

Bharat Heavy Electricals Ltd.,

(A Government of India undertaking)


Electronics Division

PB No.2606, Mysore Road, Bangalore-560026, India

Quotations are invited under two part bid system for Supply and I&C of String Monitoring Boxes for 20MW NTPC -GANDHAR Solar Power project through e-procurement route.

RFQ NO and date	BKC0000047 dated 24.07.2020. (E-tender)
RFQ due date & time	04.08.2020 up to 13.00 hrs (IST)
Date, Time & Venue of Part-I Bid Opening	04.08.2020 after 13.30 hrs (IST) (E-tender) – Website - https://bhel.abcprocure.com
Date, Time & Venue of Price Bid opening	Will be intimated later for technically accepted vendors.
Address for Communication & Contact Person in BHEL	Engineering Department: Mr. Sheetal Prasad (9739913232) Purchase Department: Mr. Chandan BK (9739252560) BHEL Electronics Division, PB NO 2606, Mysore road, Bangalore-560 026. INDIA Email: chandanbk@bhel.in sheetalprasad@bhel.in

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: BKC0000047 RFQ DATE : 24.07.2020	Due Date/Day: 04.08.2020 TUE Time : 13:00 HRS E-TENDER
MMI:PU:RF:003			
(address for communication) :		(for all correspondence)	
		Purchase Executive : CHANDAN BK Phone : 080 26989608 Fax : 26989217 E-mail: chandanbk@bhel.in	

SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	PS0679086501 16 in 1 out SMB of 1500 volt system * HSN/SAC : 8504 Test Certificate With Wireless Communication	104	ST	104	10.11.2020
2	PS0679086510 Supply of Wireless Receiver System * HSN/SAC : 8504 Test Certificate	1	ST	1	10.11.2020
3	PS0679086528 Supply of Spares for SMB * HSN/SAC : 8504 Test Certificate	1	ST	1	10.11.2020
4	PS0679086560 I&C Support for SMB	104	AU	104	08.12.2020

Total Number of Items -4

NOTES: 1. This RFQ is governed by: a) INSTRUCTIONS TO BIDDERS/SELLERS and GENERAL CONDITIONS OF CONTRACT FOR PURCHASE available at http://edn.bhel.com (RFQ-PO Terms & Conditions) b) Any other specific Terms and Conditions mentioned. 2. Bidders / Representatives who would like to be present during opening of offers are required to furnish authorization letter for the same. * The HSN/SAC no mentioned against the line items in the RFQ are indicative only.	For and On behalf of BHEL. CHANDAN BK Semiconductors & Pho 1 OF 1
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PRE QUALIFICATION CRITERIA:

- 1) The bidder should be an OEM and should have supplied minimum cumulative quantity of 100 Nos of String Monitor Box with wireless communication of 1500 V grade, 16-in (minimum) / 1-out for solar PV power plants in India during the past 3 years with reference to the date of opening of Part-1 bid. As evidence to this, vendor shall enclose copies of purchase orders and Commissioning/Performance Certificates from the respective clients.
- 2) During technical evaluation, Credentials of vendors will be submitted to end customer (M/s NTPC) for approval. Only the price bids of those vendors, **who are technically qualified and Approved by end customer** (M/s NTPC) before price bid opening, will be considered for further procurement processing.



**PURCHASE SPECIFICATION
STRING MONITORING BOX (16-IN, 1-OUT) WITH
WIRELESS COMMUNICATION**

PS-439-1334

Rev No: 00

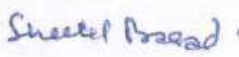

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**PURCHASE SPECIFICATION
FOR
SUPPLY OF
STRING MONITORING BOXES (16-IN, 1-OUT)
WITH WIRELESS COMMUNICATION**

Revision details :	Prepared	Approved	Date
R 00	 Sheetal Prasad	 Prachi Rao V	14-07-2020

	PURCHASE SPECIFICATION STRING MONITORING BOX (16-IN, 1-OUT) WITH WIRELESS COMMUNICATION	PS-439-1334
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This technical specification provides BHEL requirements for supply and commissioning of String Monitoring Boxes (16-in, 1-out combiner) with wireless communication for the solar photovoltaic (SPV) projects.

1.0 Scope of supply:

SL No	Item Description	Quantity
1.	Supply of string monitoring box (SMB), 16-input, 1-output with wireless communication	104 Nos.
2.	Wireless receiver system for SCADA at Inverter room	4 Nos.
3.	Supply of Spares	
	I. 30 A fuse links	150 Nos.
	II. Surge Protection Device each type	4 Set
	III. DC-DC converter	10 Nos
	IV. String Sensor Card along with communication card	5 Nos.
	V. Wireless modules transmitter	3 Set
	VI. Wireless modules receiver	1 Set
	VII. String monitoring box (SMB), Spare 16-input, 1-output with wireless communication	3 Nos
4.	Commissioning support for SMB communication to SCADA	104 Activity units

Note: The above spare quantities are to be supplied over and above the warranty requirements. Item-wise quantity and break-up prices shall be provided along with price bid.

2.0 Documents to be submitted along with technical bid without which offer is likely to be rejected.

- (a) SMB offered for 1500V application should have been already type tested/ Product certification from any National/ International accredited lab for following-
 - I. Temperature rise test on complete assembled Box as per acceptable limit mentioned in relevant clause.
 - II. Type test for enclosure as per code and standard mentioned in relevant clause.
 - III. Thermal ageing at 70 Deg C for 96 hours as per IEC 60068-2
 - IV. HV Test
 If type test reports are not available, vendor shall take up for type testing of SMB at no extra cost to BHEL.
- (b) IP protection certificate & IK-07 (or better) mechanical impact resistance certificate.
- (c) General arrangement of string monitoring (combiner) box, with overall dimensions, electrical scheme, bill of material.
- (d) Design calculation/ Certificate for temperature rise of enclosure.
- (e) Vendor has to enclose the deviation sheet clause wise separately in case any deviations are sought by the vendor. Absence of any deviation sheet shall be taken as compliance of BHEL specification in total without any deviation.
- (f) Filled up Vendor questionnaire format as per Annexure-I



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3.0 Technical specification of String Monitoring Box 16-in, 1-out

#	Details of SMB	BHEL Requirement
1.	Codes and standards	(a) UL 94 V: Fire resistance / flammability for enclosure (b) UL 746C: UV resistance for enclosure (c) IS2147 / IEC 60529: Enclosure protection (IP) (d) IEC 62262/EN 50102: Mechanical impact resistance for enclosure (e) IEC 61643-12: Surge Protection (f) IEC 62208: Enclosure for low voltage switchgear and control gear assemblies (g) IEC 60947-1: Low Voltage switchgear and control gear (h) IEC 60269 / UL2579 : Fuses Vendor shall submit the suitable Test Certificate/Report from accredited lab(s).
2.	Number of Inputs Per SMB	16 strings
3.	Rating of Each string	Max Current = 20 A Max, Fuse and fuse link rating shall be rated for min 30A Voltage = 1500 V
4.	Degree of protection	IP65 (mated) or Better
5.	Operating temperature	All component in the SMB shall be suitable for operation within temperature range of 0-70 Deg C
6.	Mounting arrangement	Mounting structure for installation of SMB onto the Module Mounting Structures will be supplied by BHEL. However, necessary mounting arrangement for assembling the enclosures as single entity shall be provided by vendor along with each SMB. All the erection hardware and mounting accessories shall be galvanized steel.
7.	Fuses with fuse holder (Only on Positive side)	1. Positive side (30A) mounted on fuse holder for each string. 2. String fuses shall be of gPV category and dedicated to solar application and conform to IEC 60269-6 or UL2579. 3. Fuse holder shall be DIN rail mounting but not of PCB Mounted fuses and its base shall comply to IEC 60269-1 4. Fuses shall be mounted in pull out type fuse holders.



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8.	SMB Enclosure	<ol style="list-style-type: none">1. Box shall be of GRP/FRP/Polycarbonate Enclosure2. Fire Retardant with Self-Extinguishing property and free from Halogen.3. UV resistant in accordance with UL 746C suitable for outdoor application.4. Degree of protection for enclosure shall be at least IP 65 .5. Mechanical impact resistance of IK 07 or better as per IEC 62262.6. Temperature rise at any point of enclosure should not be more than 12 degC above the ambient temp of 50 deg C. Vendor shall furnish the design calculation/Certificate for temperature rise for BHEL approval during detailed engineering.7. Vendor shall ensure adequate clearance with suitable insulated separator between positive bus and negative bus if it is in same enclosure. Positive and Negative section shall be orientated horizontally (Landscape orientation) on the either side of separator. Separate compartment for negative section and positive section for termination of positive and negative string input shall be preferred.8. Complete assembled SMB shall be subject to heat run type test to be witnessed by owner after manufacturing. In case it is found that the temperature rise is beyond the acceptable limits, bidder shall redesign the assembly and perform the test free of cost to verify that temp rise is within acceptable limit.9. The components mounted inside the SMB shall have higher temperature withstand capability and shall continuously operate under such conditions.10. SMB enclosure shall be of hinged type made of SS 304 and shall be rust proof11. Enclosure shall be provided with captive screws so that it screw don't fall off when cover is opened. Screw shall be made of corrosion free material. Suitable non-conducting protection cover shall be provided for any metallic hinge/screw/fastener to avoid contact with live part of the assembly.12. Mounting plate inside the SMB for mounting/fixing of devices shall be made of FRP/GRP or equivalent non-conducting material.13. All the parts shall be corrosion resistant and enclosure surface shall be free from crazing, blistering, wrinkling, color blots/striations. There should not be any mending or repair of surface.
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9.	DC Disconnecter Switch (manually operated load break switch)	<p>1500V DC grade. Current rating shall be considering the total SMB current (16 strings, 20A rating each) with derating factors for temperature and ageing etc. Design calculation for current rating selection will be submitted for approval during detailed engineering. Load break switch that shall be used to disconnect both positive & negative sides simultaneously. The PV Isolators shall be type tested to carry the nominal current till Min. ambient temperature of 60 Deg C without any de-ration inside the String Junction box.</p> <p>Solar PV on-load Isolator shall be suitable for minimum 1500 Vdc operational voltage, with minimum 250Vdc per pole breaking. Any multipolar device achieving this configuration with Shorting links will not be acceptable. Air Insulation distance shall be higher than 25 mm and the creepage distance shall be higher than 50 mm. Switching part shall necessarily contain reinforced break chamber, with an integrated magnetic arc-extinguishing system for the PV arc. Isolator terminals need to be Silver plated. The Solar PV Isolators need to have a positive break indication and will have to comply with IEC 60947-3 and PV-2 for critical current.</p>
10.	Surge protection device (SPD) for power & communication circuit	<ol style="list-style-type: none"> For power circuit, three MOV type surge arrestors Type 1+2 SPD which shall be connected from positive and negative bus to earth to be considered. The discharge capability of the SPD shall be at least 12.5kA at 8/20 micro second wave as per IEC 61643-12 and shall be rated for MCOV 1000/1500 Volt DC. During fault and failure of MOV, the SPD shall safely disconnect the healthy system. SPD shall have thermal disconnecter to interrupt the surge current arising from internal and external faults. In order to avoid the fire hazard due to possible DC arcing in the SPD due to operation of thermal disconnecter, the SPD shall be able to extinguish the arc. SPD shall have local visual indication and potential free contact for remote indication.
11.	Current and Voltage Monitoring Device	Shunt Type as per IEC61010-1 and IEC 61326-1 certified
12.	String monitoring, processing & controller system for sensing and processing the string / box parameters	<p>(a) Analog signals:</p> <ol style="list-style-type: none"> String current Box voltage Box temperature SPV module temperature (Supply of Module temperature sensor is in the scope of BHEL) <p>(b) Digital signals:</p> <ol style="list-style-type: none"> Status of DC disconnecter switch Power SPD status



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13.	Communication link/ media /Interface to communicate the data to SCADA	<p>Communication protocol for SMB communication is wireless modem. Each SMB shall be fitted with wireless converter with antenna connected outside to achieve maximum range for communication. The antenna of the device shall be properly fitted to the SMB enclosure without compromising its Ingress protection class (IP-65). As SMBs will be mounted on module mounting structures below modules, Antenna location and height shall be suitably designed considering Line of sight with Receiver. Receiver shall be supplied with suitable mounting support, the same shall be submitted for approval during detailed engineering.</p> <p>Each Inverter room shall have 26 SMB. And they shall communicate to the SCADA placed in the corresponding Inverter room. There shall be 4 such Inverter rooms. The farthest distance between SMB and the corresponding SCADA panel in Inverter room shall be 700 mtrs. Vendor shall supply wireless receiver equipment with antennas and hardware for SCADA in Each Inverter room. Vendor has to ensure all the SMB data shall be interfaced with BHEL supplied SCADA panel without having any technical problems. Wireless receiver system at each Inverter room shall receive the data's from 26 Nos of SMBs corresponding to respective IR and convert the data to RS 485 medium MODBUS protocol to feed to SCADA panel.</p> <p>The RS485 serial to wireless converter shall be of industrial type. The suggested makes of serial to wireless converter are Phoenix Contact, Cellcomm or equivalent. Vendor shall take approval from BHEL for equivalent makes.</p> <p>Power supply of wireless device shall be provided by DC-DC converter which is already available inside SMB for powering of monitoring card. 24V DC Power pack for operation of Wireless receiver system will be provided by bidder.</p>
14.	Power supply	<ol style="list-style-type: none">1. Internal DC-DC converter based power supply.2. DC power shall be drawn from solar output.
15.	Box Temperature sensor	RTD type (Pt100) or Semiconductor type
16.	Bus Bars	<p>Zinc/Tinned copper bus bars with SS304 hardware for cable terminations.</p> <p>Busbar size shall be considering the total SMB current (16 strings, 20A rating each) with derating factors for temperature and ageing etc.</p> <p>Design calculation for busbar sizing will be submitted for approval during detailed engineering.</p>
17.	Terminal blocks Rating	1500V DC, 30 A



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18.	Internal Cabling	<ol style="list-style-type: none">1. All internal wiring shall be carried out with 1800V min. (DC) grade stranded copper wires, XLPO insulated cables as per EN 50618.2. All internal wiring shall be securely supported, neatly arranged readily accessible and connected to component terminals and terminal blocks.3. Wire terminations shall be made with solderless crimping type of tinned copper lugs which firmly grip the conductor and insulation.4. Insulated sleeves shall be provided at all the wire terminations.5. Engraved core identification plastic ferrules marked to correspond with the wiring diagram shall be fitted at both ends of each wire.6. Ferrules shall fit tightly on wires shall not fall off when the wire is disconnected from terminal blocks.
19.	Input power cable size	4/6-sq-mm, copper conductor, EBXL XLPO as per EN 50618 (BHEL scope of supply). Actual cross section size will be informed during detailed engineering.
20	Output Power Cable size	2 Runs of 3.3KV grade 1-core X 400-sq-mm, Aluminium conductor, armoured, XLPE insulation, PVC sheath as per IS:7098 (BHEL scope of supply)
21	Earthing cable	<ol style="list-style-type: none">1. Provision of earthing cable entry for Power SPD and Communication SPD shall be provided.
22.	Cable Entry	<p>For Input cables in SMB box: PV straight connectors suitable for 4 or 6 sqmm cable size- 32 nos,</p> <p>For Output cables in SMB box: Nickel plated brass of double compression suitable for cable size- 2 nos</p> <p>For earthing cables: Thermoplastic polyamide suitable for cable size- 2 nos</p> <p>Make of PV straight connectors and glands shall be of reputed make as approved by BHEL.</p>