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Product Data Sheet
DTN2070 Differential Pressure Transmitter

The DTN2070 Class 1E Differential Pressure Transmitter is designed for harsh nuclear environments and manufactured by Ultra Energy. The transmitters provide precision pressure measurements in nuclear applications requiring reliable performance and functional safety. The instruments are Class 1E qualified to IEEE 323-1974 and IEEE 344- 1987. The DTN2070 contains only analog electronics utilizing a diaphragm isolated direct coupled strain gauge pressure sensor capsule. The DTN2070 is updated to meet the most stringent environmental requirements of Gen III+ reactors for harsh operating environments and post-accident monitoring applications inside containment.

The DTN2070 has undergone its own complete seismic and environmental qualification. While the transmitter has been updated over the years to improve performance and to deal with component obsolescence, the sensing capsule of the DTN2070 (Westinghouse Veritrak/ Tobar/ Camille Bauer Model 32, and most recently Weed Instrument DTN2010 and N97) is the same basic field proven design as the Model 32 originally qualified in 1982.

- Advanced thin film metal strain gauge sensor technology
- All stainless steel housings, non-painted
- Seismically qualified stainless steel mounting brackets
- Loop powered, 2 wire, 4-20 mA
- 1/4-inch NPT process connections
- Dustproof and waterproof construction;
  no humidity effect
- Interchangeability

Features

- True analog design – no microprocessor or firmware/software
- Advanced thin film metal strain gauge sensor technology
- All stainless steel housings, non-painted
- Seismically qualified stainless steel mounting brackets
- Loop powered, 2 wire, 4-20 mA
- ¼ inch NPT process connections
- Dustproof & waterproof construction; no humidity effect
- Quick disconnect electrical connectors (fully EMI shielded)
- DP Overpressure protection (2,500 psig on one side without damage)
- DP capsules are filled with high-performance radiation tolerant silicone fluid
- Field adjustable via externally accessible ports for span and zero adjustments
- Factory temperature compensation 100% tested to 300ºF (149ºC)
- Installation, instruction and maintenance manuals
- No special tools required for installation, 2mm slot screwdriver for zero and span adjustment
- No detrimental/prohibited materials, halogen surface contamination (chloride and Fluoride) less than 15 micrograms/dm2
- Cleanliness acc. to RCC-M
- Nuclear quality assurance, reference files, quality plan, traceability, materials certifications, FAT, CoC, EOMR & Follow-up documents
- Nuclear Qualified
- IEEE 323-1974 Environmental Qualification; IEEE 344-1987 Seismic Qualification
- 36.5 MRAD (365 kGy) TID with DBA dose rate to 1.2 MRAD/hr-air (12 kGy/hr-air)
- Abnormal event, seismic, LOCA, submergence and post-accident monitoring

Specifications

NAME	DESCRIPTION
Ranges and Limits	See "DTN2070 Ranges and Limits" documentation located under the Documents tab.
Performance Specification Criteria	Model DTN2070 Performance Characteristics
-Reference Accuracy	±0.25% of span (Typical < 0.15% includes Linearity + Hysteresis + Deadband & Settability + Repeatability)
-Stability/Drift	±0.2% of URL per 30 months at reference conditions
-Static Pressure Zero Effect	±0.25% URL for 1,000 psi static pressure change. This effect is systematic and can be calibrated out for a particular pressure before installation
-Zero Overpressure Effects (per 1000 psi [6.89 Mpa])	±0.25% URL one-sided, ±1% URL two-sided sequential
-Field Adjustability (Zero & Span) for Harsh Environment Models	±15% of span, within the transmitter URL
-Field Adjustability (Zero & Span) for Non-Safety, Mild and Non-Submergence Models	Zero: ±70% of URL, Span: ±33% to ±100% of URL
-Direct or Reverse Acting Capabilities	Direct or Reverse acting is factory set and cannot be changed in the field
-Operating Temperature	40°F to 257°F (4.4°C to 125°C) normal services. Operating temperatures will affect qualified life.

NAME	DESCRIPTION
-Zero Elevation, Zero Suppression Factory set	Zero elevation and suppression must be such that neither the calibrated span nor the upper or lower range value exceeds 100% of the URL
-Turn-On Time	2 seconds or less, .1 minute for rated accuracy
-Storage Temperature	-40°F to 257°F (-40°C to 125°C). Storage temperatures above 120°F will affect qualified life.
-Output Signal	4-20 mA two wire only
-Response Time, Range Code 200	≤1.5 sec (Sensor response time to 50% with a 100% span step change at 100°F [37.8°C]
-Response Time, Range Code 300	≤0.7 sec (Sensor response time to 50% with a 100% span step change at 100°F [37.8°C]
-Response Time, Range Code 400, 600 and 800	≤0.4 sec (Sensor response time to 50% with a 100% span step change at 100°F [37.8°C]
-Response Time, Range Code 850	≤0.25 sec (Sensor response time to 50% with a 100% span step change at 100°F [37.8°C]
-Damping	Factory set, 0 or 1.6 seconds
-Power Supply Effect	0.005% of calibration span/volt
-Min Current Limit	3.4 +/-.1 mA
-Max Current Limit	21.6 +/- .2 mA
-Power Supply Load Limitations	18 VDC to 48 VDC (Mild); 18 VDC to 33 VDC (Harsh); R (Ω) = Maximum field loop Resistance = 45.5 * (Power Supply Voltage - 18)

NAME	DESCRIPTION
-Load Effect	Within limits set by the line voltage, the output current is independent of load resistance
-Mounting Position Effect	No span effect; zero shift of up to 1.5 inH2O (0.249 kPa) which can be calibrated out.
-EMC/EMI Compliance	Satisfies requirements defined in: US NRC Reg. Guide 1.180 Rev. 1. 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.
-Transient Protection	Transient Protection Meets Criteria A of IEC 61000□4□4:1995 (Electrical fast transient/burst immunity test; Power and I/O Line Burst: 2kV, 15/300 ms, 5kHz)
-PED, CE mark	DTN2070 is fully compliant
-Temperature Effects [per 50°F (27.8°C)]	Note (a): Above 130°F (54.4°C), determine the error from 130°F to the temperature of interest then add the 130°F error.
- - Harsh Environments from 40°F to 130°F (4.4°C to 54.4°C)	Range Codes 200, 300, 400: ±0.6% URL + 0.4% Span; Range Codes 600, 800: ±0.35% URL + 1.0% Span; Range Code 850: ±0.6% URL + 1.2% Span
- -Harsh Environments from 130°F to 257°F, (54.4°C to 125°C)	Range Codes 200-800: ±0.7% URL; Range Code 850: ±1.35% URL; Note (a)
- - Mild, Rad Harsh and Submergence Environments from 40°F to 130°F [4.4°C to 54.4°C]	Range Codes 200-850: • ± 0.50% URL; Note (a)
Power Supply Requirements	18 VDC to 48 VDC (See the "DTN2070 Power Supply Load Limits" under the Documents tab for load resistance requirements.)

NAME	DESCRIPTION
Functional Specification Criteria	Model DTN2070 Functional Characteristics
-Range-down	3.5 to 1 (minimum span is 28.6% URL)
-Volumetric Displacement	< 0.005 in3 (0.082 cm3)
-Enclosure Rating	NEMA 6P (IP 68)
-Humidity Limits	0-100% R.H., Submergence
Physical Specification Criteria	Model DTN2070 Physical Characteristics
-Isolating Diaphragms	Range 200, 300, 400, 850, and 100: Hastelloy™ Alloy-C; Range 600 and 800: Stainless 17-7 PH;
-Drain Vent Valve	316 SST
-Process Flange	316 SST
-Process Seal	EPDM
-Electronics Housing O-ring	EPDM
-Fill Fluid	Silicone Oil - DC550 Standard
-Sensor Module Housing	316 SST
-Flange Bolt	Medium Carbon Alloy Steel, SAE J429, Grade 8, Zinc Yellow-Chromate Plated Finish Per ASTM B633
-Electronics Housing	316 SST
-Mounting Bracket	304 SST

NAME	DESCRIPTION
-Mounting Bolts	300 Series Stainless Steel, ASTM F593
Process Connections	1/4-18 NPT Optional: welded fittings
-Electrical Connections	Gen 3 QDC Quick Disconnect Connector; Seal Gland with 8 ft. leads
-Weight	16.9 lbs. (7.66 kg) with mounting bracket, bolts and SST tag 14.9 lbs. (6.78 kg) transmitter only 2 lbs. (0.9 kg) mounting bracket
-Traceability	Per 10CFR50 Appendix B, 10CFR21, NQA-1, and ISO 9001:2008; chemical and physical certification of pressure retaining parts.
Nuclear Qualification Test	Model DTN2070 Nuclear Qualification Specification
-Service Life	23.4 years at 100° F (37.8°C) (See the "Qualified Service Live vs. Temperature" under the Documents tab for details.)
-Seismic Accuracy	Specifications listed reflect Maximum error during seismic disturbance. All Ranges: Accuracy within ±0.5% URL for OBE at 1/2 SSE Accuracy within ±0.7% URL for SSE Transmitters will return to within ±0.20% after the event. (See the "Seismic - Test Response Spectra, 5% Damping" under the Documents tab for details.)
-During LOCA	+ 4.0 % of URL for DPs +3.7 % of URL for PA/PGs First 15 days & Submergence, (Excludes Radiation) (See "Actual LOCA/PAMS Chamber Temperature" under the Documents tab for details.)

NAME	DESCRIPTION
-During PAMS (Post-Accident Monitoring)	+ 2.7% of URL 43 days (See "Actual LOCA/PAMS Chamber Temperature" under the Documents tab for details.)
-Environmental/Seismic Qualification	Qualified to IEEE 323-1974 and 323-1983 Seismic: IEEE 344-75 & IEEE 344-87

Documents

NAME	VIEW / DOWNLOAD
DTN2070 Ranges and Limits	View / Download
DTN2070 Power Supply Load Limits	View / Download
Qualified Service Live vs. Temperature	View / Download
Seismic - Test Response Spectra, 5% Damping	View / Download
Actual LOCA/PAMS Chamber Temperature	View / Download
DTN2070 DP Dimensional Drawing and Mounting	View / Download
DTN2070 Model Matrix	View / Download

Accessories

Cable	Quick Disconnect Connector Mating Cable