

## Product Data Sheet

### DTN2070 Absolute and Gauge Pressure Transmitter



The DTN2070 Class 1E absolute and gauge pressure transmitters are 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)
- PA/PG transmitters have a vacuum behind the sensor diaphragm, no fill fluid
- Field adjustable via externally accessible ports for span and zero adjustments
- Factory temperature compensation 100% tested to 300°F (149°C)
- 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/dm<sup>2</sup>
- 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   |
|---|---|
| <b>Ranges and Limits</b>  | See "DTN2070 Ranges and Limits" documentation located under the Documents tab.  |
| <b>Performance Specification Criteria</b>   | Performance Specification Characteristics   |
| <b>-Reference Accuracy</b>  | ±0.25% of span (Typical < 0.15% includes Linearity + Hysteresis + Deadband & Settability + Repeatability)                               |
| <b>-Stability/Drift</b>   | ±0.25% of URL per 30 months at reference conditions   |
| <b>-Zero Overpressure Effects (per 1000 psi [6.89 Mpa])</b>                                   | ±0.25% URL one-sided, ±1% URL two-sided sequential  |
| <b>-Field Adjustability (Zero &amp; Span) for Harsh Environment Models</b>                    | ±15% of span, within the transmitter URL  |
| <b>-Field Adjustability (Zero &amp; Span) for Non-Safety, Mild and Non-Submergence Models</b> | Zero: ±70% of URL, Span: ±33% to ±100% of URL   |
| <b>-Direct or Reverse Acting Capabilities</b>   | Direct or Reverse acting is factory set and cannot be changed in the field  |
| <b>-Zero Elevation, Zero Suppression Factory set</b>  | Zero elevation and suppression must be such that neither the calibrated span nor the upper or lower range value exceeds 100% of the URL |
| <b>-Range-down</b>  | 3.5 to 1 (minimum span is 28.6% URL)  |
| <b>-Operating Temperature</b>   | 40°F to 257°F (4.4°C to 125°C) normal services. Operating temperatures will affect qualified life.                                      |

| NAME                                    | DESCRIPTION  |
|---|--|
| <b>-Storage Temperature</b>             | -40°F to 257°F (-40°C to 125°C). Storage temperatures above 120°F will affect qualified life.  |
| <b>-Output Signal</b>                   | 4-20 mA two wire only  |
| <b>-Response Time (All range Codes)</b> | ≤0.2 sec; Sensor response time to 50% with a 100% span step change at 100°F [37.8°C]   |
| <b>-Damping</b>                         | Factory set, 0 or 1.6 seconds  |
| <b>-Power Supply Effect</b>             | 0.005% of calibration span/volt  |
| <b>-Min Current Limit</b>               | 3.4 +/- .1 mA  |
| <b>-Max Current Limit</b>               | 21.6 +/- .2 mA   |
| <b>-Power Supply Load Limitations</b>   | 18 VDC to 48 VDC (Mild); 18 VDC to 33 VDC (Harsh); $R (\Omega) = \text{Maximum field loop Resistance} = 45.5 * (\text{Power Supply Voltage} - 18)$   |
| <b>-Load Effect</b>                     | Within limits set by the line voltage, the output current is independent of load resistance  |
| <b>-Mounting Position Effect</b>        | No span effect; zero shift of up to 1.5 inH <sub>2</sub> O (0.249 kPa) which can be calibrated out.  |
| <b>-EMC/EMI Compliance</b>              | 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. |

| NAME   | DESCRIPTION   |
|--|---|
| <b>-Transient Protection</b>   | Transient Protection Meets Criteria A of IEC 61000-4:1995 (Electrical fast transient/burst immunity test; Power and I/O Line Burst: 2kV, 15/300 ms, 5kHz) |
| <b>-PED, CE mark</b>   | DTN2070 is fully compliant  |
| <b>-Temperature Effects (per 50°F [27.8°C])</b>                            | 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.                                   |
| <b>- - Harsh Environments 40°F to 130°F (4.4°C to 54.4°C)</b>              | ±0.8% URL + 0.3 % Span  |
| <b>- - Harsh Environments 130°F to 257°F*, (54.4°C to 125°C)</b>           | ±0.52% URL + .25% Span; Note (a)  |
| <b>- - Mild, Rad Harsh and Submergence 40°F to 130°F (4.4°C to 54.4°C)</b> | ± 0.50% URL   |
| <b>Power Supply Requirements</b>   | 18 VDC to 48 VDC (See the "DTN2070 Power Supply Load Limits" under the Documents tab for load resistance requirements.)                                   |
| <b>Functional Specification Criteria</b>                                   | Model DTN2070 Functional Characteristics  |
| <b>-Volumetric Displacement</b>  | Negligible  |
| <b>-Enclosure Rating</b>   | NEMA 6P (IP 68)   |
| <b>-Humidity Limits</b>  | 0-100% R.H., Submergence  |
| <b>-Turn-On Time</b>   | 2 seconds or less, .1 minute for rated accuracy   |
| <b>Physical Specification Criteria</b>                                     | Model DTN2070Physical Characteristics   |

| <b>NAME</b>                        | <b>DESCRIPTION</b>  |
|------------------------------------|---|
| <b>-Isolating Diaphragms</b>       | All Range codes: Stainless 15-5 PH  |
| <b>-Drain Vent Valve</b>           | None  |
| <b>-Process Flange</b>             | 316 SST   |
| <b>-Process Seal</b>               | EPDM  |
| <b>-Electronics Housing O-ring</b> | EPDM  |
| <b>-Fill Fluid</b>                 | None (Vacuum)   |
| <b>-Sensor Module Housing</b>      | 316 SST   |
| <b>-Electronics Housing</b>        | 316 SST   |
| <b>-Mounting Bracket</b>           | 304 SST   |
| <b>-Mounting Bolts</b>             | 304 SST   |
| <b>-Process Connections</b>        | 1/4-18 NPT Optional: welded fittings  |
| <b>-Electrical Connections</b>     | Gen 3 QDC Quick Disconnect Connector; Seal Gland with 8 ft. leads   |
| <b>-Weight</b>                     | 9.2 lbs. (4.17 kg) including integral mounting bracket.   |
| <b>-Traceability</b>               | Per 10CFR50 Appendix B, 10CFR21, NQA-1, and ISO 9001:2008; chemical and physical certification of pressure retaining parts. |
| <b>Nuclear Qualification Test</b>  | DTN2070 Nuclear Qualification Specification   |

| NAME   | DESCRIPTION  |
|--|--|
| <b>-Service Life</b>                           | 23.4 years at 100° F (37.8°C) (See the "Qualified Service Live vs. Temperature" under the Documents tab for details.)  |
| <b>Seismic Accuracy-</b>                       | 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.) |
| <b>-During LOCA</b>                            | + 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.)  |
| <b>During PAMS (Post-Accident Monitoring)-</b> | + 2.7% of URL 43 days (See "Actual LOCA/PAMS Chamber Temperature" under the Documents tab for details.)  |
| <b>-Environmental/Seismic Qualification</b>    | Qualified to IEEE 323-1974 and 323-1983 Seismic: IEEE 344-75 & IEEE 344-87   |

## Documents

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| NAME   | VIEW / DOWNLOAD                 |
|--|---------------------------------|
| <b>DTN2070 Ranges and Limits</b>                       | <a href="#">View / Download</a> |
| <b>DTN2070 Power Supply Load Limits</b>                | <a href="#">View / Download</a> |
| <b>Figure 1 Qualified Service Live vs. Temperature</b> | <a href="#">View / Download</a> |
| <b>Seismic - Test Response Spectra, 5% Damping</b>     | <a href="#">View / Download</a> |
| <b>Actual LOCA/PAMS Chamber Temperature</b>            | <a href="#">View / Download</a> |
| <b>DTN2070 PA/PG Dimensional Drawing and Mounting</b>  | <a href="#">View / Download</a> |
| <b>DTN2070 Model Matrix</b>                            | <a href="#">View / Download</a> |



## Accessories

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### Cable

Quick Disconnect Connector Mating Cable