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| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company. | <u>WEATHER PROOF SMART ELECTRONIC PRESSURE AND DIFFERENTIAL PRESSURE TRANSMITTERS WITH INTEGRAL MANIFOLDS</u> | | | |
| | 1.0 SCOPE: | | | |
| | The Electronic pressure and differential pressure transmitters shall be supplied complete with all accessories to meet the requirements given below. | | | |
| | 2.0 DESIGN: | | | |
| | The transmitter shall have electronic state of the art sensor meeting all functional requirements. The transmitter shall be microprocessor based 2 -wire type and be HART Protocol compatible. | | | |
| | 3.0 SPECIFICATIONS: | | | |
| | 3.1 Performance Specifications : | | | |
| | Sl.no. | Service | Liquid / gas / vapour | |
| | 3.1.1 | Accuracy rating | ±0.065% of calibrated span for > 1/10th URL (minimum) including combined effect of linearity, Hysteresis and repeability. | |
| | 3.1.2 | Stability | ±0.1 % of Calibrated span for one year for range up to 70 Kg/cm ² and ±0.25 % of Calibrated span for one year for range more than 70 Kg/cm ² . | |
| 3.1.3 | RFI Effect | Less than 0.2 % of URL for the frequencies of 20 to 1000 MHZ and field strength 10 v/m. | | |
| 3.1.4 | Output signal | 4-20 mA DC analog along with superimposed Digital signal (based on HART protocol) | | |
| 3.1.5 | Power supply | 24 VDC ± 10% | | |
| 3.1.6 | Load Impedance | 500 ohms @ 24 VDC | | |
| 3.1.7 | Span and zero adjustability | Easily / continuously adjustable and tamper proof. Zero and span can be adjusted directly from transmitter body with out any external gadget. It can be calibrated even in case of failure of local indicator. However zero and span can be adjusted Remotely by using HART communicator from any where in the transmitter loop. | | |
| 3.1.8 | Response Time (The sum of dead time and 63.2% step response time of the transmitter) | Transmitter response time shall be Less than or equal to 100 msec. | | |
| 3.1.9 | Insulation Resistance | More than 100 M ohms at 500 V DC | | |
| 3.1.10 | Turn down ratio | 10: 1 for Vacuum / Very low pressure (<100mmWC) / Very high (>150 kg/cm ²) applications. 100: 1 for other applications. | | |
| 3.1.11 | Accessories | Mounting bracket, U clamp (for 2" NB pipe) and | | |
| Ref. Doc | Revisions : | Prepared : | Approved : | Date : |
| | Refer to record of revisions : | L.V.A.B | V.V.S | 18/03/13 |

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| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company. | | <p>fasteners etc shall be suitable for mounting in LIE/LIR impulse pipe.</p> <p>3.1.12 Drain and vent plug The transmitters shall be provided with integral SS Drain and vent plugs.</p> <p>3.1.13 Manifold The transmitters shall be provided with integral manifold of SS316 (3-valve type for pressure/5-valve type for differential).</p> <p>3.1.14 Diagnostics Self indicating feature</p> <p>3.1.15 Proven Performance</p> <ol style="list-style-type: none"> 1. All transmitters shall be of field proven quality both with respect to design and materials. 2. Vendor shall have a well proven performance record (Installed base) of operating satisfactorily in a power plant or in an hydro carbon processing industry for a minimum of 8000 running hours. <p>NOTE:</p> <ol style="list-style-type: none"> 1. Retrofit type of smart transmitter is not acceptable. 2. Prototype instruments or instruments of an experimental nature shall not be offered or supplied. 3. LVDT type transmitter is not acceptable. <p>3.2 <u>PHYSICAL SPECIFICATIONS:</u></p> <p>Process Connection 1/2" NPT- Female Traditional flange (horizontal impulse entry) type for easy interchangeability without impulse modification in future.</p> <p>Electrical Connection 2 nos of 1/2" NPT- Female, one with with double compression cable gland of SS and second with plug of SS.</p> <p>Diaphragm Material 316L SS</p> <p>Body / Wetted part material 316SS</p> <p>Sensor O - Ring Viton / Glass filled TFE</p> <p>Electronic Housing Dual compartment, weather proof as per IP-65 with durable corrosion resistant coating</p> <p>Tag Plate Material Stainless Steel</p> <p>Fill fluid Silicon-oil</p> <p>Mounting Bracket (with bolts & nuts) Stainless steel</p> <p>All bolts & nuts Stainless steel</p> <p>Mounting Mounting bracket shall be supplied (suitable for 2" pipe mounting.)</p> <p>3.3 <u>OTHER FEATURES:</u></p> <p>Zero elevation/suppression Selectable (pressure transmitters) -100% to x-100 % of URL (differential pressure transmitters)</p> <p>Indication Digital 5 digit LCD meter with engineering units</p> <p>Loop - check output Transmitter can be configured to provide constant</p> | |
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| COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company. | | <p style="text-align: right;">Signal 3.8mA through 21.6mA by HHC</p> <p>Temperature limit (ambient) -40 to + 80°C Temperature limit (process) -40 to + 120°C Humidity 0 to 100% RH EMI (Emissions) As per EN 50081-2: 1993 EMI (Immunity) As per EN 50082-2: 1995</p> <p>4.0 IDENTIFICATION & MARKING: a) The following minimum identification markings shall be stamped on to an identification tag / label fixed to the Transmitter. i. Manufacturers Type / Model Number. ii. Tag number, Calibrated range, name of service b) A 'stainless steel tag plate bearing relevant 12 digit material code of BHEL shall be attached to each item.</p> <p>5.0 PAINT COATING: Manufacturer's well proven anticorrosive paint shall be used (If painting is done on any part).</p> <p>6.0 INSPECTION AND TEST REQUIREMENTS: a Calibration test certificate shall be furnished. b Materials compliance certificate shall be furnished. c Environmental protection certificate.</p> <p>7.0 GUARANTEE CERTIFICATE: A guarantee certificate for 24 months of trouble free operation from date of shipment or 12 months from the date of commissioning, whichever is earlier, shall be furnished.</p> <p>8.0 DOCUMENTS The following Technical Information / Documents shall be furnished. a) Along with offer (2 copies each) i. Technical catalogues / literature. ii. Drawing showing, mounting details. iii. Proven track record b) After placement of order. i. Operation and Maintenance manual (1 set). ii. Inspection and Test certificates (3 copies each). iii. Guarantee certificate (3 copies). iv. Calibration details (3 copies) c) 1 softcopy of a) i, ii and b) i above shall be supplied by the vendor after order placement.</p> <p>9.0 PACKING: The material shall be properly packed to ensure that it is capable of withstanding transit risks without damage.</p> | | |
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10.0 MARKING ON PACKING CASE :

The following details shall be marked on packing case.

- i. Manufacturers name.
- ii. BHEL purchase order number.
- iii. BHEL product standard number.

11.0 VARIANT TABLES:**TABLE-1: WEATHER PROOF PRESSURE TRANSMITTERS**

(The calibration ranges will be furnished at the time of approval of data sheets)

| Var. No | Measuring Range Kg/cm ² | Over pressure Kg/cm ² | BHEL Material Code |
|---------|------------------------------------|----------------------------------|--------------------|
| 00 | 0 to 1 (ABS) | 45 | TC9755823000 |
| 01 | -1 to +1.5 | 52 | TC9755823018 |
| 02 | -1 to +4 | 52 | TC9755823026 |
| 03 | -1 to +9 | 52 | TC9755823034 |
| 04 | -1 to +10 | 52 | TC9755823042 |
| 05 | -1 to +16 | 160 | TC9755823050 |
| 06 | -1 to +25 | 160 | TC9755823069 |
| 07 | -1 to +40 | 160 | TC9755823077 |
| 08 | -1 to +60 | 160 | TC9755823085 |
| 09 | 0 to 2.5 | 52 | TC9755823093 |
| 10 | 0 to 4 | 52 | TC9755823107 |
| 11 | 0 to 6 | 52 | TC9755823115 |
| 12 | 0 to 10 | 52 | TC9755823123 |
| 13 | 0 to 16 | 160 | TC9755823131 |
| 14 | 0 to 25 | 160 | TC9755823140 |
| 15 | 0 to 40 | 160 | TC9755823158 |
| 16 | 0 to 60 | 160 | TC9755823166 |
| 17 | 0 to 100 | 160 | TC9755823174 |
| 18 | 0 to 160 | 210 | TC9755823182 |
| 19 | 0 to 250 | 400 | TC9755823190 |

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TABLE-2: WEATHER PROOF DIFF. PRESSURE TRANSMITTERS

(The calibration ranges will be furnished at the time of approval of data sheets)

| Var. No | Measuring Range (0-min-max) | Static pressure (Kg/cm ²) | BHEL Material Code |
|---------|-------------------------------|---------------------------------------|--------------------|
| 20 | -300 to 800 mmWC | 160 | TC9755823204 |
| 21 | -300 to 1500 mmWC | 160 | TC9755823212 |
| 22 | 0-60-600 mmWC | 160 | TC9755823220 |
| 23 | 0-120-1200 mmWC | 160 | TC9755823239 |
| 24 | 0-320-3200 mmWC | 160 | TC9755823247 |
| 25 | 0-640-6400 mmWC | 160 | TC9755823255 |
| 26 | 0-0.15-1.5 kg/cm ² | 160 | TC9755823263 |
| 27 | 0-0.25-2.5 kg/cm ² | 160 | TC9755823271 |
| 28 | 0-0.5-5 kg/cm ² | 160 | TC9755823280 |
| 29 | 0-0.5-10 kg/cm ² | 210 | TC9755823298 |
| 30 | 0-2.0-20 kg/cm ² | 210 | TC9755823301 |
| 31 | 0-3.0-30 kg/cm ² | 210 | TC9755823310 |
| 32 | 0-6.0-60 kg/cm ² | 210 | TC9755823328 |
| 33 | -5 to 25 kg/cm ² | 210 | TC9755823336 |
| 34 | -500 to 800 mmWC | 160 | TC9755823344 |
| 35 | -500 to 1500 mmWC | 160 | TC9755823352 |
| 36 | -1000 to 1000 mmWC | 160 | TC9755823360 |
| 37 | -1 to +1 kg/cm ² | 160 | TC9755823379 |

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| RECORD OF REVISIONS | | | | | | | | | | |
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| | | | | | | Rev. No. | Date | Revision Details | Revised By | Approved By |
| | | | | | | 00 | 18.03.13 | First issue | ----- | V.V.S |
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