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## **Pressure Instrumentation Installation Tips for Challenging Applications**

**David Dlugos  
Ashcroft Inc.**

**2018 ISA Water/Wastewater & Automatic Controls  
Symposium (WWAC)  
8-9 August 2018, Bethesda, Maryland USA**

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# Presenter

- David Dlugos
  - Global Technical Product Leader, Ashcroft Inc.
  - 37 Years experience
  - Manager of Technical Applications Group
  - BSEE, Fairfield University
  - Earned 4 US Patents
  - ISA District 1 Vice President-elect
  - Past President of CT Valley Section
  - ISA Senior Member



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# Agenda



- General Installation Guidelines
- Instrument Isolators
- Challenges of Slurries
- Mounting Multiple Instruments
- Remote Mounting
- Summary



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# GENERAL INSTRUMENT INSTALLATION GUIDELINES

- Instruments should be located to minimize the effects of:
  - Vibration
  - Extreme ambient temperatures
  - Moisture
  - Dry locations away from very high thermal sources (ovens, boilers etc.) are preferred.
- If the mechanical vibration level is extreme, the instruments should be remotely located and connected to the pressure source via flexible tubing (capillary).

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# INSTRUMENT ISOLATORS VALVES



- A shut-off valve should be installed to isolate the instrument for inspection or replacement without shutting down the process



Block &  
Bleed Valve



3-way Manifold



5-Way Manifold

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# CHALLENGES OF SLURRIES

- When instruments used to measure high particulate media such as slurries, they need to be protected from clogging.



Wafer type



Bolt Thru



Threaded



Flush flange



Flush threaded

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# MOUNTING MULTIPLE INSTRUMENTS TO ISOLATION RINGS & DIAPHRAGM SEALS

- Selection of instrument and isolation ring/ diaphragm seal combination
  - Wetted materials must be compatible with process
  - Select compatible fill fluid with proper temperature range
  - Displacement of the isolation ring must be larger than the displacement of the instruments
  - Review the chosen assembly accuracy and resolution, does it meet application requirement?
  - Check zero and span errors after instruments are installed on the rings or seals
  - Pressure switches should always be set after attaching to the rings or seals

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# MOUNTING MULTIPLE INSTRUMENTS TO ISOLATION RINGS & DIAPHRAGM SEALS

- Typical Instrument Assemblies



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# MOUNTING MULTIPLE INSTRUMENTS TO ISOLATION RINGS & DIAPHRAGM SEALS

- Temperature errors can result from expansion or contraction of the filling fluid
- These errors can be predicted by knowing specifics of:
  - Fill total internal volume and coefficients of expansion
  - Seal/instrument assembly volumetric spring rate and pressure range
  - Temperature influences of ambient and process temperatures

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# REMOTE MOUNTING OF INSTRUMENTS



- If strong vibration is present
- Temperature of the process is too hot or cold
- Not able to mount the instrument(s) due to location and size constraints
- Best practice is to remote mount the instruments on flexible tubing (capillary).
- Ideally the instruments are mounted at the same height as the desired measurement point.
- If instruments are mounted at a different height, the instruments will need to be corrected to reflect the height difference

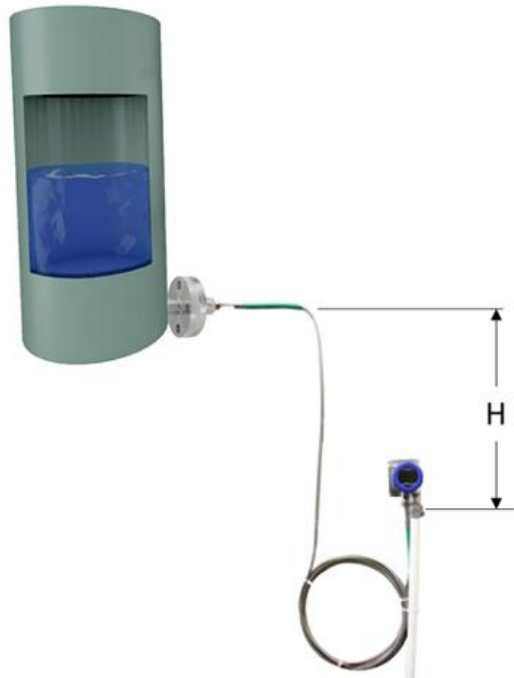
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# REMOTE MOUNTING EXAMPLE

- In a common tank example the transmitter is mounted below the tank. The capillary line is connected to a diaphragm seal with a fill fluid of silicone.



$$P = SG \times H$$

Where:

$P$  = Pressure in inches of water

$SG$  = Specific Gravity

$H$  = Height in inches

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- Most applications can have instrument mounting challenges. Selection of the proper accessories, understanding their effects and compensating for them in the measurement process can solve most of the challenges..
- Environments like slurries and applications that include vibration, pressure spikes and pulsation can be addressed by the proper instrument selection or combination of instruments, adding an instrument isolator and the necessary options or accessories.

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# Thank you!

# Questions?

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