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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>SPECIFICATION FOR</u> <u>TMR ELECTRONIC GOVERNOR</u> <u>AND</u> <u>ELECTRONIC OVERSPEED PROTECTION SYSTEM</u> <u>FOR STEAM TURBINE.</u>				
Ref. Doc	Revisions :		Prepared :		Approved :		Date :
	Refer to record of revisions :		(I.S)		(PSVS)		13.08.13

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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.		<u>INSTRUCTIONS TO BIDDERS:</u> a) Bidders are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry. Offers with incomplete information will not be considered for evaluation, and are likely to be rejected without any further correspondence with the Bidder. b) Unsolicited requests from bidders for alterations to their already submitted offer will not be permitted. These would not be taken cognizance, and offers will be evaluated without taking into account such requests/correspondence. c) Any technical features over & above BHEL enquiry specification requirements proposed by Bidder will not be given preference for the purpose of evaluation. d) Bidders shall comply BHEL specifications in total. Incomplete offers will be rejected. In case feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder. e) Bidders are advised to quote models and makes with proven track record of successful operation. Offers shall include supporting catalogue and published literature [duly highlighting, as appropriate, the offered variant] with complete de-codification of the offered models. In case of discrepancy between bidder's offer and published documents, details furnished in published documents will be taken for the purpose of evaluation. f) In the event of any conflict between these specifications, data sheets, related standards, codes etc. the bidder shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture/procurement of the items in question. g) Bidder shall submit duly filled deviation format enclosed with this specification along with technical offer, otherwise, it will be presumed that there are no deviations from this specification. Offer without this deviation list will not be evaluated & shall be rejected. If, there are no deviations, bidder shall submit signed copy of deviation format, mentioning "No Deviations". h) Changes if any made by BHEL during technical evaluation on the specification requirements or Bill of material, bidder is requested by the purchase to submit impact price (amount to be reduced or increased to the original offered price) for those changed items only, other items for which there are no technical changes, unit rates shall be maintained as it is. i) Bidder shall include UNIT prices for all spare items. Bidder may attach separate sheet for the same. j) Bidder shall include PRICE SCHEDULE format attached with this specification for its technical and commercial bids. Technical bid shall contain the PRICE SCHEDULE with 'QUOTED' against each RFQ item. k) In case of any technical query, bidders may contact the following BHEL engineer before submission of offer: Name: Ramniwas Sangwa Designation: Deputy Manager Deptt: TC Engineering Phone: +91 40 2318 3548 Email: ramsangwa@bhel.in		
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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. 1. SCOPE: 1.1 This Specification gives the requirement of TMR Electronic Governor and Electronic over speed protection system for steam turbine. The scope of bidder shall include Design, Selection, Manufacture, Assembly, Testing, Packing, Supply, documentation, training and supervision of commissioning of complete TMR Electronic Governor control and Electronic over speed protection system package for Steam Turbine. 1.2 Please refer to the SYSTEM ARCHITECTURE DIAGRAM for system overview. 1.3 Bidder has to quote for all the items required for implementation of TMR Electronic Governor Control and Electronic over speed protection as a complete package, exclusion of any item is not acceptable and the offer will be rejected. 1.4 Bidder is solely responsible for engineering, procurement, and supply with documentation,submission of drawings/ datasheets, and dispatch the material along with O&M manuals. 1.5 The complete TMR Electronic Governor Control and Electronic over speed protection system package assembled in panel and the speed sensors shall be dispatched to BHEL-Hyderabad works for testing with the steam turbine. Other accessories and mandatory spares may be dispatched to site directly from vendor works. 1.6 It is the responsibility of the vendor for engineering of the complete TMR Electronic Governor Control and Electronic over speed protection system package along with detailed Bill of material and model selection. If there is shortage or mismatch of any items identified at any stage up to commissioning the complete TMR Electronic Governor and Electronic Overspeed Protection system package, vendor shall rectify/replace/supply the items without any commercial or delivery implications. 2. TECHNICAL REQUIREMENTS: 2.1 TECHNICAL REQUIREMENTS – TMR Electronic Governor Control system: 2.1.1 The Electronic Governor Control system shall be with TMR configuration and the same shall be equivalent to “WOODWARD 5009FT”. It is responsibility of the vendor to select and design the offered TMR Electronic Governor Control system package to be equivalent to Woodward 5009FT. Comparative statement of the offered TMR Electronic Governor Control system package with respect to “WOODWARD 5009FT” shall be furnished along with the offer, Deviations if any of the offered TMR Electronic Governor Control system package with respect to “WOODWARD 5009FT” shall be listed out and furnished along with the offer. 2.1.2 TMR Electronic Governor panels shall be located in Rack room (RR) and the following operator interfaces shall be considered. - One HMI panel mounted touch screen (17” TFT screen) with operation and programming facility accordingly programming and run time licensed software's shall be provided. In case the panel HMI is non touch screen type, vendor shall provide panel mounted keyboard with integral mouse pad for operation of HMI. This keyboard shall be locaed in recessed position on the panel. - One (HMI) located at Main control room, the distance from RR to Main control room shall be considered as 2000 meters (refer RFQ for exact distance), the HMI shall be Console mounted type 21” TFT screen (Desktop PC) with keyboard and A4 size Black and white laser printer. The HMI located at Main Control room shall be used as engineering, configuration and operator station, accordingly development, logic modification and run time licensed software's shall be provided. - Vendor to supply program loader (laptop, if specified) along with necessary maintenance software's (licensed software's) for application program uploading/ unloading in the Governor during system recovery. - Necessary connector including cable to individual system shall be provided. Licensed version of latest antivirus with 3 year validity shall be provided in all Laptops and PC's / HMI. Vendor should supply licensed software of all programs preloaded in the laptop/ PC in CD with all password to access the software					
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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.		Vendor shall develop graphic screens required for monitoring, operation and annunciation purpose during detailed engineering stage and furnish the screens for approval. 2.1.3 The TMR electronic governor system should accept input from 3 speed sensors, the pole wheel details will be furnished during detailed engineering. 2.1.4 It should be possible to program the TMR electronic governor to operate the steam turbine from zero speed to rated speed with ramp rates, idle speeds, critical speeds for Hot, Cold and Warm conditions as per the start up curves to be furnished during detailed engineering. 2.1.5 The governing valve characteristics shall be programmed in the Electronic governor for linearization. 2.1.6 The TMR electronic governor should be capable of operating in Auto, semi auto and manual modes. 2.1.7 The TMR electronic governor should be able to accept 4-20 mA signal from HIC at DCS or LCP as a manual speed / load setpoint to governor. The governor shall have bump less transfer for auto/manual selection or local/ remote selection. The auto/manual selection and local/ remote selection facility shall be configured in Electronic governor and available on the HMI. 2.1.8 HMI shall include features like assignable speed range, adjustable speed set point, remote speed set point input, digital speed indication, adjustable speed ramp, override for testing the external overspeed trip system etc. 2.1.9 Vendor shall also provide pin configuration and Modbus address mapping list to purchaser's DCS vendor for configuring the serial data interface. 2.1.10 TMR electronic governor shall be SIL-3 certified as per IEC61508 / IEC61511. 2.2 TECHNICAL REQUIREMENTS – Electronic over speed protection system: 2.2.1 The Electronic over speed protection system shall be API 670 & 612 compliant and SIL-3 certified as per IEC61508 / IEC61511. 2.2.2 The Electronic over speed protection system shall be independent of the governing system. Separate electrical over speed trip circuits consisting of speed sensors and logic devices shall be used to provide in two out of three voting logic configuration. 2.2.3 The Electronic over speed protection system should accept input from 3 speed sensors, the pole wheel details will be furnished during detailed engineering. 2.2.4 The Electronic over speed protection system shall be assembled along in the TMR electronic governor panel. 2.2.5 The Electronic over speed protection system shall have online testing / repair facility and internal function generator and fully redundant power supplies. 2.2.6 The Electronic over speed protection system shall sense an overspeed event and change the state of its output relays within 40 ms max. 2.2.7 Program loader laptop / HMI PC (if specified in RFQ) shall be loaded with software for program loading / unloading and settings configuration. 2.3 TECHNICAL REQUIREMENTS – GENERAL: 2.3.1 Two feeders of UPS power supply shall be provided at cabinet by purchaser, all other power supplies for TMR Electronic Governor system, Electronic overspeed protection, HMI, separate & independent 24VDC-5A power supply for I/H converters (Redundant), power supply for Laptop, Printer, isolators etc. shall be generated/ provided by the vendor from TMR Electronic Governor cabinet. 2.3.2 For Speed measurement, Magnetic Pickups (MPU) or Proximity sensors (Explosion proof type) are required. The same shall be suitable for hazardous area classification for IEC Zone-1 & Zone-2 Group IIC, Temperature class T3. The speed sensor shall be with threading of 0.750-20 and case length of 3.0 Inches (or as required / informed during RFQ). 1 Pair (Shielded) signal cable (armored) between Speed probes and TMR Electronic Governor system and between Speed probes and Overspeed Protection system shall be supplied by the vendor (if specified in RFQ). 2.3.3 All inputs and outputs from hazardous area shall be provided with barriers and from safe area shall be provided with isolators / relays. 50% IO's shall be considered for barriers.	
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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.		2.3.4 Any other item (software or hardware) required for proper functioning of the TMR Electronic Governor and electronic overspeed protection system shall be supplied by the vendor. 2.3.5 The vendor shall design and provide earthing as per the protecting earthing system according to IEC rules. 2.3.6 It is vendor's responsibility to supply a system, which functionally meets all the requirements of this specification. Any item not supplied but required to meet the specification requirements, during the execution of the order or during commissioning to meet the proper functioning of the system, shall be supplied by the vendor at no extra delivery and no extra price. 2.3.7 Communication cables shall be supplied with connectors at both ends. Necessary additional SIO modules as required shall be supplied and assembled in the cabinet by the vendor for achieving the dual redundant communication to DCS. 2.3.8 It shall be possible to operate, program, and diagnose the steam turbine control system faults from the HMI. 2.4 TECHNICAL REQUIREMENTS – INSPECTION & TESTING: 2.4.1 The quality requirements shall be as per BHEL specifications. 2.4.2 Bidder to furnish the QA plan along with the data sheets of all the equipment inline with BHEL specifications for approval after placement of order at the time of data sheet approval during detailed engineering stage. 2.4.3 The fully assembled system shall be tested in an integral manner by simulation. Customer /Consultant /BHEL and/ or BHEL authorized representatives shall inspect the system at supplier works during factory acceptance test (FAT). Vendor shall submit their FAT procedure for approval after placement of order within 10 days of purchase order. 2.4.4 The latest certificates for use in hazardous areas shall be furnished for speed sensors by the vendor as specified below: • Certificates from statutory authorities like BASEFA, FM, PTB, UL and LCIE etc. for items of foreign origin and from CMRI etc. for items of Indian origin. • Approval certificates from CCE (Chief Controller of Explosives)/ PESO for items to be installed in India, irrespective of country of origin and the same is mandatory. In case CCE certificate is not available for any item at the time of offer, vendor shall confirm that the certificate shall be furnished during detailed engineering and before dispatch. • Approval certificate from BIS (Bureau of Indian Standards) for all flameproof instruments of Indian origin. 2.5 TECHNICAL REQUIREMENTS – IO SUMMARY: 2.5.1 The IO count listed below is the field IO for TMR Electronic Governor control application. The system shall be suitable for a total No of inputs/outputs minimum as follows. This IO count given below includes installed spares. This IO Count does not include IO's for Overspeed protection system. <table border="1" data-bbox="383 1579 1181 1803"> <thead> <tr> <th>Sl no</th><th>Description</th><th>IO Count</th></tr> </thead> <tbody> <tr> <td>i</td><td>Speed Inputs</td><td>4</td></tr> <tr> <td>ii</td><td>Actuator / Analog Outputs</td><td>4</td></tr> <tr> <td>iii</td><td>Analog Inputs</td><td>12</td></tr> <tr> <td>v</td><td>Digital Input</td><td>24</td></tr> <tr> <td>vi</td><td>Digital Output</td><td>12</td></tr> </tbody> </table> 2.5.2 The above I/O's do not include the no of I/O's required redundancy & auto testing facility. Vendor shall include the same for arriving at the final IO. Vendor to note that all I/O's indicated above shall be multiplied by vendor for redundancy separately. 2.5.3 In case the vendor offer is considering higher IO based on standard modules available, all the IO shall be wired up to terminal box in the panel. 2.5.4 All the Digital Inputs and Outputs shall be provided with interposing relays for isolation purpose.		Sl no	Description	IO Count	i	Speed Inputs	4	ii	Actuator / Analog Outputs	4	iii	Analog Inputs	12	v	Digital Input	24	vi	Digital Output	12
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2.5.5 All the analog inputs, analog Outputs & Actuator outputs shall be provide with Isolators for isolation purpose. 3. COMMUNICATIONS: 3.1 TMR Electronic Governor system shall be interfaced with the customer’s DCS (Located in RR) via dual redundant RS485 MODBUS RTU or MODBUS TCP link. Vendor shall provide the necessary communication hardware & software including RS485 surge protection / TCP converter devices along with armored serial cables and connectors at both TMR Electronic Governor system & DCS end. A distance of 100 meters shall be considered for each cable run. 3.2 The HMI with 21” LCD TFT screen shall be located in Main Control room, away from TMR Electronic Governor system panel. The communication with HMI shall be through fiber optic channel (if aspecified) else shall be on ethernet. Vendor shall provide all the required communication hardware & software including fiber optic converters & power supply for fiber optic converters along with armored fiber optic cables along with HDPE conduit and other networking accessories like LIU, patch cords etc at both ends. The fiber optic cable shall have min 2 nos spare cores. The fiber optic cable (orange colour) and converters shall be of single mode type. Orange fibre optic cables shall be routed in HDPE pipe. Fittings shall be used for joining the HDPE pipe. HDPE pipe shall be as per IS-4984 or equivalent IEC standard. Colour shall be orange with black fittings. 3.3 The HMI shall be provided with A4 size black and white laser printer along with the connecting cables and connectors. 3.4 The HMI, Laptop and printer shall be suitable for power supply range of 90 to 270 V ac 50/60 Hz. Power cable and other accessories for Laptop and printer shall be supplied by the vendor. 3.5 Electronic Overspeed Protection shall be interfaced with the customer’s DCS (Located in SRR) via dual redundant RS485 MODBUS RTU link. Vendor shall provide the necessary communication hardware & software including RS485 surge protection devices along with armored serial cables and connectors at both Electronic Overspeed Protection system & DCS end. A distance of 100 meters shall be considered for each cable run. 3.6 Vendor shall furnish the communication network schematic indicating all the hardware components along with the offer. 4. VENDOR SCOPE OF WORK/SUPPLY 4.1 SCOPE OF SYSTEM ENGINEERING The assigned Systems Engineer (SE) provides the system engineering for the project to assure that the control system is designed to meet the customer specifications. This service includes: generation of the controller wiring drawings and control system diagrams (CSD’s), the development and implementation of the control logic with Initial Controller Configuration Parameter Sets, any special recommendations on the control system components, and system programming and testing. A design audit of the completed control solution shall be made before shipment. This takes the form of a presentation by the SE to the design audit team, which reviews all aspects of the engineered solution. 4.2 SYSTEM ENGINEERING FOR EACH TMR Electronic Governor and Electronic Overspeed Protection system. System engineers shall review the control system design with the customer to ensure compatibility between the control system and the application. The system engineering service shall include the following for each TMR Electronic Governor and Electronic Overspeed Protection, but not limited to the following: I. Preparation of Design Specifications. II. Controller Configuration. III. Preparation of Drawings. IV. Mod Bus Address mapping list for interfacing TMR Electronic Governor and Electronic Overspeed Protection controller with DCS						
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			4.4 COMMISSIONING OF THE SYSTEM The Control system representative from the nearest location from the site shall supervise the erection, Commissioning, configuration and tuning of the controller & accessories supplied by vendor. The Field Engineer shall be responsible on site for system integration and commissioning, to troubleshoot and correct any connectivity issues and to tune the system in response to actual system dynamics. Vendor shall optimize the overall system with respect to appropriate integration and interface with customer’s DCS etc.			
			5. SUPPLY OF HARDWARE: 5.1 The TMR Electronic Governor hardware as specified in this specification. 5.2 The TMR Electronic Governor system shall be supplied as a fully wired & assembled system in a standalone cabinet of RITTAL make, IP55 as a minimum. 5.3 The TMR Electronic Governor system cabinet shall be located in safe area in the control room. All the equipment shall work satisfactorily even if the air conditioning fails for two hours.			
			5.4 DESIGN & FABRICATION: 5.4.1 The cabinet shall be free standing, floor mounting type with back doors and shall be totally enclosed cubicle. It shall comprise of rigid structural frame enclosed completely with cold rolled steel sheets with suitable stiffness at the rear of the cabinet. 5.4.2 The overall dimensions of each cabinet shall be in general 800 / 1600 mm width X 2100mm (or 2200mm) height (including base channel of 100 mm height) X 800mm depth. The number of panels required shall be decided by vendor meeting the specification requirement. 5.4.3 Cabinet shall have bottom entry with removable gland plates for all the power/control/signal cables. Cable glands are in cabinet supplier’s scope. Cable OD sizes shall be furnished during detailed engineering. The cable gland material shall be Nickel-plated Brass or SS316 (specified during detail engineering). The Cable gland shall be provided with checknut & PVC hood. Additional cable glands shall be supplied for the communication cables based on the size of these cables.			
			5.5 PAINTING: The paint shade for the panel shall be RAL7035 or as specified during detail engineering. 5.6 ELECTRICAL SYSTEM: 5.6.1 All wiring shall be carried out with PVC insulated 660V grade single core multi strand copper conductor. The conductor cross section shall be 1.0 mm² minimum for signal wiring and 2.5 mm² for 110 VAC 50 Hz UPS or 220 VAC UPS (confirmed during detailed engineering) & 240 VAC 50 Hz non ups power wiring. 5.6.2 All wiring shall be routed in suitable perforated PVC troughs. No trough shall be more than 70% full. 5.6.3 Open terminals shall generally be avoided. Terminal strips shall be of anti-vibration type Phoenix, wago or equivalent type. 5.6.4 Cabinet shall be provided with ample lighting inside the cabinet with door limit switch.			
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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.			5.6.5 Cabinet shall be provided with ventilation fans along with fan failure detection alarm and temperature alarm. 5.6.6 Wires carrying measurement signals associated with thermocouples, resistance thermometers and other low-level signals shall be routed in separate troughs/wire ways and not along with power cables. Power wiring and control wiring shall be separated by not less than 150mm. The crossing, if unavoidable, shall be as close to right angles as possible. 5.6.7 Wiring Colour code shall be as below: 1) Power supply hot - Black 2) Power supply neutral - White 3) Ground - Green 4) Control & Shutdown - Red 5) Signal(IS) - Blue 6) Alarm system -Yellow 5.7 POWER SUPPLY: Redundant UPS power feeders shall be provided at Cabinet and further distribution of power supplies to all equipment in Cabinet shall be in vendor’s scope. Isolation switches / circuit breakers for all power supplies shall be provided on the Cabinet (inside). 5.8 GROUNDING: 5.8.1 Cabinet shall be provided with an earthing lug and shall be grounded to an Earth bus bar. 5.8.2 Cabinet vendor to provide a separate insulated instrument circuit ground bus. This shall be electrically isolated from cabinets, structure, equipment, incoming cable trays, amour of cable etc. All circuit grounds of electronic instruments, shields and ground wires of signals cables; barrier earth etc. shall be connected to this ground. This ground shall be typically 6mm thick and 50mm wide and of copper. Both ends of this bus bar shall have suitable terminals for further connection to ground electrode provided by purchaser. Creation of multiple grounds in a loop shall be avoided. 5.8.3 Grounding shall be as per the requirement of control system, any special requirements of earth pit and resistance shall be informed during detailed engineering. 5.9 IDENTIFICATION & MARKING: 5.9.1 Each wire will be identified at both ends with its identification ferrules. 5.9.2 All terminals & terminal strips shall be identified by their individual identity. 5.10 NAME PLATES: 5.10.1 All cabinet mounted instruments, pushbuttons, lamps etc. shall be provided with name plates. 5.10.2 The name plates shall be made out of black-white-black (1.6mm thick) phenolic laminate. 5.10.3 All equipment in the cabinet shall be provided with identification. 6. SPARES PHILOSOPHY: 6.1 The system shall meet the following spare philosophy. This philosophy shall also be applicable for items like barriers, isolators, relays, terminals, lamps, push buttons etc. 6.2 SPARES: Vendor shall include following spares in their scope of supply: 6.3 SPARE SPACE REQUIREMENT: The system shall be provided with following spare space: 6.3.1 I/O racks of programmable logic controller shall have 10% usable spare space for installing additional I/O cards of each type in future. However internal wiring for the same shall be connected up to the I/O terminals. 6.3.2 Processor system of programmable logic controller shall have capability to execute additional 20% logics. 6.3.3 Each operator console shall contain 20% usable spare group and related display capability. 6.3.4 The system shall have capability to extend its historical trending, logging and user's memory by 20% to meet future expansion with/without adding additional memory modules. 6.3.5 The communication sub-system shall have sufficient capacity to handle additional data contributed by addition of 20% I/O.		
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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.			6.3.6 Usable spare space in panels and cabinets to install 10% spare hardwired items like relays, switches, lamps, fuses, circuit breakers, barriers, isolators, terminals, and panel mounted instrument etc. in future. 6.4 <u>SPARE MEMORY REQUIREMENT:</u> 6.4.1 The system shall be provided with a minimum of 40% spare memory capacity, as required for application program and data base to meet specified functional requirements. 6.4.2 It shall be possible to extend the memory by at least 20% over and above the actual requirement at a later date. 6.5 <u>SPARE SOFTWARE CAPABILITY</u> 6.5.1 Sufficient additional software capacity shall be available in the system to take care of spares requirement as specified in Spare Space Requirement of this specification to meet all functional requirements of this specification. 6.5.2 Unless specifically indicated otherwise, the offered system shall have software licenses to cover all the tag numbers indicated in the material requisition, including spare space indicated in this specification. 6.6 <u>MANDATORY SPARES</u> 6.6.1 Mandatory spares shall be ware-house spares and shall be supplied as loose items. Refer Variant table for quantity and details. 6.6.2 Spare modules for all types of IO cards, processor cards, Communication cards, power supplies, power supply cards, interface cards, controller cards, termination assemblies, isolators etc. 6.6.3 Spare networking components like RS-485 SURGE PROTECTORS, Ethernet switches, fiber optic converters (single mode type), connectors, patch cords, LIU etc. 6.6.4 Fuses of all type and rating and cable glands. 6.7 <u>CONSUMABLE SPARES:</u> A4 paper (25 rims), ribbon / printer cartridges, toner and ink required for printers (02 sets), CD/DVD (10 nos) or any other consumable item shall be supplied along with system required for minimum of six months duration after system acceptance. 6.8 <u>COMMISSIONING SPARE:</u> Vendor shall be responsible to supply any spares which are found necessary to replace failed modules, failed sub-systems, or corrupted / faulty software while performing commissioning activities. Against commissioning spares, a complement of commissioning spares such as CPU cards, IO cards, Power supplies, Isolators, Termination assemblies, pre-fab cables, fuses, connectors, EEPROMs and any other item deemed necessary considering that the failure of any component of the system should not delay the commissioning of the system. 7. <u>DOCUMENTATION:</u> Documentation shall be in three steps, during offer submission as response to BHEL Enquiry stage, drawing approval stage, and during delivery of items stage (as-built). All the documents shall be preferably in A4 size (Drawings in Auto-CAD, and documentation in A4 Size PDF) shall be used for submission. The documentation aesthetics shall be in line with international standards. Incomplete data, without title blocks, name of the item, document number, revision number, page number etc. will not be acceptable. Bidder shall be responsible for creating, making and arranging complete documentation as per BHEL requirements at all stages. 7.1 During Technical offer submission: Two copies of following - Filled up check list as per clause 17. - Catalogues of TMR Electronic Governor and Electronic overspeed protection system and other hardware. - Terminal block diagrams. - Configuration diagram of system - Details of Software. - Write-up of System. - Communication interface diagram. - GA & Bill of material.				
			Ref.	Doc			

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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.		• Deviation list as per “deviation format clause 12” if any. • Compliance certificate (duly signed & stamped copy of complete specification). • Un-priced price schedule as per clause 20. • PTR (mandatory) as per clause 13, 14 for all the items. • Filled in Certificate of logistics support as per clause 15. 7.2 Vendor shall visit BHEL office within one week of PO/LOI to collect the project specific information (Tag no’s, services, range, etc.) for engineering their drawings/documents. 7.3 During drawing approval after PO placement: Three (3) copies of the following within 3 weeks of order placement • Overall general arrangement (OGA) and BOM. • Detailed GA drawing for each and every item as per PO order. • Wiring diagrams. • Schematic drawings of all electronic modules. • Field interface terminal details. • Details of software along with listing of MODBUS addresses. • Quality plans of individual items. • Type test certificates 7.4 It is the responsibility of the vendor to review the documents for total compliance with all the BHEL specifications furnished with the inquiry before submitting to BHEL. 7.5 The data sheets will be forwarded by BHEL to Customer/Consultant for approval, comments if any from Customer/Consultant shall be clarified and revise the data sheets if required by the vendor in line with BHEL/EIL specifications furnished with the inquiry. 7.6 Vendor has to attend technical meeting with Customer/Consultant along with BHEL if required for technical discussions and obtaining approval of documents for the package items. 7.7 Along with material, final documentation in 6 Copies shall be sent to project site and two numbers of soft copies in CD with the following listed documents. However, one advance copy shall be handed over to BHEL- Engineering for approval before dispatching multiple sets of 6 copies to the project site. • Packing list. • All the documents submitted during drawing approval after incorporating FAT corrections if any. • Inspection reports • Photo copies of BHEL Approved documents • Test certificates • Warrantee certificates • Operation & Maintenance manuals • Commissioning procedure. 7.8 It is Vendors responsibility for obtaining approvals on drawings/documents from BHEL/Customer within time frame and dispatch material in time to project site office as per purchase order delivery schedule. Further vendor requests for any clarifications or approvals for delivery extensions etc. are not entertained at any stage. 7.9 Within 15 days after commissioning: • Final reports giving details of commissioning data, its analysis and recommendations, if any. • Vendor shall supply the portion of system engineering document, which requires updating as per commissioning data, and 6 copies & 2 CD’s of it shall be furnished. 7.10 Vendor shall provide the re-packing instructions after the testing is completed in BHEL works. 8. <u>GUARANTEE:</u> 8.1 Vendor shall be responsible for all the items supplied in this package ie, vendor shall provide a guarantee certificate for trouble free performance of all the items for 18 months from date of supply. Vendor shall have tie-ups with sub-vendors for providing guarantee & only OEM authorized agency shall handle the warranty period services. 8.2 If any defect in the material is reported from site the same shall be replaced by vendor at site immediately without any commercial or delivery implications.		
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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.		9. <u>PACKING, MARKING & SHIPPING:</u> 9.1 PACKING: - All the items shall be packed in very good quality packing; the packing shall be such that the items should not be damaged during loading, unloading and transportation, the packing shall be suitable for 6 months of outdoor storage from the date of shipment. - The operation and maintenance manuals of all the items 2 copies shall be included in the packing. - One copy of the packing list shall be fixed on the packing with suitable protection to with stand loading, unloading, transportation and rain. - Adequate amount of silica gel or equivalent shall be provided in each box before dispatch for the removal of moisture till installation. - All safety instructions for storage and handling shall be indicated on external surface of each box. 9.2 PACKING LIST: - Detailed packing list with description, quantity, tag nos, make and model no. etc. including the list of O&M manuals shall be prepared by vendor and submitted to BHEL before dispatch. - As this system shall be used in BHEL shop for machine testing, the minimum items required for testing shall be packed separately. Other items, which are not required for testing, shall be packed and marked separately to dispatch directly to site. Vendor shall identify this list in their offer. - All the items shall be shipped in a single shipment. - It is the responsibility of the vendor to check that all the items are dispatched along all the accessories i.e. Cable glands, Mounting brackets, adapters etc. Queries if any received from site regarding the TMR Electronic Governor and Electronic overspeed protection system package items, shall be clarified by vendor immediately, malfunction or defects of any items reported from site within the guarantee period shall be replaced at site immediately without any commercial or delivery implications. - Bidder to consider and include charges for one visit to site as part of the main package as and when informed by BHEL to resolve issues if any reported from site regarding material discrepancy of the TMR Electronic Governor and Electronic overspeed protection system package items. 9.3 Each device shall be identified with the following information as a minimum. - OEM name or identity - Manufacturer's model and /or serial number - instrument range - Tag no. The above information shall be in a permanent form on a stainless steel nameplate and permanently attached to the device/equipment.											
		10. <u>COMMISSIONING ASSISTANCE:</u> Commissioning assistance at site & BHEL works during turbine testing for the above equipment shall be provided by vendor (Lump sum). A total period of 6 working days excluding travel time and 2 visits shall be considered. The offer shall be inclusive of Travel, Boarding & Lodging and local conveyance during the visit. BHEL may decide to place order for additional number of days & visits (refer actual no of days / number of visits in Price Schedule / RFQ).											
Ref. Doc		11. <u>TRAINING (If specified in RFQ):</u> 11.1 The training shall include configuration, operation and maintenance of the TMR Electronic Governor and Electronic Overspeed protection system package. The training shall be conducted at site. All requisite training material for the said training shall be provided by the vendor during the training. 11.2 Training of 5 engineers for 2 days excluding travel time at site and one visit inclusive of Travel, Boarding, Lodging and local conveyance shall be considered.											
		12. <u>DEVIATION FORMAT:</u> Bidder shall submit duly filled deviation format (as given below) along with technical offer, otherwise, it will be presumed that there are no deviations from this specification. Offer without this deviation list will not be evaluated & shall be considered for rejection. If, there are no deviations, bidder shall submit signed copy of this format, mentioning "No Deviations". <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sl.No</th> <th style="width: 20%;">Clause No.</th> <th style="width: 20%;">Deviation</th> <th style="width: 20%;">Reason for</th> <th style="width: 30%;">Deviation category</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>				Sl.No	Clause No.	Deviation	Reason for	Deviation category			
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	of Spec	deviation	Product/design limitation	Optimization
1				
2				

13. PROVEN TRACK RECORD

The system being offered as per specification shall have well proven performance record of operating satisfactorily in two similar units in a hydrocarbon processing industry for a **minimum of 8000 running Hours**. The above criteria shall be applicable to main equipment, sub- components as well as brought out items if any. Prototype equipment / instruments or instrument under phase out cycle shall not be offered or supplied. Bidder shall submit necessary supporting documents / past users confirmation supporting to above PTR requirements along with technical offer. **Bidder to furnish the PTR details as per clause 14 and the Certificate for logistics support as per clause 16 along with the offer.**

14. PROVEN TRACK RECORD FORMAT

- Name of the Bidder
- Whether manufacturer & supplier:
- Whether System Integrator & Supplier:
- Name of Packager:

Sl.No	PTR Requirement	Ref-1	Ref-2	Ref-3	Ref-4
1	Description of the items offered				
2	Description of item as manufactured & Supplied/ engineered (identify bidder's scope of work)				
3	Purchaser's name, address, Tel no, Fax no, email and contact person				
4	Date of order placed				
5	Contractual completion date				
6	Actual completion date/ month & year of commissioning				
7	Reasons of delay if any				
8	Approved value of order				
9	Details of major break down till date.				

15. TENDER EVALUATION CRITERIA

- The total price for the complete package i.e. Main System, Mandatory spares, commissioning charges and training shall be considered for L1 evaluation.
- Duly signed & stamped un-priced price schedule and unit prices shall be submitted along with technical offer by bidder as a token of concurrence that all items are quoted without which the offer will not be evaluated. For unpriced bid bidder to fill 'Quoted' for each item and submit (refer clause 19, 20 for PRICE SCHEDULE.)

16. LOGISTIC SUPPORT

- Vendor shall ensure and provide the following information/ details along with the offer.
 - Local service facilities in India is available or not from the vendor?
 - If not available, where is the vendor's approved service facility presently located nearest to India.
 - Instruments/ System shall be user serviceable.
 - User reference list
 - When was quoted model introduced in the market?

Ref.
Doc

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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. 16.2 Certificate for logistics support (by Principal) (To be signed by Principal's corporate level signatory on company's letterhead and submitted along with the offer) I, on behalf of M/s confirm that the quoted by M/s for <by BHEL, Later> Gas Compressor of <by BHEL, Later> Project shall continue to be supported by us. The quoted item shall not be withdrawn from Indian market in next three(3) years from the date of placement of order as a matter of our corporate policy. I further confirm that in case of placement of order by M/s BHEL on M/s we shall continue to support M/s BHEL / END USER in providing back-up engineering, maintenance support and spare part to M/s BHEL / END USER for a period of 10 years from the date of expiry of warranty. SIGNATURE WITH SEAL AUTHORIZED, SENIOR MANAGEMENT LEVEL 16.3 Certificate for Logistics Support (by Vendor) (To be signed by Vendor's corporate level signatory on company's letterhead and submitted along with the offer) I, on behalf of M/s confirm that the quoted by M/s for <by BHEL, Later> Project shall continue to be supported by us and our principal(s). The quoted item shall not be withdrawn from Indian market in next three (3) years from the date of placement of order as a matter of our corporate policy as supported by attached certificate from our principal(s) M/s I further confirm that in case of placement of order by M/s BHEL on us, we shall continue to support M/s BHEL / END USER in providing back-up engineering, maintenance support and spare part to M/s BHEL / END USER for a period of 10 years from the date of expiry of warranty. SIGNATURE WITH SEAL AUTHORIZED, SENIOR MANAGEMENT LEVEL SIGNATORY				
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					11	<u>TMR Electronic Governor system- Mandatory Spares consisting of:</u> a 10% subject to minimum two of each hardware/module (including Controller card, IO card, Power supply card, communication cards, Field termination assemblies and any other cards / modules etc) of each type which are being used. b 10% subject to minimum two of all components of cabinets like Bulk power supplies (of each rating/make), Diode O-ring units (of each rating/make), Auto transfer switches, isolators, switches, barriers, signal converters, Trip amplifiers, sensors, auxiliary modules, relays, converters, annunciator cards, fused terminals, lamps / LEDs, Push buttons, selector switches, IS mV/I Converters, IS RTD/I Converters, Alarm cards (receiver switches) etc. of each type. c Prefabricated cable with converter at both ends-5 sets. d 10 % subject to minimum 2 nos. of RS232 / 485 converters, cables. e System Cabinet Air Filter 100%. f 20 % subject to minimum 2 nos. of Cabinet Cooling Fans of each type. g 20% subject to minimum 2 nos. of each type of MCBs, Auxiliary relays. h 10 % subject to minimum 2 nos. of communication system components such as hubs, switches, routers, cables, etc. i Fuses of all type and rating – 100% j Terminal blocks: 10% of installed quantity. k Cable glands –10% of min 2 no whichever is higher of each type	TC9765263112																					
					12	Consumable spares as per clause 6.7	TC9765263120																					
					Ref.	Doc																						

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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. 19. POST WARRANTY COMPREHENSIVE ANNUAL MAINTENANCE CONTRACT (PWCAMC, if specified in RFQ): a) Vendor shall quote for PWCAMC for 5 years after the completion of the normal warranty period. Vendor shall propose 5 years maintenance contract and shall exclusively mention the services to be provided, methodology, scope of work and vendors responsibility with year-wise breakup. b) In the event of any malfunction of the system hardware / software, experience service engineer shall be made available at site within 24 hours on the receipt of such information from owner. c) The contract shall include supply of maintenance spares, tools and tackles as required; travel, boarding and lodging of the service engineer. The quote shall be made year-wise up to 5 years. Contract shall include for on-site stock and shall give cost of each item after expiry of 5 years PWCAMC with escalation formula. d) Vendor shall stock 1 of each type of card / module and any other additional spares recommended, at owner site, and these shall not be part of the mandatory spares. Vendor can use these spares during the AMC. The spares used shall be replaced by vendor within 7 days with no cost to Owner. Vendor shall maintain a record of all faults during the PWCAMC. e) The service order under the PWCAMC including supply of spare parts and services shall broadly encompass:- i. Preventive Maintenance: Once a year, involving complete overhaul of the system, inspection of hardware and software, fault prediction, inspection of power supply quality, environmental and operating condition checks, major repairs / replacements and detailed reporting. This visit is in addition to visit required for periodic maintenance. ii. Periodic Maintenance: Site visits, minimum four times in a year, inspection of general healthiness of the system, study and advice on daily maintenance, inspection of hardware. If any problem is reported, running of test programs, on-line servicing and solving reported problems. Checks shall be conducted on running system i.e. a) on-line sub-systems and b) others (vendor to state). iii. Emergency Service: Any failure shall be on system supplier's account. The engineer must report at site within 24 hours of first intimation through telephone/email/fax of report of failure, with necessary spares. The system must be brought back within 24 hours after reporting at site. iv. Shutdown Visit: During annual shutdown of the plant vendors Engineer shall visit and carry out all the checks required. Each visit shall not be part of periodic / preventative maintenance visit. v. Software Maintenance / Support: Vendor is to maintain existing operating and application software to improve upon performance of system. Software modification and up-gradation and when required shall also be covered under this scope at no extra cost. vi. Notes: - a Vendor to note that while carrying out the PWCAMC activities Customer engineers may associate with system engineers. On-job training of these associated engineers shall be covered under this scope. - b All financial aspects of the PWCAMC must be listed clearly by the Vendor. - c Purchase order for PWCAMC shall be placed before expiry of defect liability (warranty as per commercial terms and conditions).				
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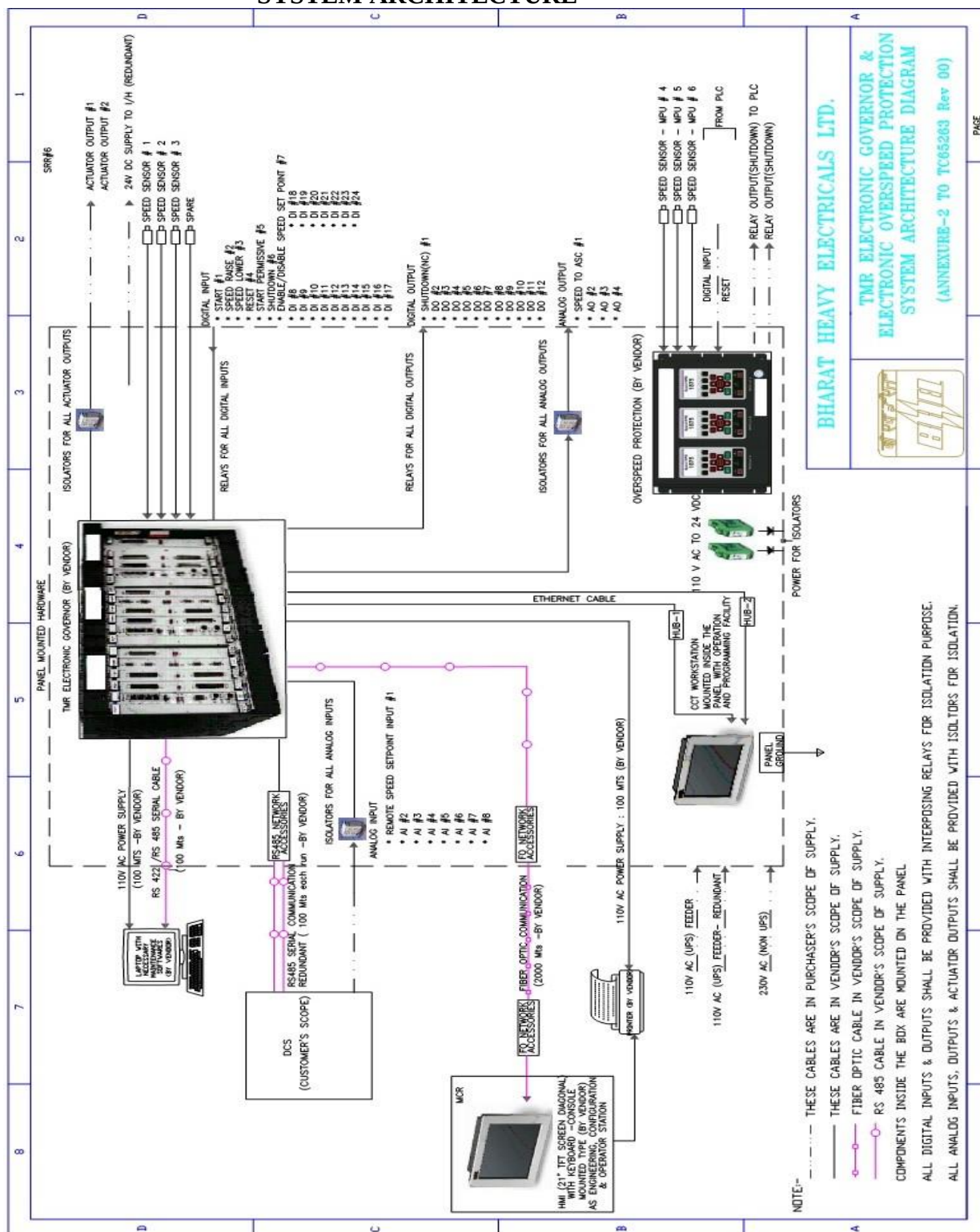
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SYSTEM ARCHITECTURE



BHARAT HEAVY ELECTRICALS LTD.

TMR ELECTRONIC GOVERNOR &
ELECTRONIC OVERSPEED PROTECTION
SYSTEM ARCHITECTURE DIAGRAM
(ANNEXURE-2 TO TC65263 Rev-00)

PAGE

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NOTE:— THESE CABLES ARE IN PURCHASER'S SCOPE OF SUPPLY.

— THESE CABLES ARE IN VENDOR'S SCOPE OF SUPPLY.

—○— FIBER OPTIC CABLE IN VENDOR'S SCOPE OF SUPPLY,

—○— RS 485 CABLE IN VENDOR'S SCOPE OF SUPPLY.

COMPONENTS INSIDE THE BOX ARE MOUNTED ON THE PANEL

ALL DIGITAL INPUTS & OUTPUTS SHALL BE PROVIDED WITH INTERPOSING RELAYS FOR ISOLATION PURPOSE.

ALL ANALOG INPUTS, OUTPUTS & ACTUATOR OUTPUTS SHALL BE PROVIDED WITH ISOLATORS FOR ISOLATION.

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		Rev. No.	Date	Revision Details	Revised By	Approved By		
		00	13.08.13	First Issue	----	P.S.V.S		
		01	24.03.17	Revised and new vatiants added	RAM	P.S.V.S		
		02	01.08.17	Revised as highlighted.	RAM	P.S.V.S		
		03	20.01.18	Revised spares list as 2no.s min. required	PSS	RAM		
		04	08.05.18	Revised for APL	PG	RAM		
		Ref.	Doc					