment is subjected, which arise from the environmental extremes resulting from normal and abnormal operational occurrences.

IEEE 344-1975/1987/2004

The NRC issued Revision 2 of Regulatory Guide 1.100, "Seismic Qualification of Electric and Mechanical Equipment for Nuclear Power Plants", in June 1988. With a few exceptions and clarifications, it endorsed the IEEE 344-1987, issued January 1987. NRC Regulatory Guide 1.100 Revision 3 issued September 2009 endorses, with exceptions and clarifications, IEEE Std. 344-2004. The major change from IEEE Std. 344-1987 to IEEE Std. 344-2004 is the update and expansion of Clause 10, "Experience," which describes the use of experience data as a method for seismic qualification of Class 1E electrical equipment (including I&C components). Qualification of Ultra Electronics' products that do not rely in any way on experience data meet the requirements of IEEE 344-2004 and complies with USNRC Regulatory Guide 1.100 Revision 3.

References:

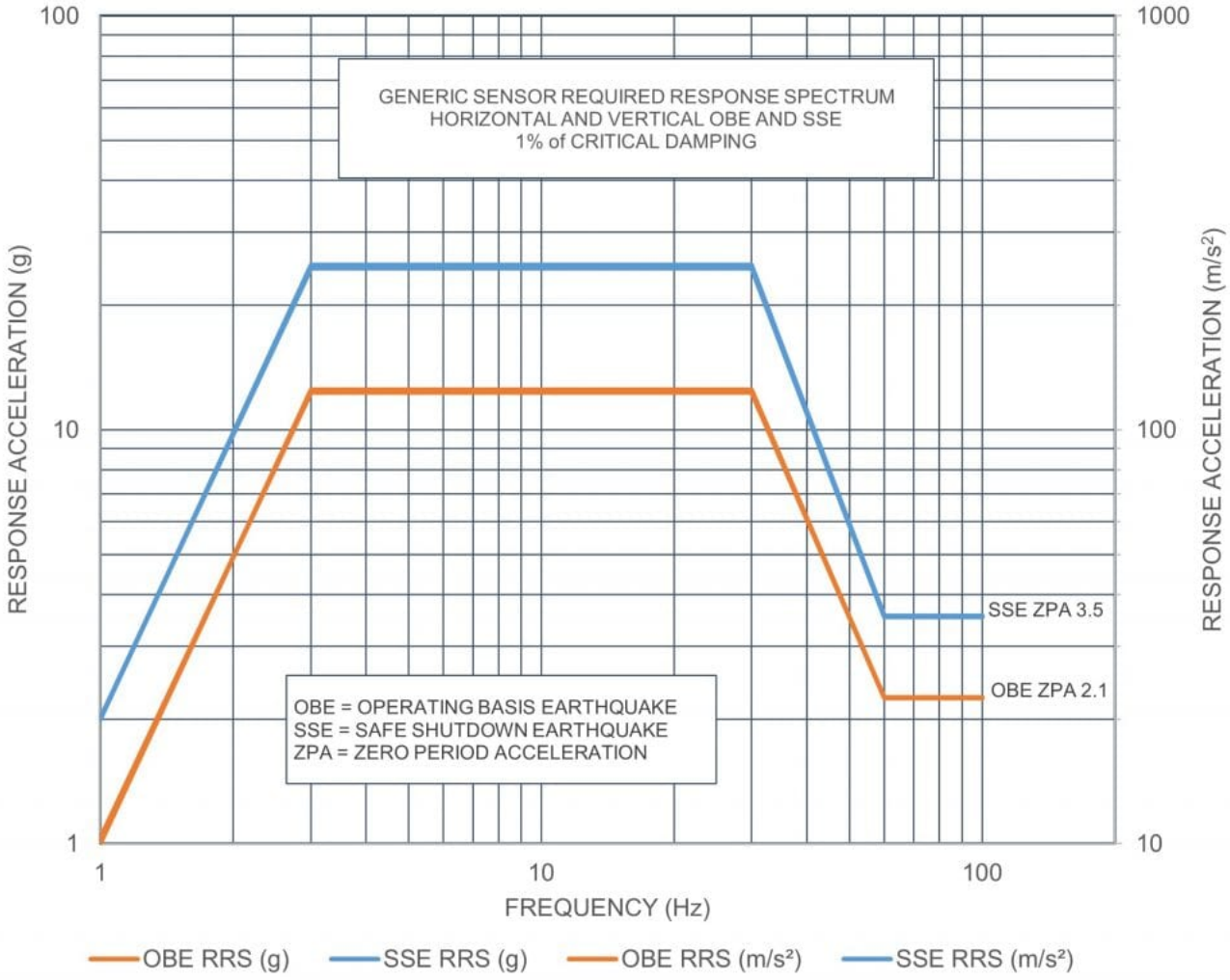
1. IEEE Std. 323-1974/1983/2003, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," Institute of Electrical and Electronics Engineers, Piscataway, NJ
2. US NRC Regulatory Guide 1.89
3. IEEE Std. 344-1975/1987/2004, "Recommended Practice for Seismic Qualification of Class IE Equipment for Nuclear Power Generating Stations", Institute of Electrical and Electronics Engineers, Piscataway, NJ
4. USNRC Regulatory Guide 1.100

Radiation Applied

The N-I/A pressure transmitter contains both digital and analog electronics. So, it is appropriate to assume a threshold of 10^3 rads (10 Gy). Radiation aging for electronic equipment not required to perform a safety-related function in a high-energy line break environment and subject to lifetime doses of less than 10^3 rads (10 Gy) is not required for mild environment qualification. Therefore the mission life TID for N-I/A pressure transmitters is $\leq 10^3$ rads (10 Gy).

Seismic

SSE: 25 g from 3 – 30 Hz (1% Damping); OBE 12.5 g from 3 – 30 Hz (1% Damping)



Seismic Accuracy

Electronics Version/Output Signal: -T (HART and 4-20 mA with SIL 2) All Ranges: ≤±5.0% URL. Specifications listed reflect maximum acceptable error during seismic disturbance. Transmitters will return to within reference accuracy (±0.05%) after the event.

Steam Pressure/Temperature & Post DBA

N/A

Qualified Life / Design Life

A qualified life is not applicable for mild environment equipment for which the seismic event is the exclusive design basis event to be addressed, instead of qualified life, a design life is determined. Design life is substantiated by sound bases in reliability theory and relevant industry standards, or experience data sources within the nuclear industry.

Shelf Life

Based on recommended storage environments, shelf life is not typically a significant portion of the service life. For example, ambient temperatures during storage are typically less than the operating temperatures assumed for aging calculations. Therefore, as long as equipment is in storage and is not energized (not experiencing self-heating), a reduction in service life is not appropriate. However, if storage conditions differ significantly from those recommended or the storage time becomes dramatically extended, the impact to the service life is determined by application of the Arrhenius time-temperature relationship.

Vibration

A field mounted transmitter may experience vibration due to its installation location. Vibration aging has not been applied in this qualification. No claim is made with regards to robustness to severe vibration for any particular time or level other than levels provided by the original equipment manufacturer's catalog specification and the DBE seismic tests conducted. In other words, the pressure transmitters are not ruggedized for operation in continuous severe vibration. The user is responsible for evaluating the installation for conditions that are adverse to reliability including excessive vibration, elevated background radiation, heat and moisture.

Nuclear Cleaning

Non-halogenated

Hydrostatic Testing

150% of maximum working pressure for DP transmitters.
At overpressure limit for GP/AP transmitters.

Traceability

Per 10CFR50 Appendix B, 10CFR21, NQA-1, and ISO 9001; chemical and physical certification of pressure retaining parts.

Documents

NAME	VIEW / DOWNLOAD
Model Codes	View / Download
Dimensional Drawing	View / Download
4 to 20 mA Output Supply Voltage vs. Output Load	View / Download
Letter of Equivalency (IDP10S, IGP10S, IAP10S)	View / Download
Commercial grade and mild environment nuclear pressure transmitter comparison	View / Download
IA-IG-IDP10S SIL 2 SIL 3 Certificate TUV 968_FSP_1640_00_18_en_el valid until 2023	View / Download