



365-147/B
31.08.16

BHEL – Tiruchirappalli – 620014, India

Valves Engineering and R&D

PURCHASE SPECIFICATION

DOC No: **SPEC:HP:0059** Rev: **01**

Effective Date: **21/04/2017**

Page: **1 of 3**

Product: Position Feedback Transmitter and Limit Switch Assembly for Turbine bypass Application

Revision Record:

Rev. No	Date	Details of Revision
00	13 April 2017	First Release
01	21 April 2017	Clause 1(a) revised

1. Scope of Supply

This specification is applicable for supply of the following three types of assemblies:

- Capacitive/Magneto-resistive type angular position feedback transmitter with limit switches housed in a single assembly
- Position feedback transmitter alone in a housing
- Limit switches alone in a housing.

The scope covers design, manufacturing, testing and supplying of the above assemblies.

The transmitter shall convert angle of rotation into analog electrical signal, while the limit switches provide digital indication on attaining preset angular position. The requirement of number of limit switches and position transmitter in an assembly may vary according to the valve. Please refer the P.O. for the exact requirement of number of limit switches and position transmitters in one assembly.

2. Description

2.1 Position transmitter:

The output of the transmitter shall be 5-15mA, linear to angle of rotation. Rotary angle shall be adjustable from 0°-30° to 0°-70°. The transmitter shall be of two wire type i.e. Power to the transmitter and output signal both together shall be through a two wire. The transmitter shall be protected against reverse voltage and electromagnetic interference. The transmitter shall be compatible for use in both the directions of rotation, i.e., clockwise and counterclock wise.

2.2 Cam type limit switches:

The limit switches shall be operated by individual cams. Cam shall be adjustable to any angle over 360°. The micro switches shall be snap action, rated to 230V Ac, 5A.

3. Technical Data:

3.1 Position Transmitter:

Supply voltage U_s	12....30V DC
Superposed a.c voltage ($U_s = 15.....27V$),	≤ 3 V RMS
Current limitation,	< 40 mA
Cutoff frequency (-3 dB)	250Hz
Angle of rotation,	Turns unrestricted, no stop
Rel. rotation angle range	0° to 30°.....70°
Axial and radial forces	≤ 20 N
Driving torque	≤ 0.1 Nm
Protection	IP65
Operating temperature range	-25°C to +80°C



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Max permissible burden	400Ω
Resistance to interference / destruction: (twisted lines, no shielding)	
Electrostatic Discharge IEC 801-2	15kV
Burst IEC 801-4	4kV
Surge IEC 801-5 (1.2/50 μs, 2Ω)	± 2 kV sym., ± 4kV asym.
Electromagnetic Compatibility Performance	EN 61000-6-2 EN 61000-6-3
Shock (IEC 68 27 DIN 40046E)	50g/11 ms, 3 shocks Each in both directions of the 3 axes
Vibration (IEC 68 6 DIN 40046E)	10 g, f ≤ 200 Hz Each of the 3 axes
Operating temperature	- 25.....+100°C
Admissible air humidity	≤ 95% relative humidity at 35°C
Nominal or operating values:	
Supply voltage,	12-30 V DC
Dynamic internal resistance	> 1 M.Ω
Hysteresis	≤ ±0.1% FSR
Zero current I _o	5 mA
Current rise ΔI	10mA
Linearity	≤ ±0.5% Full Scale Range
Stability referred to full rotation angle of 70° - 25°...+80°C	≤ ±1.0% Full Scale Range
Dimensions	As per the enclosed sketch
Cam type Limit switches:	
Snap action type:	230V, 5A

4.0 Details of Construction

The angular position transmitter shall be coupled to a stainless steel shaft. This coupling shall be easily removable, if desired. Required number of cam actuated limit switches shall be mounted on the stainless steel shaft. The position transmitter, limit switches and the stainless steel shaft shall be enclosed in an aluminium housing. This assembly shall be suitable for mounting using the interface shown in Fig-A. The housing shall be fitted with additional anti-vibration pads to isolate the assembly from the vibrations of the actuators.

5.0 Testing

5.1 Type tests:

Type tests are required to be done to validate the design of the equipment and shall be carried out at a reputed laboratory. The tests shall be carried out whenever a change in the design is carried out.

1. Operation at Minimum and maximum supply voltage.
2. Short circuit current limitation to less than 40mA
3. Heat run test for the max. operating temperature

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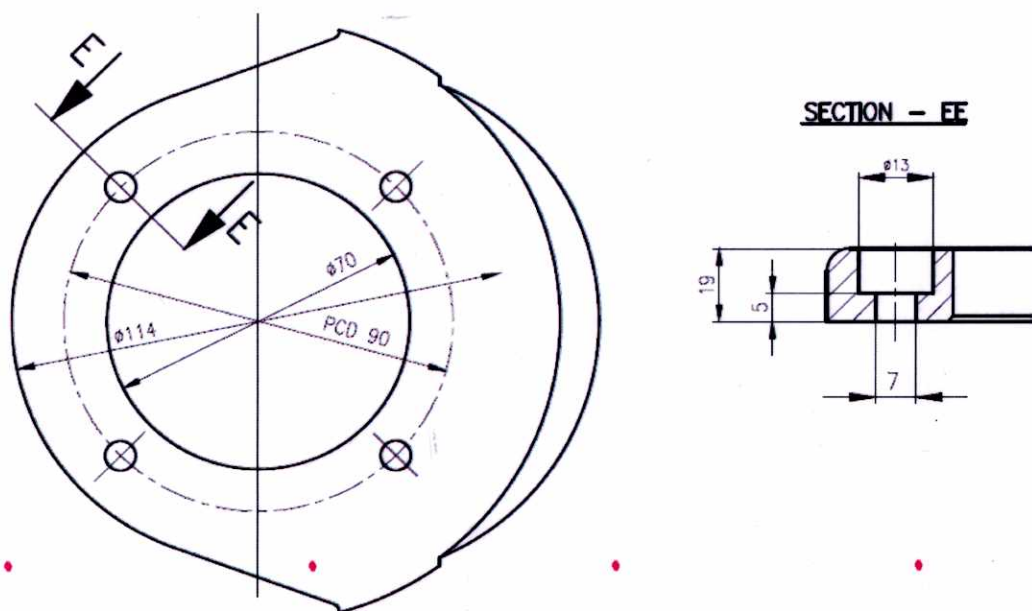
4. Linearity of output signal for the full range
5. Hysteresis of output signal for the full range
6. Accuracy of output signal with respect to angular rotation

5.2 Routine tests:

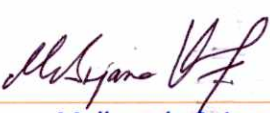
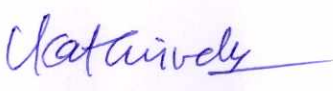
Test reports for the routine tests shall be submitted for every single assembly supplied to BHEL.

1. Dimensional test
2. Adjustment of Zero and full scale output with respect to full range of angular rotation.
3. Linearity of output signal for the full range
4. Hysteresis of output signal for the full range

FIG-A: MOUNTING DIMENSIONS ON THE ACTUATOR YOKE



- NOTE:** A) 4 Nos. of HSH Cap screw of M6x16 and 4 Nos. of spring washers shall be supplied along with the Feedback Transmitter / Limit Switch Assembly.
- B) The feedback transmitter shaft shall be $\phi 10$ mm in diameter with a minimum length of 30 mm projecting outside the feedback transmitter.

Signature		
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Designation	Dy. Manager	AGM
Date	21 April 2017	21 April 2017
Action	Prepared By	Reviewed & Approved By