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|---------------------------------|-------------------------------------------|-------------------------|------------------|
| <b>Your Company Name / Logo</b> | <b>DP TRANSMITTER CALIBRATION<br/>SOP</b> | Doc no: SOP<br>INST 002 | Rev: 0           |
| Department: Instrumentation     | Standard operating procedure              | Date:                   | Page: see footer |

## 1. Purpose

To calibrate DP transmitters safely and accurately without damaging the sensor through one sided overpressure.

## 2. Scope

DP transmitters with 3 valve or 5 valve manifolds in flow, level and differential pressure service.

## 3. References

- Manufacturer instruction manual
- Instrument data sheet (LRV, URV, square root or linear output)
- Site isolation procedure

## 4. Responsibilities

- Instrument technician: carries out the work and records results.
- Instrument engineer or supervisor: reviews and approves the records.
- Operations: grants the permit, isolates the process and returns the equipment to service.

## 5. Safety precautions

- Work only under a valid permit to work and follow the site isolation (lockout tagout) procedure.
- Wear the PPE required for the area: safety helmet, glasses, gloves and safety shoes as a minimum.
- In hazardous areas use certified or intrinsically safe test equipment, or obtain a gas free certificate and hot work permit.
- Inform the control room before starting, and before returning the instrument to service.
- A DP transmitter can see full line static pressure on one side if the manifold is operated in the wrong order. Always follow the sequence below.
- For steam or hot condensate, allow impulse lines to cool and keep condensate pots filled.

## 6. Tools and equipment

- Low pressure calibrator or hand pump with reference, suitable for the DP range (mbar)
- mA meter or documenting calibrator
- HART communicator
- Vent tubing and container for process fluid

## 7. Prerequisites

- Permit approved; flow or level loop in manual, any trips bypassed under the approved procedure.
- Data sheet values: LRV, URV and whether square root is done in the transmitter or the DCS.

## 8. Procedure

### 8.1 Zero check under static pressure (optional, before isolation)

- 8.1.1 Open the equaliser valve with both block valves still open: the transmitter now sees zero DP at line pressure.
- 8.1.2 Read the output; a zero shift here (static pressure effect) can be trimmed with a zero trim if the procedure allows.

### 8.2 Removing from service (3 valve manifold)

- 8.2.1 Check that the equaliser valve is open.
- 8.2.2 Close the high pressure (HP) block valve.
- 8.2.3 Close the low pressure (LP) block valve.

8.2.4 Open the vent valves slowly to release pressure and drain trapped fluid safely.

### 8.3 As found and as left test

8.3.1 Connect the pressure source to the HP side; leave the LP side vented to atmosphere.

8.3.2 Close the equaliser valve.

8.3.3 Apply 0, 25, 50, 75 and 100 % of the DP span upscale and then downscale, recording the mA output.

8.3.4 If the output is square root, compare against  $4 + 16 \times \sqrt{(DP\%/100)}$  instead of the linear value.

8.3.5 Trim the sensor or output if any point is out of tolerance, then record the as left test.

### 8.4 Returning to service (3 valve manifold)

8.4.1 Close the vent valves and reconnect the impulse lines.

8.4.2 Check that the equaliser valve is open.

8.4.3 Open the HP block valve slowly.

8.4.4 Close the equaliser valve.

8.4.5 Open the LP block valve slowly.

8.4.6 Check for leaks and confirm the reading with the control room.

## 9. Acceptance criteria

- As left errors within tolerance at all points.
- Correct manifold valve positions on return: both block valves open, equaliser and vents closed.
- No leaks; DCS reading consistent with the process.

## 10. Records

- Pressure transmitter calibration report (free template: [instrumentationblog.in/downloads/templates/pressure-transmitter-calibration-report/](http://instrumentationblog.in/downloads/templates/pressure-transmitter-calibration-report/))
- HART configuration record (free template: [instrumentationblog.in/downloads/templates/hart-transmitter-configuration-record/](http://instrumentationblog.in/downloads/templates/hart-transmitter-configuration-record/))

## 11. Approval

|           | Prepared by | Reviewed by | Approved by |
|-----------|-------------|-------------|-------------|
| Name      |             |             |             |
| Signature |             |             |             |
| Date      |             |             |             |

*This procedure is a generic template. Adapt it to your site permit system, the manufacturer instructions and your quality system before use.*