	<b>HYDRO PROJECTS ENGINEERING DIVISION</b> <b>TITLE : SPECIFICATION OF TOP COVER WATER LEVEL CONTROLLER FOR DRAIN PUMPS &amp; EJECTOR</b>	<b>SPECIFICATION NO.</b> <b>241526464</b>	<b>REV 00</b> <b>Page 1 of 5</b>
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**PROJECT: ARUN-III**

**1. APPLICATION:**

The level controller shall be used to provide the level switching contacts for water level in the turbine top cover. The level controller shall be based on the principle of conductivity. The level probes shall be connected to the level controller. The level switching contacts of the level controller shall be used to the starter panels / SCADA system to control the water level in the turbine top cover.

**2. SCOPE OF SUPPLY:**

**2.1 TOP COVER WATER LEVEL CONTROLLER FOR DRAIN PUMPS & EJECTOR : 05 sets**  
**(Main Project- 04 Sets + 01 Set spare)**  
**EACH SET SHALL CONSIST OF:**

- a) Level Controller box for Turbine top cover Pumps & Ejector  
- 1 No. (One No.)
- b) Level sensing probes -  
1 No. (FOR Pump-1) probe-1 + 1 No. (FOR Pump-2) probe-2 + 1 No. Ejector probe

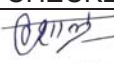
**3. TECHNICAL SPECIFICATION:**

**3.1 LEVEL CONTROLLER BOX FOR TURBINE TOP COVER PUMPS & EJECTOR**  
**[CONDUCTIVITY TYPE]:**

- i) Input supply to the level controller box: 230V  $\pm$  10% AC 1 Phase. 50Hz.
- ii) Level controller box shall have **Seven nos. single point (single channel) level switch control units** [Based on principle of conductivity type level detection] to provide the level switch contacts for each level probes (except reference probe) specified in the below table:

Sr. No.	Level switch description
1	High level probe contact
2	Pump-1 start level probe contact
3	Pump-1 stop level probe contact
4	Pump-2 start level probe contact
5	Pump-2 stop level probe contact
6	Ejector open level probe contact
7	Ejector close level probe contact

**Note:** Level control box should provide level contacts corresponding to the each level probe. Level switch contacts based on Differential type for pump control from control units are not required.

REV.NO.	00	DISTRIBUTION.	QTY.	APPROVED:			
PREPARED				(MS)			
CHECKED		HPE	01	PREPARED	CHECKED	ISSUED	DATE
APPROVED							
DATE		MM(H)	06	(PK)	(VKN)	(AP)	04.04.22

विशाल कुमार जगदीश्वर, H. E. DIVISION  
वरिष्ठ इलेक्ट्रिकल मैनेजर  
एच पी ई विभाग/HPE Division  
वी एच ई एम, भोपाल/BHEL, BHOPAL


**TITLE : SPECIFICATION OF TOP COVER  
WATER LEVEL CONTROLLER FOR DRAIN  
PUMPS & EJECTOR**
**241526464****Page 2 of 5**

- iii) The single point level switch control unit shall of enclosed modular type with suitable for Din-rail / Plate mounting type. These control units should be mounted inside the level controller box. The control units should not be of open PCB type.
- iv) These single point level switch control units shall be mounted inside the Level control box and shall be wired up to the Terminal blocks. Tentative General Arrangement of the level control units inside the Level control box shall be as per sketch No. **HPE-GC-442**.
- v) Level controller box should provide separate 1NO + 1NC independent auxiliary contacts (SPDT) corresponding to each level probes (except reference probe) from each control unit. The contact rating of each level switches should be of 2A / 240V A.C.
- vi) The level controller box shall be of wall-mounted type. It should be of rigid construction type having front door opening on with lock and handle.
- vii) The level controller box shall be of Cast Aluminum / M.S. Powder Coated / Sheet Metal housing Powder Coated / Sheet Steel stoving sheet steel / (CRCA) with minimum thickness of 1.6 mm. The class of protection of the enclosure shall be of minimum IP55.
- v) Outgoing and internal control cable of controller box shall be wired up to terminal blocks. All Level control units should be terminated to the terminal blocks. Terminal blocks shall meet the requirements of IES-947-7-1 standards. Terminal blocks shall be suitable for 6 sq. mm. size of conductors. Terminals shall be with screw type connection.
- vi) Suitable cable glands plate (removable type) should be provided at the bottom of level controller box.
- vii) Necessary anchor fastener / bolts (4 Nos.) required to mount this enclosure on wall to be supplied by supplier as loose.
- viii) Each level control unit shall have the LED indication for 'Supply On" and "Level switch relay operated". The level control unit description shall be as per below table

Control Unit.	Description for control units
1	High level alarm level switch
2	Pump-1 start level switch
3	Pump-1 stop level switch
4	Pump-2 start level switch
5	Pump-2 stop level switch
6	Ejector open level switch
7	Ejector close level switch

- ix) Following description inscribed on a metallic plate should be provided on the level controller box.  
**Description – Level controller of Top cover drain pumps & Ejector**  
**Serial No. - As applicable**  
**Material Code **HT4382037123****
- x) The instrument shall work satisfactorily against ambient temperature variation from **(+) 0° C to (+) 50° C.**


**TITLE : SPECIFICATION OF TOP COVER  
WATER LEVEL CONTROLLER FOR DRAIN  
PUMPS & EJECTOR**

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**3.2) LEVEL SENSING PROBES [PUMP-1 PROBE + PUMP-2 PROBE + EJECTOR PROBE]:**

- a. Each level controller box (covered in 3.1) shall be connected with three nos. level sensing probes (Pump-1 probe + Pump-2 probe + Ejector Probe) as per sketch no. HPE-GC-442 Rev.00.
- b. The mounting process connection of each level probe: **1-1/2" B.S.P (M).**
- c. The individual level sensing probe should be of rod type. The dia of each level-sensing probe should be as per manufacturer standard.
- d. Material :
  - Level sensing probe : Stainless steel
  - Process connection : Stainless steel
  - Rod probe housing : Weatherproof cast aluminum with cable gland for cable entry
- e. The individual level sensing probes should be partly insulated.
- f. The purpose and lengths of level probes:
- g. Protection class : IP65 or better
- **Probe -1 : Pump-1 side probe : Three in one type**

Device No.	Description of level probe	Probe lengths from mounting surface	Remarks
71W-1a	Pump-1 star level probe	90 mm	For pump1 & 2 reference probe is common
71W-1b	Pump-1 stop level probe	140 mm	
71W-R1	Reference probe	170 mm	

- **Probe-2: Pump-2 side probe : Three in one type**

Device No.	Description of level probe	Probe lengths from mounting surface	Remarks
71W-4	High Level Alarm	50 mm	For pump1 & 2 reference probe is common
71W-2a	Pump-2 start level probe	70 mm	
71W-2b	Pump-2 stop level probe	120 mm	

- **Probe-3 : Ejector Probe : Three in one type**

Device No.	Description of level probe	Probe lengths from mounting surface	Remarks
71W-3a	Ejector open	110 mm	
71W-3b	Ejector close	160 mm	
71W-R3	Reference level probe	170 mm	

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#### 4. **DOCUMENTS TO BE FURNISHED:**

Along with offer:

- Catalogues and Operating manual giving all the technical particulars with model code, Wiring termination, data sheet etc of Level probe, Level control units.
- Outline general arrangement drawing of Level controller box, level control modular unit and level sensing rod probes.
- List of deviations, if any. Otherwise, it shall be understood that the vendor is meeting all the requirements specified by us.

Vendor to note that if above documents are not furnished along with the offer; the offer shall be liable for outright rejection.

After placement of order:

- Supplier has to submit the drawing showing over all dimensions, mounting details, sectional elevation and constructional details of level probe and level controller box for our approval within 4 weeks & revised drawings to be submit within one week of receipt of our comments
- Wiring schematic diagram of level controller
- Q.A. Plan for our approval before start of manufacturing in line with our QAP.
- Supplier has to submit the O&M manual level controller for our reference.

At the time of supply:

- 2 copies of test certificates / Calibration certificate and guarantee certificates of level controller box, level control units and level probes should be submitted to indenter. One copy of the above documents shall be put inside the case / package.
- Shipping / packing lists of the level controller should be submitted to indenter and put inside the case / package.

#### 5. **INSPECTION & TESTING:**

Functional test of level controller along with level probe units is to be carried out and certificate for the same to be furnished. The inspecting agency shall certify that the testing has been witnessed as per APPROVED Q.A. Plan supplied by the vendor. Acceptance or waiver of inspection does not absolve the supplier of his responsibility to rectify the instrument in case it does not perform satisfactorily at hydro site where it is actually used.

#### 6. **GUARANTEE:**

The item must be guaranteed for trouble free operation, good workmanship for a period of 18 months from the date of dispatch.

#### 7. **PACKAGING:**

Each "level probe unit" and each "Level controller box" shall be packed separately in **individual carton with silica gel, adequate cushioning material and water proof cover** to avoid the movement of the internals and ensure that the instrument is capable of withstanding the transit conditions without damages.

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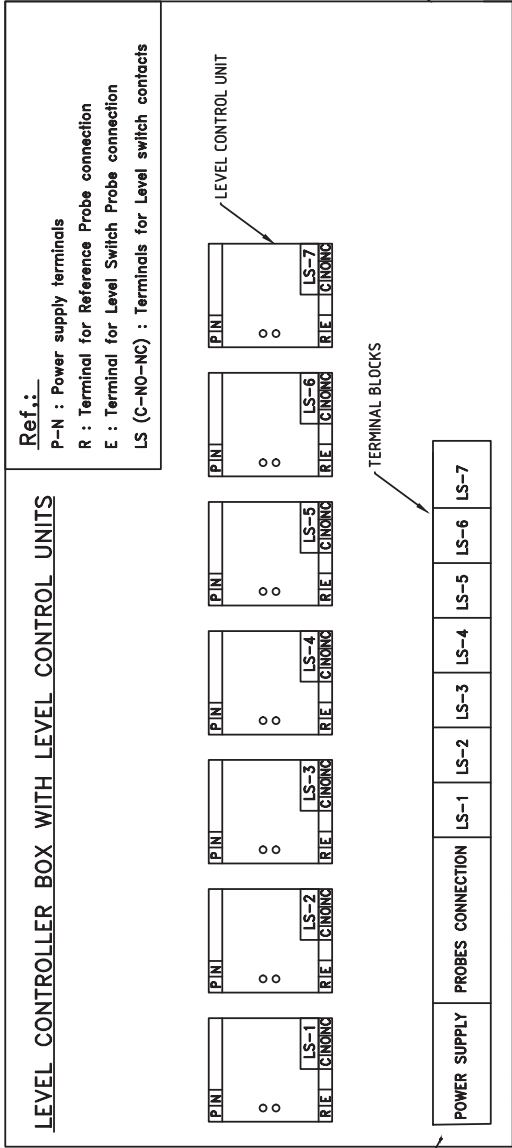
#### 8. **IDENTIFICATION:**

Each packed unit of level probe and level controller box shall be identified with the following information.

1. Manufacturer's name or identification.
2. Manufacturer's model no. or serial no.
3. Material code of the item as per enquiry description
4. Material item description as per approved drawing

DETAIL OF LEVEL CONTROLLER BOX AND LEVEL SENSING PROBES  
FOR TOP COVER DRAIN PUMPS AND EJECTOR

SKETCH NO. HPE-GC-442 REV.00  
Item No.01 OF PI NO 241526464

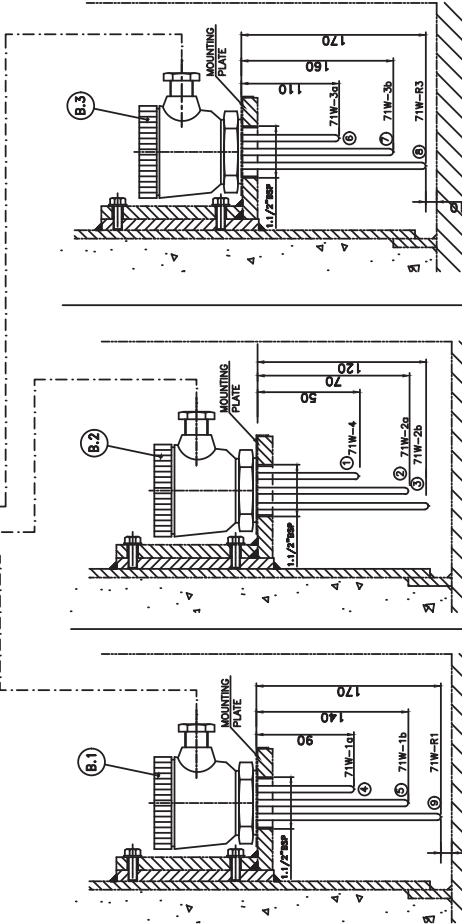


**NOTE:**

- (I) ONE SET OF LEVEL CONTROLLER FOR TOP COVER DRAIN PUMPS & EJECTOR CONSISTS OF FOLLOWING:
- A) ONE NO. LEVEL CONTROLLER BOX WITH LEVEL CONTROL UNITS
  - B) ONE NO. EACH OF LEVEL PROBES i.e.
    - 1 NO. FOR PUMP-1 (PROBE-1)+1 NO. FOR PUMP-2 (PROBE-2)
    - + 1 NO. EJECTOR PROBE (PROBE-3)
- (II) CABLES BETWEEN LEVEL PROBES & LEVEL CONTROLLER BOX IS NOT IN SUPPLIER SCOPE.

**LEVEL DESCRIPTIONS OF LEVEL PROBES :**

- ① - HIGH LEVEL (71W-4) ALARM
- ② - PUMP-2 START LEVEL PROBE (71W-2a)
- ③ - PUMP-2 STOP LEVEL PROBE (71W-2b)
- ④ - PUMP-1 START LEVEL PROBE (71W-1a).
- ⑤ - PUMP-1 STOP LEVEL PROBE (71W-1b)
- ⑥ - OPEN EJECTOR LEVEL PROBE (71W-3a).
- ⑦ - CLOSE EJECTOR LEVEL PROBE (71W-3b)
- ⑧ - REFERENCE LEVEL PROBE FOR EJECTOR (71W-R3)
- ⑨ - REFERENCE LEVEL PROBE FOR PUMP 1 & 2 (71W-R1)



DETAIL OF LEVEL SENSING PROBE-1  
FOR PUMP-1

DETAIL OF LEVEL SENSING PROBE-2  
FOR PUMP-2

DETAIL OF LEVEL SENSING PROBE-3  
(EJECTOR PROBE)

## **PRE-QUALIFYING (PQ) CRITERIA FOR VENDORS**

**P.I. NO.: – 241526464**

**ITEM DESCRIPTION: – CONDUCTIVITY TYPE LEVEL CONTROLLER FOR TURBINE TOP COVER**

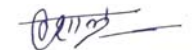
**PROJECT: – ARUN-III**

- 1) Vendor should have supplied conductivity type level controller for level switching in water application in any Hydro Power Station / any other industry in India or abroad with following parameters in last 5 years (from tender opening date Part-1).
  - (a) Probe length of level controller for level switching: **100 mm or more**
  - (b) Type of Level probe = 3 in 1 or more.

Vendor shall furnish unpriced PO copy and Delivery Challan / Invoice with Approved Drawing / Bill of Material / Data Sheet or any other relevant documentary evidence as proof of supplying conductivity type level controller with above parameters.

- 2) The Vendor should be authorized dealer of offered conductivity type level controller and submit the authorization letter from OEM. It is not applicable for OEM.
- 3) The OEM of conductivity type level controller should have ISO certificate.

**Note:** Vendors are required to submit documentary evidence to prove the above qualifying criteria along with the bid /offer.

  
विशाल कुमार/ V.K. KUMAR  
वरिष्ठ प्रबंधक / Senior Manager  
एच पी ई विभाग/HPE Division  
बी.एच.ई.एल., भोपाल/BHEL, BHOPAL

Manufacturer's name & Address:		Product Quality Assurance Plan			Project :						
		Product: - Conductivity Type Level controller for Turbine Top Cover Drain Pump & Ejector ***** P.I. No. 241526464 ***** *****			QAP No.: QAP_241526464 Rev. No.: 00 Page No. : 01 of 01			Package : P.O. No. : Customer : B.H.E.L. Bhopal			
Sr. No.	Component & Operation	Characteristics	Type of Check	Quantum of Check	Reference document	Acceptance Norms	Format of Record	Agency			Remark
								M	C	N	
1.0.0	Mechanical Components										
1.3.0	Painting	Paint shade and paint finish	Visual	100%	Process Sheet	Conformance to Process Sheet	Vendor test report	p	-	-	
2.0.0	Electronic Components	Specification Details, Make, Type No. Packing	Visual	100%	Component data sheet/P.O./Inspection Instructions	Conformance to data sheet/ P.O./ Inspection Instructions	Internal test report	p	-	-	
2.1.0		Functional test	Electrical	100%	Component data Sheet	Conformance to norms in data sheet	Internal test report	p	-	-	
3.0.0	Finished Instrument	Workmanship, Name plate entries, Accessories & Aesthetics	Visual	100%	Customer Data sheet/ Drawings	Conformance to data Sheet/ Drawings	Internal test report				Refer note 5
3.1.0		Functional test	Electrical	100%	Conformance data sheet/ Test & QC procedure	Conformance to data Sheet/ Test & QC Procedure	Internal test report/Test Certificate	p	*	*	
			<b>LEGENDS :</b>			Customer approval					
			M : Manufacturer								
			N : Customer								
			C : Contractor /TPIA								
			P : Perform								
			W : Witness								
			V : Verification								
			Reviewed By :								
Manufacture			Contractor								
SIGNATURE											
			Name & Signature of Approving Authority								

**Notes:-**

1. Reference Documents will be available at the time of inspection for Verification
2. SP – Sampling Plan as per IS : 2500
3. TPIA – Third Party Inspection Agency
4. Each item should be dispatched after properly packing mentioned in the clause No. 7 of specification No 241526464.
5. For order qty. N, quality of Bhel/TPI witness shall be follows(for N≤10=100%,10<N≤= 20%,50<N<100=10%,N>100 =5%)



Manufacturer's name & Address:			Product Quality Assurance Plan					Project :			
			Product: Level Sensing Rod Probes *****_*****_*****_*****_***** P.I. No. 241526464 *****_*****_*****_*****_***** *****_*****_*****_*****_*****					QAP No. : QAP_241526464 Rev. No. : 00 Page No. : 01 OF 01			
Sr. No.	Component & Operation	Characteristics	Type of Check	Quantum of Check	Reference document	Acceptance Norms	Format of Record		Agency		Remark
1	Mechanical Components								M	C	N
1.1.0	Casting	Dimensional	Measurement	A sample from each lot	Manufacturer's Drawing	Conformance to Drawings	Internal test report		p	-	-
1.1.1		Visual Checks	Visual	100%	Impaction Instructions	Conformance to instruction	Internal test report		p	-	-
1.2.0	Machining	Dimensional	Measurement	Sampling plan	Manufacturer's Drawing	Conformance to Drawings	Internal test report		p	-	-
1.2.1		Visual Checks	Visual	100%	Impaction Instructions	Conformance to instruction	Internal test report		p	-	-
1.3.0	Painting	Paint shade and paint finish	Visual	100%	Process Sheet	Conformance to Process Sheet	Vendor test report		p	-	-
2	S S 316 Parts (if applicable)	Chemical Composition	Lab Test	Each lot	Product specifications	Conformance to Specifications	Material test certificate		p	-	-
3	Pressure Testing	Leakage Check	Hydraulic	A sample from 01 lot of Max. 10% of total qty.	As per manufacture standard	As per manufacturer standard	Internal test report		p	-	-
4	Finished Assemblies										
4.1.0		Workmanship, Name plate entries, Accessories etc.	Visual	100%	Approved data sheet/approved drawings	As per approved data sheet & drawings	Internal test report				Refer note (5)
4.1.1		Overall Dimension	Measurement	100%					p	*	*
4.1.2		Insulation Test	Megger test	100%	Manufacturer standard procedure	> = 10 M OHMS	Internal test report				
4.1.3	Degree of Protection	IP-65	Type test	Prototype	IS 2147:1962	IS 2147 : 1962	Test Report		p	v	v
			LEGENDS : M : Manufacture N : Customer		Reviewed By :						
Manufacturer			Contractor		C : Contractor /TPIA P : Perform W : Witness V : Verification		Customer Approval				
SIGNATURE					Name & Signature of Approving Authority						

**Notes:-**

1. Reference Documents will be available at the time of inspection for Verification
2. SP – Sampling Plan as per IS : 2500
3. TPIA – Third Party Inspection Agency
4. Each item should be dispatched after properly packing mentioned in the clause no. 7 of specification no. 241526464
5. For order qty. N, quality of Bhel/TPI witness shall be follows(for N≤10=100%,10<N≤ 20%= 50<N<100=10%,N>100 =5%)