

**Product Information D3****LIFE SCIENCES**

# D3 Differential Pressure & Level Transmitter

**CLEANadapt****Range of applications**

- Head pressure and level measurement in pressurized vessels with continuous process temperature up to 110°C (230°F)
- Differential pressure measurement across filters
- CIP/SIP at 135°C (275°F) for 1 hour when ambient is below 60°C (140°F)

**Application examples**

- Hygienic pressure and level monitoring for life science applications
- Bio-reactor level and head space monitoring
- Filtration processes

**Hygienic design/Process connection**

- Front flush, 3-A installation for silos by Anderson flush fitting, E&H universal, or tank spud connections
- Conforming to 3-A Sanitary Standard 74-06 with Tri-Clamp® DIRECTadapt
- Product contacting materials compliant to FDA
- Sensor and product contact surfaces made of stainless steel
- Available with over 20 integral hygienic connections, more available through CLEANadapt adapters

**Features**

- Intuitive user interface makes set-up and configuration easy
- Electronic Differential provides 2 analog outputs (differential pressure and top or bottom pressure)
- State of the art temperature compensation minimizes error in dynamic temperature applications
- Fully electronic differential allows field replacement of components and repairability.
- Integrated tank tables allows volume and mass output when tank and product information are input
- Available in relative (vacuum and pressure)
- Patented dual o-ring seals provide IP69K ingress protection
- Dual loop output with Hart 7.0 communication and graphical LCD display

**Options/Accessories**

- Optional digital remote kit making display easier to view
- Optional M12 molded cordset available
- Wide range of ranges and fittings available

**Measuring principle of the pressure sensor**

In the D3 system each sensor uses a piezoresistive transducer to measure the difference between the atmospheric and process pressures. Additionally, a temperature sensor measures the temperature of the transducer and fill fluid to provide an output compensation. The resistive temperature signal and the voltage signal from the transducer are inputs to a correction algorithm which provides a pressure output in digital form. The digital signal is transferred from each sensor to the head where the microprocessor determines the difference and converts the output to a 4-20mA signal for the difference and one for the head pressure or total system pressure depending on the user's selection.

**Authorizations**
**AMSE BPE  
2019  
Compliant**
**Differential level sensor D3****Differential level sensor D3**

| Specification                     |   |  |
|-----------------------------------|---|--|
| <b>Measuring range URL</b>        | Relative  | -14.7...500 PSI, -1...35 BAR, -400...13850 inches w.c.   |
| <b>Overpressure strength</b>      | Factor  | 1.5 x nominal pressure of measuring element  |
| <b>Measurement accuracy</b>       | Differential error  | +/- 0.15% (DIFF <sub>URV</sub> +TOP <sub>URV</sub> )   |
|                                   | Top/Bottom sensor error   | +/-0.10% of calibrated range up to 5:1 turndown (+/-0.15% over if 5:1 turndown)  |
|                                   | Repeatability   | 0.05 %   |
|                                   | Long-term stability   | 0.2 % URL every 2 years  |
| <b>Temperature effect</b>         | Process   | < 0.016 % of calibrated measuring range / 5.5 °C (10 °F)   |
|                                   | Ambient   | < 0.016 % of calibrated measuring range / 5.5 °C (10 °F)   |
| <b>Temperature range</b>          | Process   | -18...110 °C (0...230 °F), at ambient ≤ 71 °C (160 °F)   |
|                                   | Ambient   | -18...71 °C (0...160 °F)   |
|                                   | CIP/SIP Cleaning  | 135°C (275°F) for 1 hour when ambient is below 60 °C (140 °F)  |
| <b>Response time</b>              |   | < 0.2 seconds  |
| <b>Sample rate</b>                |   | < 0.05 seconds   |
| <b>Materials</b>                  | Connection head<br>Metal cover<br>Plastic cover<br>Threaded connector | Stainless steel, AISI 304 (1.4301), R <sub>a</sub> ≤ 0.8 μm (32 microinch)<br>Stainless steel, AISI 304 (1.4301), R <sub>a</sub> ≤ 0.8 μm (32 microinch)<br>Polycarbonate<br>Stainless steel, AISI 304 (1.4301), R <sub>a</sub> ≤ 0.8 μm (32 microinch)                            |
|                                   | Wetted parts<br>Diaphragm<br>Diaphragm seal/oil filling               | Stainless steel, AISI 316L, R <sub>a</sub> ≤ 0.2 μm (8 microinch)<br>Stainless steel, AISI 316L, R <sub>a</sub> ≤ 0.2 μm (8 microinch)<br>Medical white oil / mineral oil / paraffin oil<br>FDA approval number 21CFR172.878, 21CFR178.3620, 21CFR573.680<br>Neobee M20 (optional) |
| <b>Process connection</b>         |   | 1-1/2" Tri-Clamp®<br>2" Tri-Clamp®<br>2½" Tri-Clamp®<br>3" Tri-Clamp®<br>AIC CPM Flush Mount<br>Anderson Flush Mount - Short and Long<br>Rosemount/Foxboro Sanitary Spud - Short and Long<br>Endress & Hauser Universal Adaptor - Short and Long<br>G1" CLEANadapt<br>DRD          |
| <b>Electric connection</b>        | Cable gland   | M16x1.5  |
|                                   | Plug-in connection  | M12 plug, 5-pin, 1.4305  |
| <b>Certifications/Compliances</b> |   | AMSE BPE 2019 Compliant<br>CE Compliant<br>CRN#OF19809.5 (consult factory for applicable regions and configurations)<br>CAN/CSA-22.2 No. 61010-1<br>IP 67 (with cable gland) / NEMA 4X<br>IP 69 K (with plug-in M12 connection)  |
| <b>Auxiliary Power Supply</b>     | Voltage   | 18...35 V DC   |
|                                   | Current Limit   | 4.2A   |
| <b>Output</b>                     | Loop 1 (Differential)   | analog 4...20 mA and Hart 7.0  |
|                                   | Loop 2 (Top or Bottom)  | analog 4...20 mA   |
| <b>Tightening torque</b>          | For assembly all D3 components  | 27 Nm (20 ft-lbs)  |

**Cleaning/Maintenance**

- In case of using pressure washers, don't point nozzle directly to electrical connections!

**Reshipment**

- Sensors shall be clean and must not be contaminated with dangerous media! Note the advice for cleaning!
- Use suitable transport packaging only to avoid damage of the equipment!

**Advice to conformity**

- Applicable guidelines:  
Electromagnetic compatibility 2004/108/EC
- The accordance with applicable EC-guidelines is confirmed with CE-labeling of the device.
- You have to guarantee the compliance of all guidelines applicable for the entire equipment.

**Transport/Storage**

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -55...+90 °C
- Relative humidity max. 95 %

**Standards and guidelines**

- You have to comply with applicable regulations and directives.

**Disposal**

- This instrument is not subject to the WEEE directive 2002/96/EC and the respective national laws.
- Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points.

**Order code of fully assembled sensor**

**D3** Sensor assembled

**Internal fill**

**M** Mineral Oil (FDA approved)

**N** Neobee M20

**Top Sensor URL**

**5** 0...6 PSI; 0...0.4 BAR, 0...166" w.c.

**6** -14.7...30 PSI; -1...2 BAR, -400...830" w.c.

**7** -14.7...100 PSI; -1...7 BAR, -400...2770" w.c.

**8** -14.7...500 PSI; -1...35 BAR, -400...13850" w.c.

**Top Sensor Fitting**

**XXX** (See fittings table for 3 digit code)

**Top Sensor Remote Cable**

**O** Integral

**B** 10' Cable

**E** 25' Cable

**F** 50' Cable

**Bottom Sensor URL**

**5** 0...6 PSI; 0...0.4 BAR, 0...166" w.c.

**6** -14.7...30 PSI; -1...2 BAR, -400...830" w.c.

**7** -14.7...100 PSI; -1...7 BAR, -400...2770" w.c.

**8** -14.7...500 PSI; -1...35 BAR, -400...13850" w.c.

**Bottom Sensor Fitting**

**XXX** (See fittings table for 3 digit code)

**Bottom Sensor Remote Cable**

**O** Integral

**B** 10' Cable

**E** 25' Cable

**F** 50' Cable

**Enclosure cap**

**2** Clear cap

**3** Stainless steel cap

**Connector Locations** (see location diagram)

|          | Electric | Top Sensor | Bottom Sensor |
|----------|----------|------------|---------------|
| <b>1</b> | A        | B          | C             |
| <b>2</b> | A        | C          | B             |
| <b>3</b> | B        | A          | C             |
| <b>4</b> | B        | C          | A             |
| <b>5</b> | C        | A          | B             |
| <b>6</b> | C        | B          | A             |

**Electrical connection**

**A** M12 QDR

**C** Cable gland

**N** 1/2" NPTF adaptor

**Top Pressure Units**

**P** PSI

**B** Bar

**W** inches of water

**L** millibar

**Top Pressure Range**

**XXX** see "Calibrated Range" table

**Diff Pressure Units**

**P** PSI

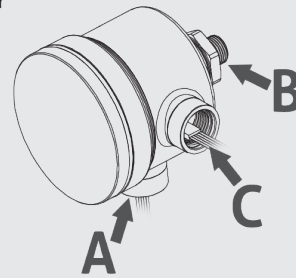
**B** Bar

**W** inches of water

**L** millibar

**Diff Pressure Range**

**XXX** see "Calibrated Range" table



**D3** **N** **6** **004** **E** **6** **004** **B** **2** **1** **A** **P** **028** **W** **294**

Order code of sensor head

D3E

Enclosure cap

- 2 Clear cap
- 3 Stainless steel cap

Connector Locations (see location diagram)

|   | Electric | Top Sensor | Bottom Sensor |
|---|----------|------------|---------------|
| 1 | A        | B          | C             |
| 2 | A        | C          | B             |
| 3 | B        | A          | C             |
| 4 | B        | C          | A             |
| 5 | C        | A          | B             |
| 6 | C        | B          | A             |

Electrical connection

- A M12 QDR
- C Cable gland
- N 1/2" NPT adaptor

Top Pressure Units

- P PSI
- B Bar
- W inches of water
- L millibar

Top Pressure Range (see "Calibrated range" table)

XXX

Diff Pressure Units

- P PSI
- B Bar
- W inches of water
- L millibar

Diff Pressure Range (see "Calibrated range" table)

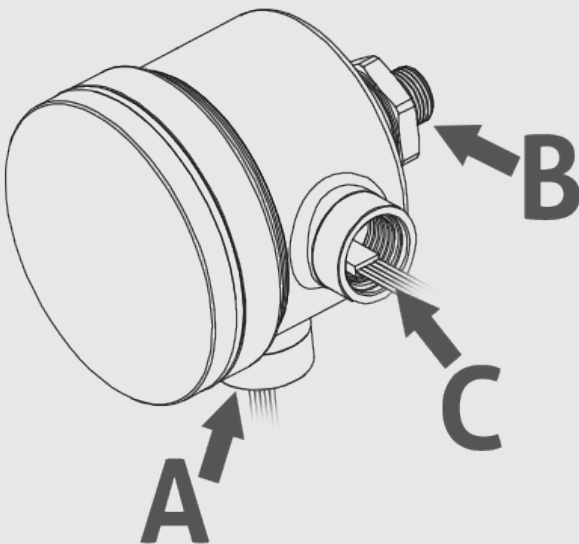
XXX

D3E 2 1 A P 028 W 294

Calibrated Range

| range code | range                       |
|------------|-----------------------------|
| 251        | -1...1                      |
| 286        | -1...2.5                    |
| 217        | -1...3                      |
| 056        | -1...4                      |
| 304        | -1...7                      |
| 025        | -14.7...0                   |
| 028        | -14.7...15                  |
| 029        | -14.7...30                  |
| 031        | -14.7...60                  |
| 032        | -14.7...100                 |
| 314        | -14.7...200                 |
| 501        | 0...1.2                     |
| 428        | 0...1.5                     |
| 057        | 0...2                       |
| 235        | 0...3                       |
| 192        | 0...4                       |
| 060        | 0...6                       |
| 309        | 0...7                       |
| 061        | 0...10                      |
| 502        | 0...18                      |
| 065        | 0...20                      |
| 066        | 0...30                      |
| 224        | 0...35                      |
| 067        | 0...40                      |
| 068        | 0...50                      |
| 069        | 0...60                      |
| 206        | 0...70                      |
| 071        | 0...100                     |
| 294        | 0...140                     |
| 073        | 0...150                     |
| 074        | 0...160                     |
| 075        | 0...200                     |
| 077        | 0...300                     |
| 078        | 0...350                     |
| 079        | 0...400                     |
| 503        | 0...415                     |
| 504        | 0...480                     |
| 081        | 0...500                     |
| 505        | 0...830                     |
| 084        | 0...1000                    |
| 499        | 0...1200                    |
| 506        | 0...1385                    |
| 507        | 0...1600                    |
| 086        | 0...2000                    |
| 508        | 0...3300                    |
| 089        | 0...4000                    |
| 999        | custom range (must specify) |

Location Diagram



| Order code of sensor stem |  |
|---------------------------|--|
| <b>L3S</b>                | (Sensor stem)                                    |
| <b>URL</b>                |  |
| <b>5</b>                  | 0...6 PSI; 0...0.4 BAR, 0...166" w.c.            |
| <b>6</b>                  | -14.7...30 PSI; -1...2 BAR, -400...830" w.c.     |
| <b>7</b>                  | -14.7...100 PSI; -1...7 BAR, -400...2770" w.c.   |
| <b>8</b>                  | -14.7...500 PSI; -1...35 BAR, -400...13850" w.c. |
|                           | <b>Fitting (See Fittings Table)</b>              |
| <b>XXX</b>                |  |
|                           | <b>Capillary fill</b>                            |
| <b>M</b>                  | Mineral oil (FDA approved)                       |
| <b>N</b>                  | Neobee M20                                       |
|                           | <b>Remote cable</b>                              |
| <b>O</b>                  | Integral   |
| <b>B</b>                  | 10' Cable  |
| <b>E</b>                  | 25' Cable  |
| <b>F</b>                  | 50' Cable  |
| <b>L3S</b>                | <b>5</b>   |
|                           | <b>004</b>                                       |
|                           | <b>N</b>   |
|                           | <b>O</b>   |

| Fittings Table |  |
|----------------|--|
| <b>004</b>     | 1-1/2" Tri-Clamp®                            |
| <b>005</b>     | 2" Tri-Clamp®                                |
| <b>006</b>     | 2½" Tri-Clamp®                               |
| <b>007</b>     | 3" Tri-Clamp®                                |
| <b>123</b>     | AIC CPM Flush Mount                          |
| <b>088</b>     | Anderson Flush Mount Short (71060-A4, A6)    |
| <b>089</b>     | Anderson Flush Mount Long (71060-A3, A5, A9) |
| <b>141</b>     | Rosemount/Foxboro Sanitary Spud - Short      |
| <b>142</b>     | Rosemount/Foxboro Sanitary Spud - Long       |
| <b>154</b>     | Endress & Hauser Universal Adaptor - Short   |
| <b>155</b>     | Endress & Hauser Universal Adaptor - Long    |
| <b>160</b>     | G1" CLEANadapt                               |
| <b>181</b>     | DRD  |

| Accessories                                     |            |  |              |
|---|------------|--|--------------|
| Cord Sets                                       |            | Flush Mount Gaskets                      |              |
| Shielded Molded w/25' cable                     | 42117H0025 | Anderson - Silicon Gasket (USP Class VI) | 44348A0003   |
| Shielded Molded w/50' cable                     | 42117H0050 |  |              |
| Shielded Molded w/100' cable                    | 42117H0100 |  |              |
| Weld-In Shells for Anderson Flush Mount (316L)  |            | Other Accesories                         |              |
| Anderson Long-Insulated Std. Vessel             | 71060A0003 | Stainless Steel Cap w/gaskets            | 5632900001   |
| Anderson Short-Uninsulated Std. Vessel          | 71060A0004 | M12 Quick Disconnect Receptacle          | SP56726A0004 |
| Anderson Long-Insulated Press. Vessel           | 71060A000  | Cord Grip                                | SP5633100000 |
| Anderson Short-Uninsulated Press. Vessel        | 71060A0006 | 1/2" NPTF adaptor                        | SP5633200000 |
| Anderson Long-Insulated H/D Press. Vessel       | 71060A0009 | Seal Kit (6) gaskets                     | 5633000001   |
| Tank Shell Plugs (Supplied with nut and gasket) |            | Field Wireable Connector-Straight        | 42119B0000   |
| Anderson Long                                   | 56511B0001 | Field Wireable Connector-90°             | 42119A0000   |
| Anderson Short                                  | 56511B0002 | 10' Remote Kit                           | SP73228A0010 |
| Flush Mount Calibration Adapters                |            | 25' Remote Kit                           | SP73228A0025 |
| Anderson Fitting Calibration Adapter            | 73198A0001 | 50' Remote Kit                           | SP73328A0050 |
|   |            | Rosemount/Foxboro Clamp Connection       | 46600A0001   |