

HYDROGENERATOR ENGINEERING DIVISION

HGE/2020-21/EOI/VMS

Date: 24.11.2020

SUB:- Regarding floating of Technical bid expression of interest for Vibration monitoring system

In line with Make in India policy of GOI, it is proposed to invite technical expression of interest (EOI) from prospective Indian manufacturer for supply of Vibration monitoring system for Hydro generator.

Presently this item is being procured from PMD vendors (no. of PMD vendors = 9). Out of 9 vendors, 6 vendors are foreign manufacturers. Hence, this exercise is being undertaken to identify additional Indian sources for this item.

Present projected requirement is approx. 15 sets per year.

Pre-qualification requirement Doc. No. HGE 2028 Rev.00 & Specification HG 10016 Rev.07 is attached for further action.


Please note that, this exercise is only for identification of new sources & technical evaluation. BHEL does not make any commitment whatsoever for procurement of these items.


P.K.VERMA
MGR./HGE

AGM/HGE 

AGM/HGE (HOD) 

AGM(MEX)

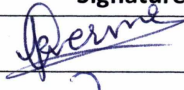
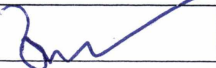
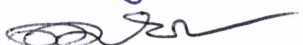
 BHOPAL	TECHNICAL PRE-QUALIFICATION REQUIREMENT			DOC. NO. : HGE-2028 DATE: 23-11-2020 REV NO : 00 PAGE 1 OF 1
	TECHNICAL	PQR	FOR VIBRATION	
	MONITORING SYSTEM			
	DEPARTMENT : HGE			

Technical Pre-Qualification Requirement (TPQR)
for Vibration monitoring system for hydro generators

S. NO.	DESCRIPTION OF TPQR	VENDOR RESPONSE	
		COMPLIANCE (YES / NO)	SUPPORTING DOCUMENTS REQUIRED TO ACCEPT COMPLIANCE
1)	Only Indian manufacturers will be considered. (Class-I supplier as per make in India policy)		Certificate of being Original manufacturer to be submitted alongwith self-certification of class-I supplier.
2)	Compliance to specifications HG 10016 rev-07.		Clause wise compliance of specification HG 10016 rev-07.
3)	The original manufacturer should have adequate in-house manufacturing set up for manufacturing of vibration monitoring system of at least 10 sets per year.		List of manufacturing facilities along with the necessary confirmation stating the facilities are sufficient to manufacture vibration monitoring system.
4)	The original manufacturer should have adequate in-house testing/ calibration facilities.		List of testing facilities available in-house /outside source (if any) along with the necessary confirmation stating the facilities are sufficient for testing of air gap monitoring system.
5)	Quality assurance plan.		Compliance to QAP No. QA/HGE/VMS/02 to be submitted with the bid.
6)	The supplier should have supplied and commissioned minimum 1 vibration monitoring systems.		Copy of minimum 1 P.O. along with the installation & commissioning certificate (in hydro power plant only) to be submitted.

Note:

- This TPQR is applicable for Indian manufacturers only.
- Compliance to above technical pre-qualification requirements is mandatory. In absence of compliance of above requirements vendor's offer is liable to be rejected.
- BHEL reserves the right to verify the information/confirmation furnished by the vendor. In case the information submitted is found false or incorrect, the offer will be rejected and the vendor is liable to be blacklisted.
- Make in India Policy attached.

	Name	Signature	Date
Prepared By	P.K.VERMA		23.11.2020
Checked By	A.DIXIT		23.11.2020
Approved By	A.BISWAS		23.11.2020



QUALITY ASSURANCE DEPARTMENT

QA PLAN FOR - VIBRATION MONITORING SYSTEM

SH. 01 OF 01


QA PLAN NO. - QA/HGE/VMS/02 dt. 18.11.2020 , REV-00

S. NO.	COMPONENT /OPERATION	CHARACTERISTICS	CLASS	TYPE	QUANTUM OF CHECK		REF. DOC.	Acceptance Norms	RECORD FORMAT	AGENCY		REMARKS
					SUPPLIER	BHEL/TPI				PERFORM	WITNESS	
1.0	Proximity probe, Accelerometer probe & tachometer	i) visual & dimensional	Major	Physical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
		ii) Calibartion	Major	Electrical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
2.0	Power supply Module	i) visual & dimensional	Major	Physical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
		ii) Calibartion	Major	Electrical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
		iii)power supply variation	Major	Electrical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
3.0	Relay Module, Display Module	i) Visual & Dimensional	Major	Physical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
		ii) Functional operation	Major	relay function	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
		iii)power supply variation	Major	Functional	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
4.0	Instrument rack arrangement	i) visual & dimensional	Major	Physical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
		ii) mounting arrangement	Major	Physical	100%	20%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	
5.0	VMS Software	software	Minor	software	100%	100%	As per BHEL specification	As per approved data sheet	TC	Supplier	BHEL /TPI	

Prepared by  18/11/2020

Checked by 

Approved By 

<div><div><div></div><div></div></div><div><div></div><div></div></div></div>		<div><div><div>सी.एच.ई.एल</div><div>BHEL</div></div></div>	<div>उत्पाद मानक</div> <div>PRODUCT STANDARD</div>		<div>HG 10016</div> <div>Rev.07</div>	<div>पृष्ठ 7 का 1</div>
<div><div>SPECIFICATION OF ONLINE VIBRATION MONITORING SYSTEM</div><div><div>This specification has TWO Sections.</div><div><div>SECTION-1: Contains the technical specification of “CONTINUOUS ON LINE VIBRATION MONITORING SYSTEM” and requirement of technical documentation along with quotation.</div><div>SECTION -2: Contains project details with project specific requirements of quantity of Vibration Sensors per set.</div></div><div><div>SECTION – 1</div><div><div>1.0 APPLICATION</div><div><div>The instrument is intended to be used for "Continuous On Line Vibration Monitoring system" of Hydro Generators with speed ranging from 60 to 1500 rpm.</div><div>2.0 WORKING ENVIRONMENT</div><div><div>Continuous On Line Vibration Monitoring system covered in this specification shall be capable of operating trouble free at an ambient temperature range of 0° to 50° C (Max.), 98.8% relative humidity, noise level of 90 dB. All equipments should be suitable for power house elevation indicated in section-II of spec.</div><div>3.0 SCOPE OF SUPPLY</div><div><div>Scope of supply shall be to suit requirement specified under this product standard.</div><div><div>a) Sensors as specified under Section-II.</div><div>b) Vibration monitoring units as specified under Section-II.</div><div>c) Cables, junction boxes etc. to suit above configuration.</div><div>d) Cable accessory & other hardware’s to suit above configuration.</div><div>e) Work station, printer as specified under Section-II.</div><div>f) Networking hardware & cables for integration of vibration monitoring units with SCADA/Workstation as specified under Section-II.</div><div>g) Supervision of installation.</div><div>h) Supervision of commissioning.</div><div>i) O & M manuals & as built drawings.</div><div>j) Training of site staff.</div><div>k) Any other item required for completion of vibration monitoring system.</div></div></div></div></div></div></div></div></div>						
<div>संशोधन : 07, दिनांक 04.03.14, डीटीसी की गाइडलाइंस के अनुसार संशोधित ।</div>			<div>हाइड्रोजनरेटर इंजीनियरिंग विभाग भारत हेवी इलेक्ट्रिकल्स लिमिटेड</div>			
<div><div>सोनू बघेल</div><div>सोनू बघेल</div></div>	<div><div></div><div>अंशुमान दीक्षित</div></div>	<div><div>तैयारकर्ता</div><div>SD/</div><div>आर.के.पांडे</div></div>	<div><div>अनुमोदनकर्ता</div><div>SD/</div><div>सी.के.एम.शास्त्री</div></div>	<div><div>जारी करने की दिनांक</div><div>15.04.1989</div></div>		

SPECIFICATION OF ONLINE VIBRATION MONITORING SYSTEM

This specification has TWO Sections.

SECTION-1: Contains the technical specification of "CONTINUOUS ON LINE VIBRATION MONITORING SYSTEM" and requirement of technical documentation along with quotation.

SECTION -2: Contains project details with project specific requirements of quantity of Vibration Sensors per set.

SECTION - 1

1.0 APPLICATION

The instrument is intended to be used for "Continuous On Line Vibration Monitoring system" of Hydro Generators with speed ranging from 60 to 1500 rpm.


2.0 WORKING ENVIRONMENT


Continuous On Line Vibration Monitoring system covered in this specification shall be capable of operating trouble free at an ambient temperature range of 0° to 50° C (Max.), 98.8% relative humidity, noise level of 90 dB. All equipments should be suitable for power house elevation indicated in section-II of spec.


3.0 SCOPE OF SUPPLY

Scope of supply shall be to suit requirement specified under this product standard.

- Sensors as specified under Section-II.
- Vibration monitoring units as specified under Section-II.
- Cables, junction boxes etc. to suit above configuration.
- Cable accessory & other hardware's to suit above configuration.
- Work station, printer as specified under Section-II.
- Networking hardware & cables for integration of vibration monitoring units with SCADA/Workstation as specified under Section-II.
- Supervision of installation.
- Supervision of commissioning.
- O & M manuals & as built drawings.
- Training of site staff.
- Any other item required for completion of vibration monitoring system.

		उत्पाद मानक PRODUCT STANDARD	HG 10016 Rev.07 पृष्ठ 7 का 2
गोपनीय एवं अधिकार सुरक्षित इस प्रपत्र पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे।			
<p>4.0 SPECIFICATION</p> <p>4.1 Input Power Supply</p> <p>The instrument shall be suitable for operation at input power supply as specified in Section-II of this document.</p> <p>4.2 Standard Features</p> <p>Instrument shall have following minimum standard features -</p> <ul style="list-style-type: none"> (a) Signal processing by microprocessor of latest generation. (b) Transducers should satisfy the American Petroleum Institute (API) standard 670 & DIN-ISO 10817-1; 199-11. (c) All the modules like power supply, system monitors & vibration monitors as applicable, shall be supplied in flush panel mounted standard size rack. Any vacant position on the rack shall be fitted with a blanking plate. Adequate mounting hardware shall be supplied with the instrument. (d) Display device shall be an integral part of the vibration monitoring Instrument. (e) Wall mounted type or rear panel mounted type vibration monitor is NOT Acceptable (Except proximeter housing). (f) Display & instrument setting should be user friendly so that all operations & checks can be performed from monitor front while machine under operation. Measuring range should be freely programmable. All the settings, programming shall be through the monitor only & there should not be any need for external device or PC/Laptop, console etc. (g) The vibration monitoring equipment shall be mounted on Turbine-generator gauge panel located in generator floor. The equipment shall be front flush mounting type. Maximum panel cutout should be 483 mm x 265 mm x 304.8 mm (w x h x d). If smaller rack size is feasible, same should be quoted with dimensions. (h) English language legends and display. (i) LCD digital display of adequate size. (j) Communication protocol as per Section-II. (k) Self-diagnosis checks & features. (l) Relay alarm contacts and analog output as specified in Section-II. 			

		<p style="text-align: center;">उत्पाद मानक PRODUCT STANDARD</p>	<p>HG 10016 Rev.07</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">गोपनीय एवं अधिकार सुरक्षित इस प्रपत्र पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे ।</p>		<p style="text-align: right;">पृष्ठ 7 का 3</p>	
		<p>4.3 The on line vibration monitoring equipment shall consist of following :</p> <p>4.3.1 Transducers</p> <ol style="list-style-type: none"> The Proximity Transducers(Non-Contact Sensors) (with 1 m Screened cable, having connector suitable for extension cable or junction box) should be suitable for generator shaft material of 1.5 % Manganese steel forging with one set of spare nuts with each sensor. Transducer to have 50 mm threaded length for adjustment at site. Proximity Transducers to be provided with suitable mounting bracket which can be welded/bolted with housing for measurement of shaft vibration. Velocity pickups (Contact Sensors) (with cable as mentioned above) with suitable mounting plate which can be welded with housing for measurement of bearing bracket vibration with one set of spare Nuts/Bolts/Screws with each pick- up. Proximity transducers shall be run- out free. The requirement of transducers shall vary from order to order and shall be as indicated in Section-II. <p>4.3.2 Probe driver (If applicable).</p> <p>4.3.3 Cables</p> <ol style="list-style-type: none"> Extension Cable 9 m long (Screened) for connection between probe cable and junction box with each transducer. Connecting cable 50 m long (Screened) for connection between junction box & vibration monitor rack with suitable end connections for each transducer. Work Station / SCADA connectivity (Screened cable 300 m long suitable for connectivity between vibration monitors / SCADA) common for Power house. <p>4.4 Modules of Vibration monitor</p> <p>The vibration monitoring instrument shall in general consist of following modules, all mounted in one housing which in turn is mounted on flush panel type instrument rack so that the complete unit can be mounted on Turbine Generator Gauge Panel on Generator floor.</p> <ol style="list-style-type: none"> Vibration Input module. Vibration monitoring module & Display Module. Power supply module. Relay module. (As specified in Section-II of this document) Output (4-20 mA) module. (As specified in Section-II of this document) Communication Port Module. (As specified in Section-II of this document) <p>The quantity of each of items as referred above shall be suitable for quantity of probes indicated in Section-II.</p>	

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<p style="writing-mode: vertical-rl; transform: rotate(180deg);">गोपनीय एवं अधिकार सुरक्षित इस प्रपत्र पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे ।</p>			
<p style="text-align: right;">पृष्ठ 7 का 4</p> <p>4.5 Mounting Hardware</p> <p>All mounting hardware required for instrument, Transducer, proximeter housing, cable's couplers, like brackets, plates, Nuts/bolts/screws, clips, connections, markers, Conduits & accessories etc. shall be supplied by the vendors for each set.</p> <p>4.6 Programming & instrument setting</p> <p>Programming & instrument Setting shall be through vibration monitor itself & there should be no need for any computer & software for programming during commissioning.</p> <p>4.7 Workstation / SERVER grade Computer (common for all units) – (If required in Section-II)</p> <p>Workstation (common for all units) with printer (A4 color deskjet, compatible with latest operating system of supplied computer) shall be provided for storage retrieval & diagnostic of vibration data of all units. The configuration of offered computer, printer & OS shall be latest & of reputed make and subject to approval by BHEL.</p> <p>4.8 The system shall be designed for seamless integration. Plant SCADA system will be available placed in central control room at the power house. It shall be possible to communicate with SCADA over RS485 PORT with MODBUS RTU/Ethernet port with MODBUS TCP protocol as specified in Section-II. All networking hardware and data cables between SCADA/Work station and vibration Monitoring system of units shall be in supplier's scope. Scheme shall be so designed that all vibration Monitoring system of power house shall be connected to SCADA.</p> <p>5.0 TESTING /QAP</p> <p>The equipment shall be extensively tested for functional operation, calibration of sensors and reliability before dispatch.</p> <p>6.0 INSPECTION</p> <p>The inspection requirements as mentioned in enquiry.</p> <p>If inspection is required in enquiry. The equipment shall be inspected & tested at supplier's works in the presence of BHEL/Third party/Customer prior to dispatch. Supplier shall notify the readiness of equipment for inspection & dispatch at least 45 days in advance for deputation of inspection team to supplier's works along with internal test reports. All charges regarding travel, lodging & boarding for BHEL or Customer shall be borne by respective agency.</p> <p>7.0 PACKING AND FORWARDING</p> <p>The complete equipment shall be suitably packed for sea worthy packing and safe transport. Packing of the equipment shall also be suitable for dead storage of equipment for five years.</p>			

उत्पाद मानक
PRODUCT STANDARD

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पृष्ठ 7 का 5

8.0 INSTALLATION & COMMISSIONING OF VIBRATION MONITORING SYSTEM

- Lump sum Supervision for Installation & Commissioning, calibration & testing of complete lot of Vibration monitor equipment covered under scope of supply for each generator.
- Preparation and submission of commissioning test report on Vibration monitor equipment for each generator.
- Supervision of installation & supervision of commissioning charges may be kept separately.
- Preparation of “**as-built**” drawings indicating total installation of Vibration monitor system with location of Vibration sensors, method of fastening Vibration sensors, and their electrical connections for one machine.
- Training at site for suitable no. of working hours for customer’s engineers on the fundamentals of the Vibration monitor system (installed) and the use of Vibration monitor instrumentation package & softwares with suitable recommendations of vibration test procedures, data/result interpretation, Vibration test file management, etc. for implementation by end user for first set only.

9.0 DOCUMENTATION:

9.1 With offer (Two Copies each)

- a) Descriptive details/leaflet of each item.
- b) GA drawing of equipment and Interconnection/ wiring diagram of system.
- c) Mounting details like weight, panel cutout etc.
- d) Packing specification.
- e) Quality assurance plan, model packing list and final test report format.

9.2 During detail design stage before taking up manufacturing for BHEL approval:

- MQAP & FQP
- Schematic And GA drawings
- Bill of quantities
- Data sheets of major items
- Profarma packing list
- Draft copy of O & M manual

9.3 Along with supply of main equipment :

- (a) Documents shall be supplied as per Annexure-CL

10. Guarantee -- As per Annexure - CL.

11. Liquidated damage

A penalty shall be applicable for late delivery of equipment. Condition and rate of penalty shall be as specified on the enquiry.

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SECTION-II
PROJECT SPECIFIC REQUIREMENTS

HG 10016

Rev.07

पृष्ठ 7 का 6

1.0 PROJECT DATA & PROBES DETAILS: [As per project requirement]

1.1 Project Name, Customer, Location :

1.2 No. of Generators/ Motors :

1.3 Power house elevation :

1.4 Input power supply : -----V \pm 10%, ----- \pm 5% Hz, Single phase AC

1.5 Quantity of Transducers :

Locations		1		2		3		4		5		6	
Quantity of transducers for →		Bearing 1		Bearing 2		Bearing 3		Shaft Coupling		Axial Vibration		Stator frame	
		x	y	x	y	x	y	x	y	x	y	x	y
Proximity Transducers with Suitable mounting bracket which can be welded with housing for each unit.													
Velocity pickups with Suitable mounting bracket which can be welded with housing for each unit.													
Contract Spares (Common)	Proximity Pick ups												
	Velocity Pick ups												
Working Spares (Common)	Proximity Pick ups												
	Velocity Pick ups												

2. No. of Vibration monitoring units : -----

2.1 SCADA connectivity : Required / Not required

3. Requirement of alarm relay contacts –

- 2 NO, 2 NC for each channel :

- 1 NO, 1 NC for each channel :


- Grouped relay contact 2 NO, 2 NC for :
each locations separately for proximity pick up and velocity pick up as applicable

4. Requirement of 4-20 mA analog output for each channel : Yes - , No -

5. Communication protocol for SCADA communication : MODBUS/TCP using ETHERNET -
MODBUS RTU using RS485 -

6. Key phasor transducer : Required / Not required

गोपनीय एवं अधिकार सुरक्षित इस प्रपत्र पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की संपत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे ।

		उत्पाद मानक PRODUCT STANDARD		HG 10016 Rev.07 पृष्ठ 7 का 7					
गोपनीय एवं अधिकार सुरक्षित इस प्रपत्र पर दी गई जानकारी भारत हेवी इलेक्ट्रिकल्स लिमिटेड की सम्पत्ति है इसे प्रत्यक्ष या अप्रत्यक्ष रूप से कम्पनी के हितों को नुकसान पहुँचाने के लिए कदापि उपयोग नहीं किया जावे ।	<p>6. Length of Extension cables for transducers. (From transducer up to junction box or probe driver box, whichever is applicable) – 9 meter for each probe (minimum)</p> <p>7. Distance of central control room from the machine: ----- meters.</p> <p>8. Screened cable should be of 50 meter for each transducer.</p> <p>9. Workstation & Printer: Required / Not required.</p>								
	<table border="1" style="width: 100%;"> <tr> <td style="width: 33%; text-align: center;">PREPARED BY</td> <td style="width: 33%; text-align: center;">APPROVED BY</td> <td style="width: 33%; text-align: center;">DATE</td> </tr> <tr> <td style="height: 40px;"></td> <td></td> <td></td> </tr> </table>				PREPARED BY	APPROVED BY	DATE		
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