

## Product Data Sheet

### N-E13DM Differential Pressure Transmitter



These transmitters measure differential pressure and transmit a proportional 4 to 20 or 10 to 50 mA dc signal. They are 2-wire transmitters that have been type-tested for applications under seismic, radiation, aging, and loss-of-cooling accident (LOCA) environments of Nuclear Power Plants per IEEE 323-1974 and 344-1975 requirements.

## Features

- QUALIFIED FOR NUCLEAR APPLICATIONS
- A Design Control and Quality Assurance Program has been established which complies with ANSI N45.2 and Code of Federal Regulations 10CFR50, Appendix B. Certificates of Testing are provided with each transmitter relating to nuclear cleaning, hydrostatic testing, and calibration. Production transmitters have been type-tested to demonstrate their performance, under typical accident conditions, for Class IE, in-containment applications of Nuclear Power Generating Stations. Type test reports (user documents) are available.
- SERVICEABILITY
- The complete line of N-E13 Series transmitters is supplied with detailed instructions and parts lists that provide the user considerable flexibility and capability for field repair.
- FIELD INTERFACE
- An optional junction box allows quick and easy field wiring to terminal blocks without the need for nuclear splices or seals. Optional seismic mounting brackets allow vertical or horizontal pipe mounting or wall mounting.

# Specifications

NAME	DESCRIPTION
<b>OPERATING CONDITIONS</b>	Notes: a. LOCA peak is 216°C (420°F) for a 3-minute duration, and 176°C (350°F) for a 10-minute duration. b. Accident dose rate is 3x10e6 rad/h for 2 hours, then 1x10e6rad/h. For Details, refer to document section "LOCA HELB test profile".
<b>-Ambient Temperature (Topworks with Amplifier)</b>	Reference Operating Conditions: 24±2°C (75 ±3°F); Normal Operating Conditions Limits (OBE): 0 and 80°C (32 and 180°F); Operative Limits (DBE): -18 and +216°C [Note a above] (0 and 420°F)
<b>-Process Temperature</b>	Reference Operating Conditions: 24±2°C (75 ±3°F); Normal Operating conditions Limits (OBE): 0 and 80°C (32 and 180°F); Operative Limits (DBE): -18 and +120°C [Note a above] (0 and 250°F)
<b>-Relative Humidity</b>	Reference Operating Conditions: 50±10%; Normal Operating conditions Limits (OBE): No limit; Operative Limits (DBE): No Limit
<b>-Ambient Pressure</b>	Reference Operating Conditions: 101 kPa (14.7 psi); Normal Operating conditions Limits (OBE): 94 and 108 kPa (14.7 and 15.7 psi); Operative Limits (DBE): 586 kPa (85 psi)
<b>-Vibration and Seismic ("g" load in any plane)</b>	Reference Operating Conditions: Negligible; Normal Operating conditions Limits (OBE): Per OBE Test Profile (See document section "OBE Test Profile"); Operative Limits (DBE): Per SSE Test Profile (See document section "SSE Test Profile",)
<b>-Position</b>	Reference Operating Conditions: Upright; Normal Operating conditions Limits (OBE): 0-90° tilt in any plane; Operative Limits (DBE): No Limit

NAME	DESCRIPTION
<b>-Radiation Rate (Gamma)</b>	Reference Operating Conditions: Negligible; Normal Operating conditions Limits (OBE): 0.2 rad/h; Operative Limits (DBE): 3 x 10e6 rad/h (Note: Accident dose rate is 3 x 10e6 rad/h for 2 hours, then 1 x 10e6 rad/h.)
<b>-Total Integrated Dose (TID) (Gamma-Air Equivalent)</b>	Reference Operating Conditions: Negligible; Normal Operating conditions Limits (OBE): 3.5 x 10e4 rad; Operative Limits (DBE): 2 x 10e8 rad (Note: TID includes 1.5 x 10e8 rad accident dosage plus 0.3 x 10e8 rad gamma equivalent for a beta TID of 1.5 x 10e9 rad. Margin also included in TID)
<b>Span, Range, and Maximum Overrange Pressure</b>	See document section "Span, Range, and Maximum Overrange Pressure".
<b>Supply voltage and External Load Loop Resistance for Class 1E Transmitters</b>	Class 1E Transmitters (Nuclear Classification Code CS-N/SRC) per IEE 323-1974 and IEE 344-1975 see documentation section "Supply voltage vs. Load Loop Resistance for Class 1E Transmitters". Note
<b>Supply voltage and External Load Loop Resistance for Class II Transmitters</b>	Class II Transmitters (Nuclear Classification Code CS-N/SRD) structural integrity only per IEE 344-1975 see documentation section: "Supply Voltage vs Loop Resistance for Class II Transmitters"
<b>PERFORMANCE SPECIFICATIONS</b>	Notes: (a) Performance not applicable after a seismic, radiation, aging, or LOCA/HELB event (b) Hysteresis is 0.10% of span or 0.012 kPa (0.05 inH <sub>2</sub> O), whichever is larger.
<b>-Accuracy</b>	Sensor Code (capsule) M and H span between 50 and 130kPaΔP ): ±0.5 at Reference Operating Conditions in % of Calibrated Span. Sensor Code (capsule) H Span between 130 and 210 kPaΔP: ±0.75 at Reference Operating Conditions in % of Calibrated Span. See Performance Specification Note (a).

NAME	DESCRIPTION
<b>-Repeatability</b>	Sensor Code (capsule) M and H): 0.1 at Reference Operating Conditions in % of Calibrated Span. See Performance Specification Note (a).
<b>-Hysteresis</b>	Sensor Code (capsule) M [see Performance Specifications Note b):] Sensor Code (capsule) H: 0.10 at Reference Operating Conditions in % of Calibrated Span. See Performance Specification Note (a).
<b>-Deadband</b>	Sensor Code (capsule) M and H): 0.05 at Reference Operating Conditions in % of Calibrated Span. See Performance Specification Note (a).
<b>-Reproducibility (includes effects of hysteresis, repeatability, deadband, and drift over a one-hour period.)</b>	Sensor Code (capsule) M and H): 0.15 at Reference Operating Conditions in % of Calibrated Span. See Performance Specification Note (a).
<b>-Drift/Year</b>	Sensor Code (capsule) M and H): 0.25 at Reference Operating Conditions in % of Calibrated Span. See Performance Specification Note (a).
<b>DBE Performance Specification</b>	Note (a): The DBE performance specifications were derived from type testing transmitters at approximately 25% of the upper span limit (USL) or greater. See documentation section "Minimum Acceptable Span for Extremes of DBE Conditions" for errors listed.
<b>-Normal Radiation TID 3.5 x 10<sup>4</sup> rad (gamma)</b>	Max Output Shift, % of Calibrated Span: ±2.5 at Upper Span Limit; ±0.5 [see DBE Performance Specification Note (a)].
<b>-Accident Radiation</b>	TID Includes 0.3 x 10 <sup>8</sup> rad gamma equivalent for beta TID of 1.5 x 10 <sup>9</sup> rad plus 0.2 x 10 <sup>8</sup> rad for margin. Seismic refer to documentation section "OBE Test Profile" and "SSE Test Profile".

NAME	DESCRIPTION
-- TID 2.0 x 108 rad (gamma)	Max Output Shift, % of Calibrated Span: $\pm 2.5$ at Upper Span Limit; $\pm 0.5$ [see DBE Performance Specification Note (a)].
-- Accident Radiation Seismic During OBE's and SSE's	Max Output Shift, % of Calibrated Span: $\pm 5$ at Upper Span Limit; $\pm 5$ [see DBE Performance Specification Note (a)].
-- Accident Radiation Seismic After OBE's and SSE's	Max Output Shift, % of Calibrated Span: $\pm 1$ at Upper Span Limit; $\pm 1$ [see DBE Performance Specification Note (a)].
-LOCA/HELB	Refer to documentation section "LOCA/HELB Test Profile".
-- LOCA/HELB From 24 hours to 30 days (30 days at 176°F = 1 year at 120°F)	Max Output Shift, % of Calibrated Span: $\pm 1$ at Upper Span Limit; $\pm 3$ [see DBE Performance Specification Note (a)].
-- LOCA/HELB First 3 hours of Test Profile	Max Output Shift, % of Calibrated Span: $\pm 3$ at Upper Span Limit; $\pm 8$ [see DBE Performance Specification Note (a)].
-- LOCA/HELB From 3 hours to 24 hours of Test Profile	Max Output Shift, % of Calibrated Span: $\pm 2$ at Upper Span Limit; $\pm 6$ [see DBE Performance Specification Note (a)].
Enclosure Classification	Meets IEC IP65 and provides the environmental protection of NEMA Type 4.
Topworks Cover and Base Material	Code I Cast iron per ASTM A48-64, Class 30, with Amercoat 66 finish. Code A Low copper aluminum alloy with vinyl paint finish. Application The aluminum cover and base meet the same requirements as the nuclear transmitter with cast iron cover and base for seismic, radiation, aging, and LOCA/HELB, except where chemical sprays are present.
Instrument Mounting	Mounting is on a vertical or horizontal DN 50 or 2 in pipe, or on a surface. A set of parts is optionally available for this purpose.

NAME	DESCRIPTION
<b>Bottomworks Materials</b>	See Documents Section "Nonprocess-Wetted and Process-Wetted Materials - Transmitter Bottomworks".
<b>Approximate Mass (Add 3.4 kg (7.5 lb) when optional seismic mounting bracket is used)</b>	With Cast iron Topworks: 19 kg (42 lbs) [Note: when optional cast iron, nonindicating junction box is used, add 2.3 kg (5 lb) to total mass.]; With Aluminum Topworks: 11 kg (25 lbs) [Note: When optional aluminum, nonindicating junction box is used, add 0.8 kg (1.8 lb) to total mass.]
<b>Standard Procedures</b>	Design Control In accordance with ANSI N45.2 and Code of Federal Regulation 101.11, Appendix B; Quality Assurance Program In accordance with ANSI N45.2 and Code of Federal Regulation 101.11, Appendix B; Qualification Program: Class IE Per IEEE 323-1974 and IEEE 344-1975. Nuclear Classification Code is CS-N/SRC; Class II: Per IEEE 344-1975 (Structural integrity only). Nuclear Classification Code is CS-N/SRD.
<b>Standard Tests and Certificates</b>	Nuclear Cleaning To 1 ppm chloride content. Certificate (Form 7221) is provided; Hydrostatic Test At 150% of rated pressure. Certificate (Form 7220) is provided; Calibration Certificate (Form 3759) is provided. Certificate of Compliance: Class IE (Safety related: to IEEE 323-1974, IEEE 344-1975, and NUREG-0588 [Cat. 1] Dec. 1979.) Form 4129CS-N/SRC is provided; Class II Form 4129CS-N-SRD is provided (Structural integrity: to IEEE 344-1975).
<b>Type Test Reports</b>	Type test reports (user documents), Transmitter supporting qualification of these transmitters to IEEE Standards 323-1974 and 344-1975 (aging, LOCA, and radiation), are available on an as-needed basis. They are not routinely provided with every transmitter. The adjacent table lists transmitter models covered by the appropriate user documents.
<b>User Documents</b>	1. QOAC10 Qualification Program, N-E10s. 2. QOAC11; Test Report. 3. AOAAC12 Similarity Document

## Documents

NAME	VIEW / DOWNLOAD
Span, Range, and Maximum Ovrerange Pressure	<a href="#">View / Download</a>
Supply voltage vs. External Load Loop Resistance for Class 1E Transmitters	<a href="#">View / Download</a>
Supply voltage vs. External Load Loop Resistance for Class II Transmitters	<a href="#">View / Download</a>
OBE Test Profile	<a href="#">View / Download</a>
SSE Test Profile	<a href="#">View / Download</a>
Minimum Acceptable Span for Extremes of DBE Conditions	<a href="#">View / Download</a>
LOCA-HELB Test Profile	<a href="#">View / Download</a>
Nonprocess-Wetted and Process-Wetted Materials - Transmitter Bottomworks	<a href="#">View / Download</a>
N-E13DM Model Code	<a href="#">View / Download</a>
Nominal Dimensions	<a href="#">View / Download</a>
Qualified Life vs. Service Life	<a href="#">View / Download</a>



# FAQs

## Accessories

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**Mounting Bracket; -A, -B, -C**

See documentation section "NE-11GM-Model Code".

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**Integral Mounted  
Nonindicating Junction Box; -  
D, -E, -F, -G, -H, and -I**

See documentation section "NE-11GM-Model Code".

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**Reverse Output; -J and -K**

See documentation section "NE-11GM-Model Code".

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**Range Kit Elevated or  
Suppressed Zero -L**

Allows for suppressed-zero or elevated-zero ranges. The elevated-zero kit is not applicable to the N-E11AL, AM, and AH Series transmitters, since they are absolute pressure instruments and can have suppressed zero ranges only.

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**Calibration Accessory**

A calibration accessory (BO137AZ) is offered for transmitters having a cast iron base and cover (Material Code "I")

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