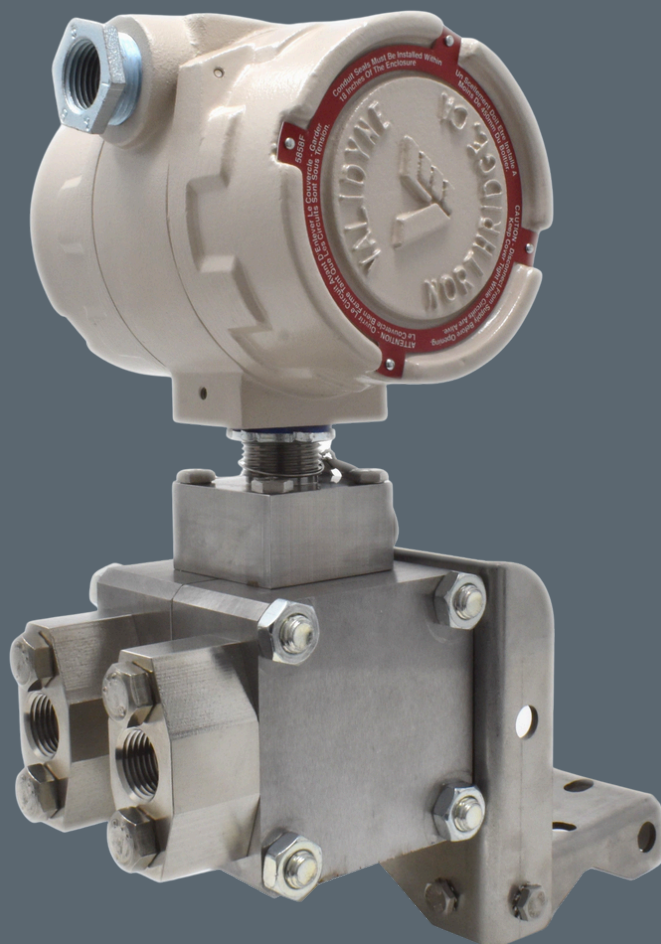


N-DR800 draft range pressure transmitter



Overview

The N-DR800 is a nuclear-qualified, analog, loop powered draft range pressure transmitter for very low-pressure measurement. It has a full-scale range as low as $\pm 0.25''$ H₂O, making it ideal for air flow control applications. It can be turned down to $\pm 0.1''$ H₂O, with higher full-scale ranges to $\pm 100''$ H₂O available. It offers 0.5% accuracy and an operating temperature range of -20°F to $+185^{\circ}\text{F}$. The total combined temperature effects are less than 3%/100°F.

Low pressure nuclear power plant applications

- HEPA vent filter
- HEPA filter discharge flow
- Control room air
- Containment pressure
- Scrubber/pre-concentrator demister
- Rad waste evaporator
- Vent stack monitoring
- Turbine building DP
- Main chimney flow

Replacement for obsolete draft range transmitters

- Ametek Gulston-Statham DR 3200
- Prime 340D (Cameron, Barton, Moore Products)
- Rosemount™ 1151DR
- Tobar 56DR
- KDG Mobrey (Emerson, Delta) Series 4000 draft range

Technical specifications

Further features

- Fully analog, loop powered, 4-20 mA
- Operates from 12 to 45 VDC terminal voltage
- Nuclear grade (CGD/OEM)
- IEEE 344 seismic/mild environment
- Designed for electromagnetic compatibility with other nuclear plant I&C
- EMC per NRC RG1.180
- Wetted parts traceability
- Full Range as low as 0.25" H2O without turndown or amplification
- Low ambient temperature effects improve very low measurements
- Selectable resolution on zero and span adjustments ease critical calibrations
- Sensor body and wetted parts made from 410 SST for corrosion resistance

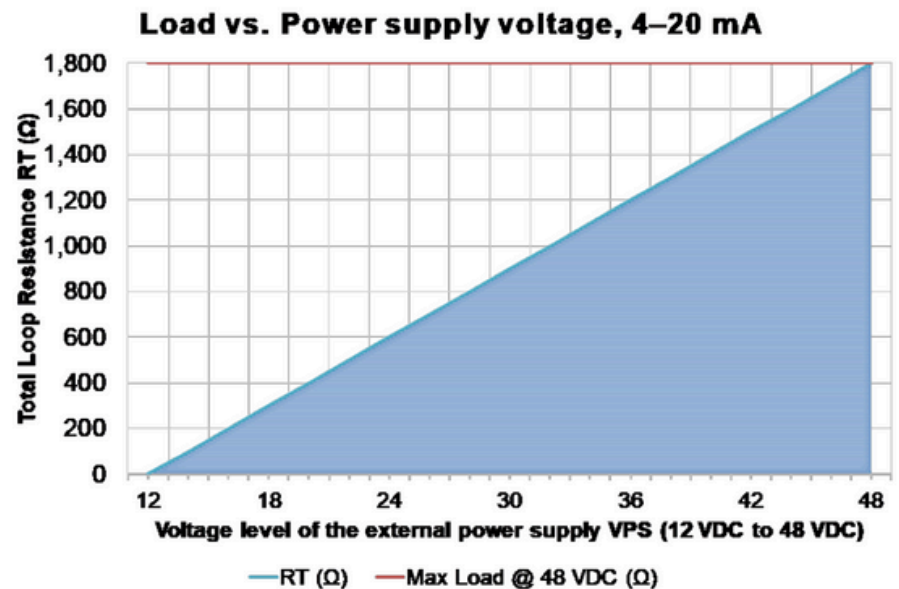
Construction

- Gasketed, threaded covers on the electrical enclosures (NEMA 4 enclosure).
- Dual electrical cavities in the electrical housing keep field wiring separate from the electrical compartment.
- 1/4" NPT female pressure connections on 2.125" centers
- Pressure connections front/ rear
- Sensor body and wetted parts made from 410 SST
- IEEE 344 Seismic qualified stainless-steel mounting bracket

Electrical

- Two-wire loop powered 4-20 mA
- Wide power input range of 12 to 48 VDC (see power supply/load curve)
- Reverse polarity and short circuit protection
- Selectable damping with user selectable time constant from 0.25 to 8 seconds
- External zero and span adjustment potentiometers

Power supply/load curve



$$VPS = (.02 \times RT) + 12$$

VPS = power supply voltage

RT - total loop resistance

.02 - full scale current (Amps)

12 = VDC min. terminal Volts

Nuclear specifications

IEEE 323/344 Class 1E Mild Environment where seismic is the only design basis event (DBE) of consequence: Seismic qualification envelopes the Generic Seismic Profile per EPRI TR-107330 Figure 4-5 with 5% damping horizontal and vertical. EMC Compliance to USNRC RG 1.180.

Technical specifications

Reference standards and specifications

- IEEE Std. 323-1974/1983/2003, "IEEE Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," The Institute of Electrical and Electronics Engineers, Inc
- IEEE Std. 344-1975/1987/2004, "IEEE Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations," The Institute of Electrical and Electronic Engineers, Inc
- EPRI TR-107330, "Generic Requirements Specification for Qualifying a Commercially Available PLC for Safety-Related Applications in Nuclear Power Plants," EPRI, December 1996
- MIL-HDBK-217F, Military Handbook: Reliability Prediction of Electronic Equipment

MIL-HDBK-217F MTBF and failure rate

- 25°C (77°F) MTBF 7,274,526 hours (830.4 years); failure rate FIT 137.5 (10⁹ hours)
- 40°C (104°F) MTBF 5,378,455 hours (614.0 years); failure rate FIT 185.9 (10⁹ hours)

Reliability

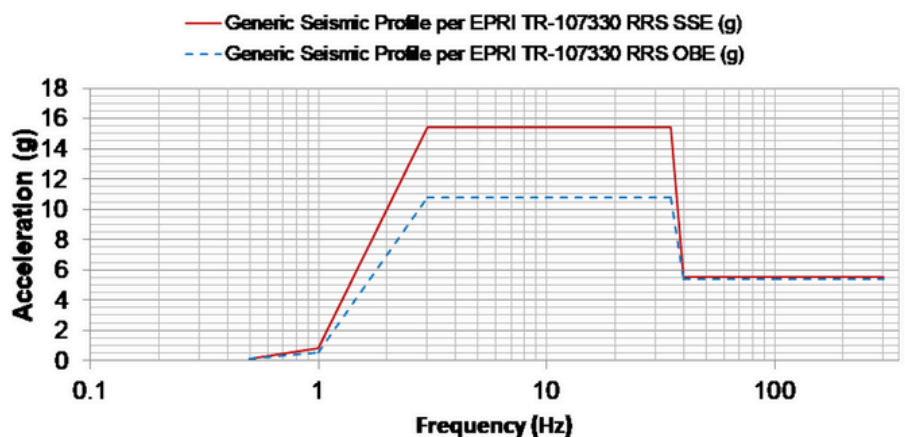
Reliability calculations indicate a 95.3% probability that these transmitters will operate for 40 years at 25°C without failure. The test program verified that the specimens can meet or exceed their performance requirements in mild environment applications under normal, abnormal, operational basis event and safe shutdown event conditions.

Quality assurance and certification of origin

Ultra Energy is a value-added reseller of Model N-DR800 under an OEM/VAR agreement with Validyne Engineering located in Northridge CA. The EMC protection circuitry has been designed and tested by Ultra Energy to comply with US NRC Reg. Guide 1.180 (IEC 61000 Series options). Ultra performs commercial grade dedication under its 10CFR50 App. B QA program and owns the IEEE 323/344 Class 1E qualification. Ultra Energy is the exclusive channel to market for N-DR800. This product is designed and manufactured in U.S.A.

Seismic qualifications

5% Damping Ratio - Horizontal and Vertical - 10% Margin Added



Test levels from EPRI TR-107330, Figure 4-5 (1996 corrected edition.) During the Seismic test the output remained within $\leq \pm 18$ mV disturbance, which is less than the $\pm 0.5\%$ reference accuracy. The N-DR800 output before, during and after OBE and SSE remained within the $\pm 0.5\%$ of URL.

Technical data

Feature	Description
DP range	Upper range limit (URL)
P25	± 0.25 inH ₂ O, 0.6225 mbar, 62.16 Pa
P50	± 0.5 inH ₂ O, 1.245 mbar, 124.3 Pa
1P0	± 1 inH ₂ O, 2.49 mbar, 248.6 Pa
2P5	± 2.5 inH ₂ O, 6.225 mbar, 622 Pa
5P0	± 5 inH ₂ O, 12.45 mbar, 1,243 Pa
10P	± 10 inH ₂ O, 24.9 mbar, 2,486 Pa
25P	± 25 inH ₂ O, 62.25 mbar, 6,216 Pa
50P	± 50 inH ₂ O, 124.5 mbar, 12,432 Pa
1CO	± 100 inH ₂ O, 249 mbar, 24,864 Pa
Turndown (applicable for all range codes)	2.5:1
Zero adjust	Continuously adjustable 20-turn zero pot. Works in combination with circuit board jumper to provide a zero setpoint from -100% to +85% of full-scale.
Span adjust	Continuously adjustable 20-turn span pot provides turn-down ratios up to 2.5:1. Works in combination with circuit board jumper for bipolar applications.
Temperature effects	3%/100°F combined zero and span, -20°F to +185°F

Technical data

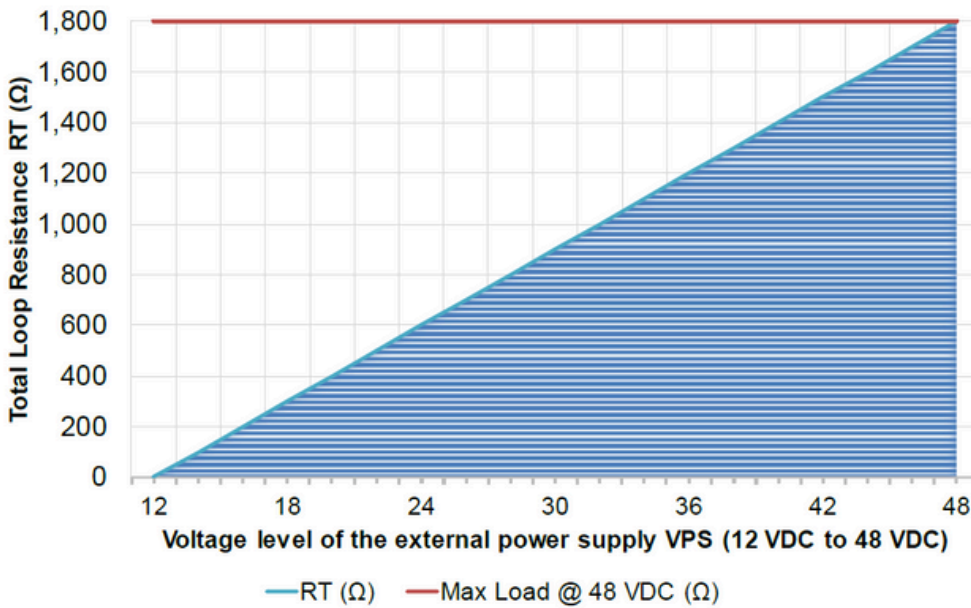
Feature	Description
Humidity	0-100% relative humidity
Overpressure limits	±5 psi (with less than 5% FS Zero Shift)
Max. line pressure	100 psi 10" H2O and below; 2000 psi above 10" H2O
Line pressure coefficient	10" H2O FS and below, 1% FS or less per 100 psi; above 10" H2O FS, 1% FS or less per 400 psi (typical)
Accuracy	0.5% or better, including non-linearity, hysteresis, non-repeatability and dead band
Stability	±0.5% Full-Scale over 6 months
Damping	Time constant selectable from ¼ to 8 seconds
Signal Output	4-20 mA (true two-wire system)
EMC and circuit protection	US NRC RG 1.180, IEC 61000 Series, Reverse polarity, short-circuit proof
Pressure connections	¼" NPT female pressure connections on 2.125" centers
Electrical connections	Terminal barrier strip for field wiring and test points
Electrical enclosure	Powder coated aluminum NEMA 4 with Neoprene gasket and threaded covers
Weight	16 lbs (without bracket and accessory fittings)
O-rings	Available with BUNA-N (std.), Ethylene Propylene, Viton-A, or Silicone.

Technical data

Feature	Description
Chemical compatibility	Process fluids and gasses compatible with 410 SST, Inconel, 316 SST and selected O-ring material
Accessories	Wall Mount Seismic Mounting Kit 1000-520-0015T (2lbs)

Power supply curve

Load vs. Power supply voltage, 4–20 mA



$VPS = (.02 \times RT) + 12$ Where:
 VPS = Power Supply Voltage
 RT = Total Loop Resistance
 .02 = Full Scale Current (Amps)
 12 = VDC Min. Terminal Volts

Technical specifications

Model matrix

Model Matrix/ Ordering Information

Model	Transmitter Type	DP
N-DR800D	Draft Range Differential Pressure Transmitter	•
Capsule URL		
P25	± 0.25 inH ₂ O, 0.6225 mbar, 62.16 Pa	
P50	± 0.5 inH ₂ O, 1.245 mbar, 124.3 Pa	
1P0	± 1 inH ₂ O, 2.49 mbar, 248.6 Pa	
2P5	± 2.5 inH ₂ O, 6.225 mbar, 622 Pa	
5P0	± 5 inH ₂ O, 12.45 mbar, 1,243 Pa	
10P	± 10 inH ₂ O, 24.9 mbar, 2,486 Pa	
25P	± 25 inH ₂ O, 62.25 mbar, 6,216 Pa	
50P	± 50 inH ₂ O, 124.5 mbar, 12,432 Pa	
1C0	± 100 inH ₂ O, 249 mbar, 24,864 Pa	
Options		
O-Rings		
N	BUNA-N (Standard)	
E	Ethylene Propylene	
V	Viton-A	
S	Silicone	
Output Calibration		
1	4-20 mA (Standard = 0, + URL)	
2	4-12-20 mA = - URL, 0, + URL	
3	Customer Specified	
Display		
A	None	
Certification		
4	Standard Industrial	
E	Class 1E, Safety Related	
Fittings		
A	No 1/2" NPT Adapters	
B	With 1/2" NPT Adapters	
Mounting Bracket		
B0	Wall Mount Seismic Mounting Kit 1000-520-0015T	
Other Special Customization		
SP	Consult Factory	

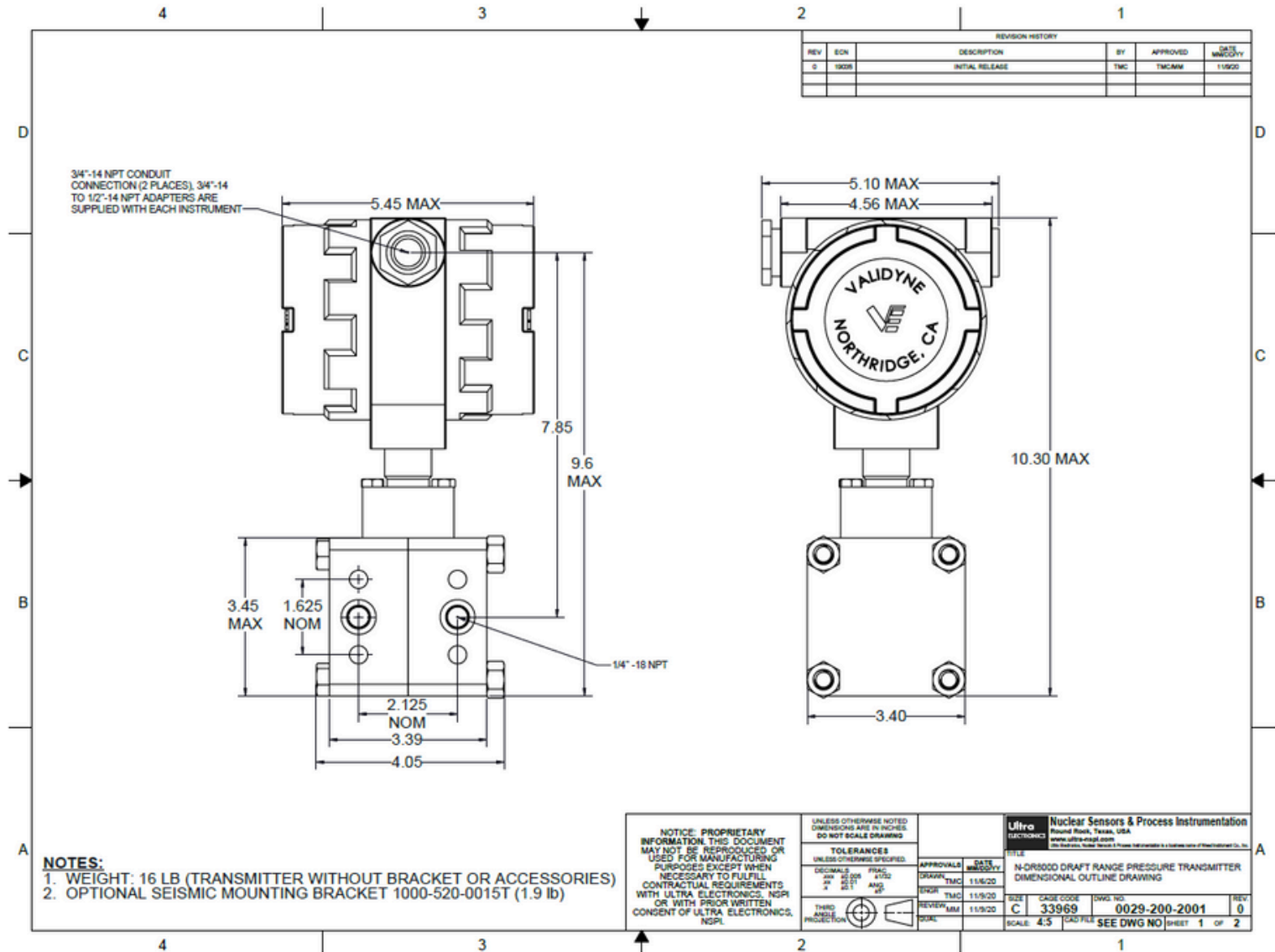
Example Model Code:

N-DR800D-1P0-N-1-A-E-A-B0

N-DR800D ±10 inH₂O, BUNA-N, 4-20 mA Standard Calibration, No display, Class 1E Safety, No 1/2" NPT adaptors, with Seismic mounting bracket kit.

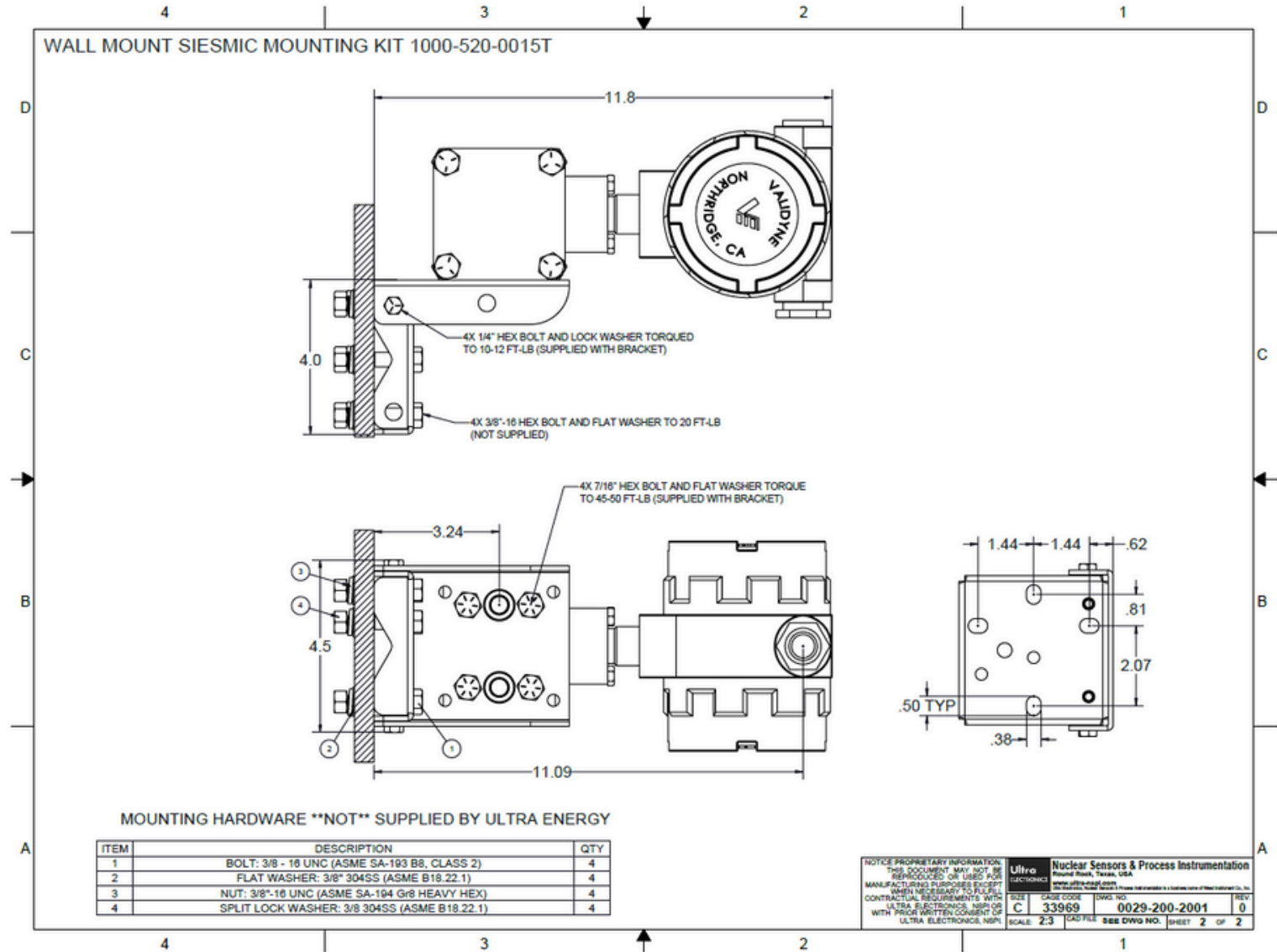
Technical specifications

Dimensional drawings



Technical specifications

Dimensional drawings



About Ultra Energy

Organizations working with nuclear and industrial technologies must deliver reliable production at the same time as safeguarding people, the environment and infrastructure. We develop and manufacture measurement and control solutions that give our customers complete, long-term control over systems operating in harsh environments, helping them operate safely and increasing the value derived from their investments over their total lifespan.

Part of Curtiss-Wright, Ultra Energy has worked with nuclear and industrial customers for over 60 years. We support customers across the world from facilities located in the US and UK. Our solutions are embedded in strategic national infrastructure and our people are active partners in customer programs that are focused on delivering advanced future nuclear and industrial capabilities.

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United States of America

707 Jeffrey Way
Round Rock
Texas 78665-2408
USA

Tel: +1 512-434-2800

United Kingdom

Innovation House
Lancaster Road
Ferndown Industrial Estate
Wimborne
Dorset BH21 7SQ
UK

Tel: +44 (0) 1202 850 450

For more information

Web: ultra.energy

Email: sales@ultra-nspi.com