

REQUEST FOR QUOTATION

 MMI:PU:RF:003	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: ANKBOS0004 RFQ DATE : 18.JAN.2017	Due Date 31.JAN.2017 Time: 13:00 HRS VENUE : NEW ENGG. BLDG
--	---	--	--

PURCHASE FILE COPY

NOTE THAT ALL COMMERCIAL DOCUMENTS SHALL BE MADE AVAILABLE ON OR BEFORE 21.01.2017. BIDDERS SHOULD REGULAR VISIT WEBSITE www.bhel.com AND <https://bheleps.buyjunction.in> TO KEEP THEMSELVES UPDATED.

(for all correspondence)
Purchase Executive : Ankita Reja
Phone : 26989637
Fax :
E-mail: ankitareja@bheledn.co.in

BIDS SHALL BE SUBMITTED THROUGH E-PROCUREMENT PORTAL <https://bheleps.buyjunction.in>

SI No.	Description	Qty	Unit	Delivery qty	Delivery Date
1	PS0679067256 Supply of 50kVA String Inverters As per BHEL Spec Ps-439-1117. Test Certificate	65	NO	65	
2	PS0679067264 Supply of 30kVA String Inverters As per BHEL Spec Ps-439-1117. Test Certificate	2	NO	2	
3	PS0679067272 Supply of 20kVA String Inverters As per BHEL Spec Ps-439-1117. Test Certificate	15	NO	15	
4	PS0679067280 Supply of Data Loggers As per BHEL Spec Ps-439-1117. Test Certificate	10	ST	10	
5	PS0679067299 Commng Support for SI-Katargam WW As per BHEL spec PS-439-1117.	1	AU	1	
6	PS0679067302 Commng Support for SI-Katargam WDS As per BHEL spec PS-439-1117.	1	AU	1	
7	PS0679067310 Commng Support for SI-Rander WW	1	AU	1	
8	PS0679067329 Commng Support for SI-Sarthana WW	1	AU	1	
9	PS0679067337 Commng Support for SI-Varachcha WW	1	AU	1	
10	PS0679067345 Commng Support for SI-Althan WDS	1	AU	1	
11	PS0679067353 Commng Support for SI-Udhana	1	AU	1	
12	PS0679067361 Commng Support for SI-Rander	1	AU	1	
13	PS0679067370 Commng Support for SI-Mota Varachcha	1	AU	1	
	PS0679067388 Commng Support for SI-Kosad		AU		

For and On behalf of BHEL.

REQUEST FOR QUOTATION

	BHARAT HEAVY ELECTRICALS LIMITED Electronics Division PB No. 2606, Mysore Road Bangalore - 560026 INDIA	RFQ NUMBER: ANKBOS0004 RFQ DATE : 18.JAN.2017	Due Date 31.JAN.2017 Time: 13:00 HRS VENUE : NEW ENGG. BLDG
MMI:PU:RF:003			

PURCHASE FILE COPY

(for all correspondence)
Purchase Executive : Ankita Reja
Phone : 26989637
Fax :
E-mail: ankitareja@bheledn.co.in

Sl No.	Description	Qty	Unit	Delivery qty	Delivery Date
14		1		1	
15	PS0679067396 Commng Support for Data Loggers	10	AU	10	

Total Number of Items - 15

Please note that the tender will be opened in the presence of the bidders or his authorised representatives (maximum two per organisation) who choose to be present with authorisation letters. Refer annexure for the terms and conditions.

Please specify Terms of delivery, Excise duty, sales tax, Ex-BHEL, Ex-works surcharge, Insurance,P&F, Freight and other taxes very clearly .
For evaluation,exchange rate(TT selling rate of SBI) as on scheduled date of tender opening (Part-I bid incase of two part bid) shall be considered.
The offers of the bidders who are on the banned list as also the offer of the bidders, who engage the services of the banned firms, shall be rejected.The list of banned firms is available on BHEL web site www.bhel.com

- This is only RFQ not an order.
- In all correspondence quote RFQ No. & due date.
- In Quotation BHEL material code / RFQ Sl. No. should be mentioned clearly.
- Quotation Envelope / Fax not superscribed with RFQ No.and due date is liable for rejection.
- Quotation should remain valid for a minimum peiod of 90 days from due date.
- In case of non-receipt of Quotation or regret letter for 3 consecutive RFQs you are liable to be removed from our vendors list.
- All Prices should be written in words and numbers.
- Excise Chapter Heading should be mentioned for all items where VAT is applicable .

For and On behalf of BHEL.

	PRE-QUALIFICATION CRITERIA GROUP : PHOTOVOLTAICS	
		REV NO: 00
		PAGE : 1 OF 1

**3 PHASE STRING INVERTERS AND DATA LOGGERS FOR GRID CONNECTED
SOLAR PV POWER PLANT**

PRE-QUALIFICATION CRITERIA

- 1) Vendor shall have supplied String Inverters of capacity 20 KW and above accumulating to a total of 1 MW for the last 2 Years from the date of bid opening. Also, cumulative minimum of 200 KW of string Inverters of capacity 20 KW & above should have been working satisfactorily for six months as on Bid opening date. As an evidence to these, vendor shall provide PO copy as proof of supply and Certificate from client for the above mentioned six months satisfactory performance.
- 2) Vendor should have after sales service centers for String Inverters in India. Vendor shall provide the address and contact details of service centers.
- 3) In case of authorised dealers, authorisation letter from OEM is a must to qualify. Also, either the OEM or the dealer shall meet SL.NO 2 above.

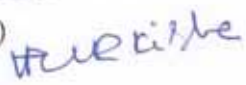
	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 1 OF 8

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 anyway detrimental to the interest to the company.

**TECHNICAL SPECIFICATION FOR
3 PHASE STRING INVERTERS AND DATA LOGGERS
FOR GRID CONNECTED SOLAR PV POWER PLANT**

Approved by : (BNR)  18/01/17		
Revision details: R00	Prepared (RK) 	Date 16/01/2017

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 2 OF 8

1.0 Introduction:

This document provides technical specification for 3-phase String Inverters along with Data logger for grid connected Solar Power Plants.

1.1 Scope of supply and Commissioning support:

As per the Annexure-1.

1.2 Documents to be submitted along with the technical bid (Part-I) :

- Supporting documents required against Pre-Qualification Criteria of the tender
- Technical datasheets of the String inverters and data loggers
- Filled in values/ details wherever the same are asked for in this BHEL technical specification.
- Clause-wise compliance to the BHEL specification, and amendments/corrigendum if any, with sign and seal on every page.

Note:

In case of any clarifications needed in this specification, the same needs to be communicated in writing at least five days prior to the technical bid opening date.

2.0 Technical Specification for Grid Connected Solar String Inverter:

Vendor shall submit the below specification for all the ratings of the inverters as per the Annexure-1

Sl. No	Technical parameter	Specification
1	Make (Make and Model No. shall be furnished by the vendor along with relevant Type Test certificates)	Vendor to specify
2	Inverter Switching device	IGBT
2.1 DC Parameters:		
1	DC Input Voltage Range	300 V to 1000 V or better
2	MPPT Feature	Details shall be furnished by vendor. MPPT shall have provision (manual setting) for constant voltage operation.
3	MPPT voltage range	Vendor to indicate

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 3 OF 8

4	Number of independent MPPTs required per String Inverter	Vendor to indicate
5	DC input terminations	Vendor to specify type of termination & number of terminations available. If terminations are MC4 type, vendor shall also supply mating connectors for the above pairs to enable perfect termination during installation.
6	DC disconnect switch	Integrated disconnect switch shall be provided on DC side of the String Inverter
7	String current monitoring	String current monitoring shall be available at inverter and at computer through data logger

2.2 AC Parameters

1	Rated output power	Vendor to indicate the output kVA
2	AC Output Voltage (Vnom)	400 V
3	No of phases/wires	Three phase three wire output configuration.
4	Grid voltage range	+15% to -20% of Vnom or better
5	Grid operating frequency & its range	50 Hz & 51.5 Hz to 46.5 Hz
6	Total Harmonic Distortion (THD) and maximum current ripple	< 3% and 5% PP
7	AC side connection	Vendor to specify type of termination available along with the maximum possible conductor size
8	Unbalanced Output Load	'PCU is able to withstand and unbalanced output load to the extent of 30%.

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 4 OF 8

9	Standby Consumption	Idling current at no load shall not exceed 2% of the full load current
10	Inverter efficiency:	should exceed 93% for output ranging from 20% to full load. >95% at full load
11	Reactive power (adjustable)	Operating range of PF shall be 0.95 Lagging to 0.95 Leading or wider for the rated kVA.

2.3 Protection Features

1	Anti-Islanding Protection	Shall be provided.
2	DC Reverse polarity protection	Shall be provided.
3	AC side short circuit protection	Shall be provided.
4	DC and AC side Surge Protection	Shall be provided
5	Under Voltage and Over Voltage Grid Protection	Shall be provided
6	Earth Fault Supervision	Shall be provided.
7	Single Phase Preventer	Shall be provided.

2.4 General Features

1	Operating Temperature range	0 Deg. C to + 55 Deg. C or better
2	Overall Dimensions (L x B x H)	Shall be provided by the vendor.
3	Weight	Shall be provided by the vendor
4	Relative Humidity	0 to 85%, Non-condensing or better

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 5 OF 8

5	Type of Cooling	Details shall be furnished by the vendor
6	Degree of Protection (Outdoor application)	IP 65 or better
7	Display on Front Panel and Indicators	a) instantaneous PCU ac power output and the DC voltage current and power input b) Accuracy of display: 3% of full scale factor or better
8	Maximum altitude:	Vendor to mention up to what altitude above sea level inverters will work without de-rating.
9	Mounting arrangement	All wall/structure mounting bracket and hardware shall be supplied for each inverter with detailed drawing. All hardware shall be SS304

2.5 Applicable Standards

1	IEC 61727	Certificate shall be furnished
2	IEEE 1547 / IEC 62116	Certificate shall be furnished
3	IEC 61000	Certificate shall be furnished
4	IEC 61683	Certificate shall be furnished
5	IEC 62109- 1&2	Certificate shall be furnished
6	IEC 60068-2	Certificate shall be furnished

3.0 Technical Specification for Data logger:

Data Acquisition System shall be provided for each of the 10 solar PV plants as per the Annexure 1 attached. The number of data loggers required in order to integrate all the string inverters of a particular power plant shall be in the scope of the supply. **Vendor can submit own make or any third party data logger satisfying to the below specification for BHEL approval, but integration of all the features as per**

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 6 OF 8

below specification will be in the scope of vendor. Vendor has to submit all the requisite supporting documents for the data logger at the time of technical scrutiny.

DATA ACQUISITION SYSTEM/ PLANT MONITORING	1) Data Logging shall have provision for plant monitoring. Time and date stamped system data logs for analysis shall be available to download on PC. Instrumentation for display of systems parameters and status indication to be provided. 2) Data logger shall have the provision to integrate the signals from pyranometer, anemometer module and ambient temperature sensor. These values have to be readout and integrated into the data logging system. Ambient / Solar PV module back surface temperature shall be also monitored on continuous basis. 3) The following are the parameters that shall be accessible via the operating interface display: AC voltage, AC output current, Output power, DC input voltage, DC input current, Time active, Time disabled, Time Idle, Temperatures (°C), Converter status, Protective function limits i.e., AC over voltage, AC under voltage, Over frequency, under frequency, ground fault, PV Starting voltage, PV stopping voltage, over voltage delay, under voltage delay over frequency, ground fault delay, PV starting delay, PV stopping delay. 4) All major parameters shall be read on the digital front panel at any time and logging facility of the current values, previous values shall be available through data logging system. 5) Digital Energy Meters/TVMs will be recording the energy production in ACDB. There shall be a provision in the data logger to integrate this final reading and display on the computer. 6) Computerized DC String/Array monitoring and AC output monitoring shall be provided. 7) String and array DC Voltage, Current and Power, Inverter AC output voltage and current (All 3 phases and lines), AC power (Active, Reactive and Apparent), Power Factor and AC energy (All 3 phases and cumulative) and frequency shall be monitored. 8) The data shall be recorded in a common work sheet chronologically date wise. The data file shall be MS Excel compatible. The data shall be represented in both tabular and graphical form. All instantaneous data shall be shown on the computer screen. 9) Software shall be provided for USB download and analysis of DC and AC parametric data for individual plant. 10) Provision for instantaneous Internet monitoring and download of historical data shall be also incorporated. 11) Remote Server and Software for centralized Internet monitoring system shall be also provided for download and analysis of cumulative data of all the plants and the data of the solar radiation and temperature monitoring system. 12) Simultaneous monitoring of DC and AC electrical voltage, current, power, energy and other data of the plant for correlation with solar and environment data shall be provided. 13) Remote Monitoring and data acquisition through Remote Monitoring System software at the owner server location with latest software/hardware configuration and
--	---

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 7 OF 8

	service connectivity for online / real time data monitoring / control complete to be supplied and operation and maintenance / control to be ensured by the bidder. 14) The vendors shall be obligated to push real-time plant monitoring data on a specified intervals (say 15 minute) through open protocol at receiver location (cloud server) in XML/JSON format, preferably. Suitable provision in this regard will be intimated to the bidders. 15) Data logger shall have provision to log the status of numerical relays, breakers status, and transformer status. 16) The data logger shall be selected with required number of digital inputs, digital outputs, analog inputs, MODBUS RTUs, Ethernet ports and communication interface ports for accomplishing the above functionalities.
Remote Monitoring System	- A remote monitoring system shall be included with each photovoltaic system. - The monitoring system should transmit the following data in real-time to a central server and store it: · DC currents, voltages and power. · AC currents, voltages and power. · Irradiation, ambient temperature, module temperature and wind speed. · Error logs. - This data may be transmitted either using the available LAN or GSM/ GPRS, or any other mode of connectivity available at the site. - This data shall be accessible by customer through a secure login account. - The stored data should be represented through hourly, daily, monthly, etc. graphs and easily downloadable in .csv or .xls format. - An independent data logging system for plant control and monitoring shall be provided for SPV Power Plant. Remote linkage access for plant operations monitoring shall be provided through data logging system. Complete functional software for accessing through PCs and smart phones with user login accounts shall be provided.

Note: Pyranometer, Anemometer and temperature sensors will be in BHEL scope of supply. All the cabling required for inverters, sensors and other data signals will be in the scope of BHEL.

4.0 Inspection:

4.1 Manufacturing Quality Plan (MQP) including following tests shall be submitted to BHEL for approval, within 7 days from the date of BHEL PO or LOI whichever earlier:

- a) Tested to demonstrate operation of its control system and the ability to be automatically synchronized and connected in parallel with a utility service, prior to its shipment.
- b) Operation of all controls, protective and instrumentation circuits demonstrated by direct test if feasible or by simulation operation conditions for all parameters that cannot be directly tested.
- c) Demonstration of utility service interface protection circuits and functions, including calibration and functional trip tests of faults and isolation protection equipment.

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	PS-439 -1117
		REV NO: 00
		PAGE : 8 OF 8

d) Operation of startup, disconnect and shutdown controls also to be tested and demonstrated, stable operation of the PCU and response to control signals shall also be tested and demonstrated.

e) Factory testing includes measurement of phase currents, efficiencies, harmonic content and power factor. All tests shall be performed 25, 50, 75 and 50% of the rated nominal power.

f) Factory test report: Should be supplied with the unit after all tests. The FTR shall include detailed description of all parameters tested qualified and warranted.

4.2 String inverters and data loggers will be carefully inspected and tested during manufacture and prior to dispatch in accordance with the standard practice of manufacturer and the applicable standards. These certificates in triplicate shall be supplied before the dispatch of the equipment.

Purchaser reserves the right to inspect the equipment/ components at the manufacturer's works. Purchaser shall have an open access for conducting quality inspection of the system as well as components as and when deemed necessary. Purchaser may engage third party inspection agencies for achieving the assured quality of the components. Bidder shall extend necessary cooperation to the third party inspection agencies besides the Purchasers inspection team for effectively carrying out the Inspection/ testing.

4.3 For pre-dispatch inspection at vendor works, vendor shall furnish the factory test report of the Inverters along with inspection call to BHEL.

5.0 Commissioning support:

Vendor shall depute their service engineer to project site as per the intimation of BHEL for commissioning support of string inverters and data loggers. Also, vendor has to integrate all the signals to the data logger, complete demonstration of data monitoring and data logging to be shown by vendor after commissioning. Necessary training shall be provided to site team for installation, commissioning and maintenance of string inverters and data loggers.

Vendor shall quote a lump sum value for each site which shall be inclusive of all the costs travelling, boarding and lodging etc.,

6.0 Warranty:

During the warranty period, whenever a technical problem or failure of any component is encountered with vendor supplied equipment, BHEL shall report the same to the vendor. Vendor must ensure that the problem is attended to within one week from the date of reporting either by replacement or repair of the defective part(s) free of cost to BHEL. Charges incurred by the vendor towards travel, lodging, boarding, shifting of the equipment and any other contingency expenditure shall be deemed in the scope of the vendor.

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	Annexure-1
		REV NO: 00
		PAGE : 1 OF 2

Project Introduction:

BHEL is installing 3.6 MWp of roof-top Solar PV plant on 31 roofs at different location as per the following tentative distribution:

S. No.	Name of Site	Required Installation (KWp)	No. of buildings	Roof wise Proposed Installation	String Inverters		
					50	30	20
1	Katargam Water Works (WW)	940	3	390	7		2
				250	5		
				300	6		
2	Katargam Water Distribution System (WDS)	650	3	350	7		
				100	2		
				200	4		
3	Rander WW	500	4	100	2		
				150	3		
				100	2		
				150	3		
4	Sarhana WW	700	10	220	4		1
				230	4	1	
				40			2
				40			2
				40			2
				20			1
				50	1		
				20			1
				20			1
				20			1
5	Varachcha WW	250	3	-			
				100	2		
				150	3		
6	Althan WDS	270	2	100	2		
				170	3		1
7	Kosad WDS	150	1	150	3		
8	Udhana Zone office	15	2	-			
				15			1
9	Rander Zone office	30	1	30		1	
10	Mota Varachcha WDS	100	2	100	2		
				-			
		3605		3605	65	2	15

	PURCHASE SPECIFICATION GROUP : PHOTOVOLTAICS	Annexure-1
		REV NO: 00
		PAGE : 2 OF 2

Scope of Supply:

S. No	Description	Quantity
1	Supply of 3-phase String Inverter having following AC output power capacity Quantity of inverter of each rating below is indicative. This will be finalized before price bid opening with the cumulative capacity of the inverters shall be 3600 kVA(min)	
	50 kVA (min)	65 Nos.,
	30 kVA (min)	2 Nos
	20 kVA (min)	15 Nos.,
2	Supply of Data loggers (Each set comprising of complete data logging instrumentation required for achieving data logging requirements for each SPV plant as per the specification)	10 Sets
3	Commissioning support for inverters	10 AU
4	Commissioning support for all Data loggers	10 AU