केन्द्रीय बारानी कृषि अनुसन्धान संस्थान
Central Research Institute for Dryland Agriculture
संतोषनगर / Santoshnagar, सैदाबाद पोस्ट / Saidabad P.O., हैदराबाद / Hyderabad - 500 059.
फोन / Ph : 040-24530161, 24530163, 24530157, 24530243, फैक्स / Fax : 040-24531802
वेब / Web : www.crida.in ; ई-मेल / E-mail : admin@crida.in

F.No. 9-1/(21)/NICRA/2015/ST Date: 16.02.2016

TENDER CORRIGENDUM (Extension of Time)

A tender notice on 20-01-2016 in 'The Times of India' has been published with last date 11-02-2016 to submit sealed tender in Two bid system (Technical & Financial) in the prescribed form, from reputed Firms and manufacturers of Equipments, for the purchase of 'Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc'. It is to inform that last date for submission of tender is extended up to 02-03-2016,14:00hrs. The tender would be opened on the same day at 15:00hrs.

All other issues of Bid security, Tender cost, Terms & Conditions will remain unchanged. For more information please refer tender info on www.crida.in.

DIRECTOR

भाकृअनुप - केन्द्रीय बारानी कृषि अनुसन्धान संस्थान

ICAR - Central Research Institute for Dryland Agriculture

संतोषनगर, सैदाबाद-पोस्ट हैदराबाद ५०००५९ **Santoshnagar, Saidabad P.O. Hyderabad 500 059**

040-24530161,24530163,24530224 Fax:040-24531802 www.crida.in Email : stores@crida.in

CORRIGENDUM FOR NOTICE INVITING TENDERS (Last Date Extension)

TENDER ENQUIRY FOR SUPPLY, INSTALLATION AND COMMISSIONING OF "EDDY COVARIANCE FLUX TOWER FACILITY" AT CRIDA :-

F.No. 9-1/(21)/NICRA/2015/ST **Dated : 17th February, 2016**

CRIDA is a premier publicly funded Research Institute on Dryland Agriculture under the Indian Council of Agricultural Research (ICAR), DARE, Ministry of Agriculture, Government of India. The Director, CRIDA Santoshnagar, Hyderabad – 500 059, Telangana India, now Invites sealed tenders for Supply, Installation and commissioning of "**Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc"** in two bid system (technical bid and financial bid) from the eligible bidders/reputed manufacturers/ authorized dealers/suppliers.

GENERAL TERMS & CONDITIONS

1 **Cost of Tender Document :** The cost of Tender Document is Rs.**1000**/- in the form of **Demand Draft (DD)** drawn in favour of **"ICAR Unit - CRIDA A/c."** Payable at Hyderabad.

2 **Downloads of Tender Documents:** Tender Document with full details can be downloaded from CRIDA Website (http://www.crida.in) or the Government of India, Central Public Procurement Portal (http://www.eprocure.gov.in) and in such cases, participation in the tender will be subject to remittance of the prescribed **Cost of tender document** & **EMD** along with the Technical Bids.

3 **EMD : EMD in the form of crossed Demand Draft/Bankers cheque** drawn from any commercial bank *in favour of* **"ICAR Unit – CRIDA A/c."**, payable at Hyderabad should be enclosed with the tender (technical bid) quoted by the bidder(s). The bidder has to submit **EMD** except those who are registered with Central Purchase Organization (CPO), National Small Industries Corporation (NSIC), SSI units registered with NSIC or the concerned Ministry or Department. The unsuccessful bidders EMD will be returned soon after the finalization of Tender, where as the successful bidders **EMD** will be returned subject to furnishing the required **Performance Security** for an amount of **10%** of the value of the contract in the form of **Demand Draft, Fixed Deposit Receipt** or **Bank Guarantee from any commercial bank**. The amount of **EMD** submitted along with tender document will be forfeited in the event of failure to supply the equipment after issue of supply order. The decision in all these matters shall be final and binding on you. No interest will be paid on Earnest Money/Security Deposit for the period of retention in the CRIDA, Hyderabad.

Description of Item (Please see specifications at page Nos. 7-16)	Tender cost Rs.	EMD (Rs.)
Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc	**1000/-** If downloaded from website **1100/-** If required by post.	**4,00,000/-**

4. Technical Bid & Financial Bid : The bidders should submit the bids consists of all technical specifications/details as well as item wise financial cost for the items quoted along with commercial terms and conditions. The original copy of tender should be sent to this Office in a sealed cover in a double envelope.The inner envelope should also be sealed. The outer cover should be super scribed **Tender for** "**Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc"**. The tenderer must place the two sealed envelopes clearly marked **'TECHNICAL BID'** and **'FINANCIAL BID'** by indicating the Draft number, date & amount of EMD on the envelop of **'**TECHNICAL BID', failing which the tender will not be opened. **Financial Bid to indicate a warning "DO NOT OPEN WITH THE TECHNICAL BID".**

5 Security Deposit: The successful bidder has to furnish an amount equivalent to ten **(10) per cent** of the order value as **Performance Security Deposit** which will be refunded / returned only after satisfactory completion of the contractual obligations including warranty. The Security Deposit should be in the form of Demand Draft, Fixed Deposit Receipt or Bank Guarantee from any Commercial Bank and on which no interest will be paid.

6 Important Dates:

1.	**Start date of down loading the Tender Document**	**17-02-2016**	**11:00 hrs**
2.	**Last date for down loading of Tender Document or any addendum / corrigendum**	**02-03-2016**	**11:00hrs**
3.	**Last date and time for submission of Tenders**	**02-03-2016**	**14:00 hrs**
4.	**Date and Time for opening of Technical Bids**	**02-03-2016**	**15:00 hrs**

6 Submission: Tender with proper superscription on the cover as "**Eddy Covariance Flux Tower Facility"** should be submitted in the Office of the Director, CRIDA, Santoshnagar Hyderabad – 500 059, Telangana, on or before the due date and time as given in the tender document.

7 Due Date: Tenders received after due date and time will not be considered. The Institute will not be responsible for postal delays.

8 Delivery Schedule: Unless otherwise specified, the **material should be supplied & installed within 30 days** from the date of issue of the Purchase Order. No part supply is allowed. Specific mention should be made as to whether delivery will be from ready stock or will have to be imported / acquired and in the latter case the time required for delivery after purchase order is placed should be indicated clearly.

9 Note: The Envelope containing the tender, as well as all subsequent Communications should be addressed/delivered to:

The Director
Central Research Institute for Dryland Agriculture
Santoshnagar, Saidabad Hyderabad – 500 059, Telangana, India

10 All communications must be addressed to the above Officer by designation but not by name.

11 Payment: No advance payment is permissible. Payment will be made only after satisfactory supply & installation of the goods / equipment material in couple of weeks with due certification of the concerned in-charges.

12 Place of Delivery : Stores and Purchase Officer, Central Research Institute for Dryland Agriculture, Santoshnagar, Saidabad, Hyderabad – 500 059, Telangana

13 Liquidate Damage: if you are failed to deliver any or all of the goods or to perform the services with in the delivery period specified above, a sum equivalent to **0.5%** of the contract price per week or part thereof off delay until actual delivery or performance shall be deducted from the bill up to a maximum deduction of **10%** of the contract price. Once the maximum is reached, we may consider termination of the contract.

14 Bank details for e-payment: The bank details may be furnished along with tender for making e-payment to the successful bidder

15 ISO certification: The ISO certification of the product (wherever applicable) may be furnished along with tender.

16 **Period of Validity:** The rates quoted shall be valid for a minimum period of **180 days** beyond the date of opening of tenders.

17 **Rates:** Rates should be quoted in the prescribed Price Schedule in Indian Rupees only.

18 **Specifications:** Full specifications of the item quoted for should be indicated in the tender along with illustrated pamphlets, drawings etc. wherever available. The supplier has to submit the compliance statement on the technical specifications in the prescribed format enclosed to this schedule.

19 **Indigenous items**: Articles of indigenous origin are required except where specified otherwise. Where indigenous make is not available foreign made articles can be quoted for, provided, payment is acceptable in Indian currency.

20 **Shipment:** Supply is to be made by passenger train or by road transport securely packed at supplier's risk, unless otherwise specified.

21 **Rate Contracts:** In case of any of the item mentioned in the schedule are covered by Rate Contract of DGS&D etc. the rate contract number and date of validity may be specified invariably. Supply of copy of the Rate Contract is more helpful.

22 **Taxes / Duties**: If taxes, duties, or any other charges over and above the rates quoted are payable by the purchaser, actual / percentage of such taxes / duties / charges should be clearly indicated.

23 While submitting the tender document the brochures, catalogues etc. must be invariably enclosed with technical bid.

24 **Excise Duty:** Institute is exempted from payment of Customs / Central Excise Duty charges Vide Govt.of India, Ministry of Science and Technology, Deptt.of Scientific and Industrial Research, vide Letter No.**TU/V/RG-CDE(372)/2011, dated 29-08-2011.**

25 **Service Support and Warranty: 3 (Three) years NBD Onsite (OEM) Comprehensive warranty and Service** from the date of installation and acceptance by the Academy as specified in the Schedule of Requirements. However, the manufacturer's warranty, which exceeds the period specified in the Schedule of Requirements, should be extended accordingly.

26 **Enquiry's on tender**: Any enquiry's regarding the tenders will not be entertained once the tenders are opened.

27 **Acceptance of tender**: Director, CRIDA reserves the right to accept or reject any of the tenders either in part or in full without assigning any reason thereof.

28 **Quantities**: Director, CRIDA reserves the right to reduce or increase the quantity at the time of placing the Purchase Order.

29 The Technical Bids are to be opened by the institute Purchase Committee in the first instance and will be evaluated technically by the Institute Technical Advisory Committee (TAC). At the second stage Financial Bids will be opened only for the technically qualified tenders for further evaluation before awarding the contract.

30 **Decision**: The Decision of the Director, CRIDA on any dispute in the matter will be final and legally binding.

31 **Jurisdiction**: All disputes including court proceedings shall be settled within the Hyderabad jurisdiction only.

32 **Rejection of tenders**: Tenders not complying with the above conditions are liable to be rejected.

33 **IMPORTANT NOTE:** The bidder should submit the Technical & Financial bid including specifications/details along with item wise price mentioned in the Technical bid. The Technical bid must be accompanied with earnest money deposit in the form of Demand Draft. In any case the technical bid without EMD/Demand Draft will not be entertained. The bid should be sealed properly by the bidder and duly super scribed and submit to the above office at the date and time specified above.

34 **Other conditions :**

a. Late submission of tenders & unsigned tenders shall not be entertained at any cost after specified date & time as indicated. **The tenders without EMD amount will not be considered.**

b. In the event of the date & time specified for tender receipt being declared as a closed holiday for purchaser's office, the due date for submission of tenders will be the following

working day at the specified timings. CRIDA does not hold any responsibility for postal delays.

c. The supply and Installation of "**Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc"** as per supply order shall be transported to CRIDA campus at your cost.

d. The tender document should invariably be filled in and duly signed by the authorized signatory by affixing the company/firm seal on every page of tender and the terms and conditions should strictly be followed before submitting the tender.

e. The bidders/representatives who are going to attend the technical bid/financial bid opening may invariably bring authorization letter issued by the respective company/ firm for the purpose.

Director, CRIDA reserves the right to accept or reject any or all the tenders. Decision of the Director will be final and legally binding. All disputes will be subject to Hyderabad Jurisdiction only.

(Stores & Purchase Officer)

CHECK LIST

Please give page numbers to the tender document and all enclosures and also verify the following documents before submission of the tender in the sequence listed below, to avoid rejection or disqualification of your tender.

PLEASE NOTE THAT ALL RELATED PHOTO COPIES MAY PLEASE BE ENCLOSED WITH THE TENDER DOCUMENT AS A PROOF

S.No.	List of the Documents to be enclosed with the Tender	Page No.	Enclosed (Yes/No)
1.	**Cost of Tender Schedule**: Rs.**1000**/- in the form of Demand Draft drawn in favour of **"ICAR Unit – CRIDA A/c.".** The Tender Document can also be downloaded with full details through CRIDA Website (http://www.crida.in/) or the Government of India, Central Public Procurement Portal (http://www.eprocure.gov.in)		
2.	**Earnest Money Deposit**: **EMD** should be drawn on any Commercial bank as indicated in the notice inviting tenders in favour of "**ICAR UNIT – CRIDA A/c**" **EMD D.D.No**._____ Dated:_____ for Rs. _____ ; Bank _____		
3.	Following documents as indicated in the tender document printed on the tenderer's letterhead with date signature and seal.		
3 (a)	**Tender Form**		
3 (b)	**Statement on Compliance** of the Technical Specifications with deviations, if any and technical literature of the product to be enclosed;		
3 (c)	**Financial Bid**		
3 (d)	The entire **original tender document (Technical Bid) with seal and signature on each page** at the time of submission of tender document(s) with in the due date.		
4	Document showing the firm/company's turnover be Rupees Two Crores per annum for the preceding **two financial years i.e. 2013-14 & 2014-15** certified by the Chartered Accountant		
5	Document regarding **registration /Certificate** of incorporation of the firm issued by the appropriate government to be enclosed.		
6	Certificates of registration for **Sales Tax / VAT** issued by appropriate Government for the required services with the seal of the tenderer to be enclosed.		
7	The firm should submit **Income Tax returns** of previous 3 financial years i.e., **2012-13, 2013-14 & 2014-15** along with the tender document.		
8.	**NSIC/SSI certificates** registered with NSIC (if applicable) to be enclosed		
9.	**Any other document** or information as required in the tender document.		
10.	**Total pages of your entire Tender Document (Technical Bid)** including Enclosures	**No.of Total Pages : _____**	

Certified that the above information is correct and the firm is willing to accept all the terms and conditions of the tender document.

Signature and Seal of the Bidder: _____
Business Address: _____
_____

TENDER FORM
(To be filled in by the Tenderer duly printed on their letter head)

Tenderer's Ref.No._____ Date:_____

From: _____ Grams: _____

_____ Phone No._____

PIN_____ Fax No. _____

To
The Director
Central Research Institute for Dryland Agriculture,
Santoshnagar, Saidabad, HYDERABAD – 500 059

Ref: Your Tender Notice Advt. No. _____ dated----------.

Dear Sir,

I/We hereby offer for your requirements detailed in the schedule hereto or such portion thereof as you may specify in the Acceptance of Tender at the **rates given in the said schedule and agree to hold this offer for 180 days for acceptance.** I/We shall be bound by a communication of Acceptance dispatched within the prescribed time and also execute agreement required in this regard.

2. I/We have understood the Instructions to Tenderers and General Conditions of Contract governing such contracts placed by Indian Council of Agricultural Research and its Research Institutes and the Special Conditions of Contract, and have thoroughly examined the details indicated in the Schedule to Tender thereof and am/are fully aware of the goods and/or services required and my/our offer to supply/provide the goods and/or services strictly is in accordance with the requirements.

3. D.D.No._____Dt._____for Rs._____(in words) Rupees _____ _____ only) drawn on (Bank) _____ is enclosed towards Earnest Money Deposit.

The following pages have been added to and form part of this tender.

Yours faithfully,

Signature of the Witness Signature:_____

Name: _____ Name : _____

Address:_____ Address : _____

SCHEDULE OF REQUIREMENTS & FULL TECHNICAL SPECIFICATIONS WITH COMPLIANCE
(*Should be submitted duly printed on the letterhead of the bidder separately for each item and option*)

Schedule – I : Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc

Part II	
Technical specifications of the equipment	
Eddy covariance specifications	
	Item No I • **Data Collection Platform** • **Infrared gas analyzer & 3D sonic anemometer for CO_2 and H_2O** • **Slow Sensors** **Item No II** • **Open path Methane analyzer** • **Automated soil CO_2 flux system**
S.no	**Description**
A	**Major specifications**
	1. The system should consist of "data logger /data storage device /data collection platform with remote connectivity and should be able to log high speed eddy covariance data from fast sensor: Infrared gas analyzer, 3D sonic anemometer, Methane analyzer and other sensors. **2.** The system should consist of fully developed hard ware for data logger/Data collection platform (DCP). 12V/100AH rechargeable Lead Acid Battery, Solar Panel, Charge Controller, Meteorological Sensors and Accessories. **3.** The data logger /data storage device /data collection platform should be programmable by higher level language for flexible R & D requirements. (For both CO_2, CH_4). The fully integrated system will only be accepted. **4.** A heavy duty adjustable tripod (Base diameter with legs extended) stand which mount all the sensors which can with stand high winds and weather resistance with full load of instruments. **5.** The DCP ,sensors and solar panel will be mounted on a tower/tripod which should cater for fitments of assemblies for sensors,DCP,solar panel and other accessories **6.** The data logger /data storage devices and sensors must comply with the type, range, accuracy, resolution and operating temperature conditions of the specifications. **7.** Different sensors as mentioned in specifications should be provided with complete accessories i.e. connectors, approx. 4-8 meter cable and mounting fixtures. The integration of the sensors with the DCP will be ensured by the firm **8.** Software should be able to import the logged data directly for processing the data. **9.** Onsite training should be provided to the CRIDA staff (Scientific and Technical) on the operation and maintenance of the system. **10.** Supplier should give a **warranty** for **2 years** from the date of commissioning of the system and **4 years** annual maintenance contract(AMC) charges may be included

	Item No I	
B	**Specification For fast sensors (Infrared gas analyzer & 3D sonic anemometer)**	
	An Integrated or time synchronized instrument platform with zero sensor separation and measures on single electronic device, which includes infrared Gas Analyzer (IRGA) for fast measurements of CO_2 and H_2O fluxes and Sonic Anemometer for 3D wind speed and direction. System should also include air temperature and barometric pressure sensors.	
1	**General Specifications:** • Both IRGA and 3D Sonic Anemometer should have zero sensor separation for no sensor separation error. • Both IRGA and 3D sonic Anemometer should have common electronics for triggering the measurement of both the sensors at the exact same time which is very essential for correct Eddy Covariance studies.	
2	**IRGA Specifications**	
	Operating temperature range	-20° to +60°C
	Calibrated Pressure Range:	75 to 100 kPa
	Input Voltage Range	10 to 14 Vdc
	Power @ 25°C:	5 W (steady state and power up).
	Measurement Rate	User defined with maximum of rate of 60 Hz.
	Output Bandwidth	5,10 or 20Hz, user programmable
	Output Options:,	SDM, RS-485, USB, analog
	Auxiliary Inputs:	Air temperature and pressure
	Path Length:	15.37 cm
3	**CO_2:**	
	Accuracy:	1% or better
	Precision RMS (maximum):	0.16ppm
	Calibrated Range:	0 to 1000 ppm
	Zero Drift with Temperature (maximum):	±0.3 PPM or better
	Gain Drift with Temperature (maximum):	±0.1% of reading/°C or lower.
	Cross Sensitivity (maximum):	±1.5 x 10^{-4} mol CO_2 /mol H_2O or better.
4	**H_2O:**	
	Accuracy	2% or better
	Precision RMS (maximum):	0.006 m mol/mol.
	Calibrated Range:	0 to 70 m mol/mol
	Zero Drift with Temperature (maximum):	±0.05 m mol/mol/°C or better
	Gain Drift with Temperature	

	(maximum):	±0.3% of reading/°C
	Cross Sensitivity (maximum):	±0.1 mol H_2O/mol CO_2
	Sonic Anemometer Specifications:	
5	Measurement Path	
	Vertical:	10.0 cm (3.9 in.)
	Horizontal:	5.8 cm (2.3 in.)
	Transducer Diameter:	0.64 cm (0.25 in.)
	Accuracy	
	Offset Error:	u_x, u_y: <±10.0 cm s^{-1};uz: <±5.0 cm s^{-1}
	Wind direction	<1 degree at 1m s^{-1}
	Gain Error:	
		Wind Vector within ±5° of horizontal:<±2% of reading
		Wind Vector within ±10° of horizontal <±3% of reading
		Wind Vector within ±20° of horizontal: <±6% of reading
	Measurement Precision RMS	u_x, u_y :1 mm s^{-1} u_z: 0.5 mm s^{-1}
		Sonic Temperature: 0.025°C
		Wind direction 0.6°
	Speed of Sound	Determined from 3 different paths; corrected for
6		crosswind effects
	Barometer Specifications:	
	Total Accuracy:	±2 kPa (0° to + 60°C) or better
7	Measurement rate:	(1-10 Hz)
	Ambient Temperature Specifications	
	Total Accuracy:	±0.15°C (-30° to +60°C)
C	**Specification of data collection platform (DCP)**	
	1. The Data Collection Platform (DCP) should incorporate the latest state-of-the-art technology and must consume very low power. Since the equipment will have to operate under stringent weather conditions, the system should be rugged and sealed to avoid ingress of moisture. Recorded data should be stored for at least 6months and store the site information with each logged files. 2. This unit should be able collect all the synchronized data at one point of time from anemometer data stream, Open Path CO_2 / H_2O Analyzer, CH_4 Analyzer, and other Biomet Sensors data 3. The complete details of the current set up of the DCP should be provided. The loading of setup/program will be demonstrated with Laptop separately. The user manual should spell out the settings. A separate copy of the set up program should be provided in a CD. 4. The design of the DCP should be modular and the replacement of the modules should be easy and user friendly. 5. The DCP should have least tuning parts (preferably none) and should provide consistent performance for at least two years. 6. Keeping in view the low/high temperature conditions in the field there should be a	

	provision for quick and easy replacement of the DCP from the NEMA-4X enclosure. The mounting/ dismounting of the DCP in the enclosure should be with the help of latches. Further, it should be possible to lock/ unlock these latches with gloves-in-hand. 7. The complete Technical Demonstration should be provided. 8. User manual for the station will also be provided by the firm which will include the setup/program details, calibration constants, wiring diagram of the concerned sensors, and any other station specific details. 9. Input range: The data logger/data storage device should have multiple input ranges along with "**Auto Ranging**" facility to measure the sensors accurately without any loss of accuracy. The data logger/ data storage device should be able to measure from wide range of sensors having very high signal output to very low signal output such as sensors for measuring Solar radiation very accurately. 10. Scan Rate: Data logger /data storage devices should be capable of sampling analog channels at a user defined scan rate varying from 100Hz to 1 day. 11. RS 232 C- Port: The DCP should have at least 1 dedicated RS232-C port and another at least 3 more which can be converted between RS232/Digital depending upon user requirement capable of having communication with external devices through user defined protocols such as Pakbus, Modbus, and DNP3 protocols supported. 12. Ethernet/LAN Port: DCP should have an Ethernet port to make the system online using LAN based internet connection to access the data logger /data storage devices remotely or to connect a sensor with Ethernet output. 13. Data Storage: The system should have in-built facility to store more than 15 lakh data records in its internal memory. It should also be possible to download the stored data on flash/USB card /PC including date and time information. A 16GB secured industrial grade CF memory card should be provided with the system for logging and retrieval of fast sensor's data. 14. Power requirements**:** Typical Current consumption in Sleep Mode should be 3 mA or less and the maximum current consumption at the highest scan rate should not exceed 10 mA without backlight and display ON. Short circuit and over load protection.
D	**Telemetry Scope/Data communication**
	1. System should have facility of remote connectivity and also transfer the corrected data from field site to central laboratory through GPRS modem/GSM or satellite communication unit. 2. Network operator should be suggested by the vendor according to the network availability at the site. 3. Data from the sites should be centrally collected at data receiving center with the help of interface software, accept fast sensor time series fats sensor's raw data (10 Hz/20 Hz). 4. Systems should also be accessible from any part of the world on internet running computer with the compatible software. 5. It should also be possible to connect the system using Smartphone application. 6. Smartphone application should have facility of retrieving old data, viewing real time data and uploading program file through Smartphone application. 7. Smartphone application should also have facility to view the old collected data, making graphs, so that data and graphs can be emailed to other concerned persons.

	8. At data receiving center, a real time data display in graphical and digital mode for all the sites should be provided. 9. System should have facility of showing alarms in real time display at receiving station and should also have facilities of sending alarm through email also. 10. Alarm indicators should be programmable as per the local site situations.
E	**Air Temperature Sensor and Relative Humidity Sensor with Radiation shield**
1	**Air temperature sensors** Type: Sensirion SHT75 Range : -30° to +65°C or better Accuracy: ± 1°C or better (-40°C to +70°C) Time constant: 120 s (63% response time in air moving at 1 m/s) Input power supply: 10V DC to 16V DC Output: SDI12
2	**Relative Humidity** Sensor element: Sensirion SHT75 Range : 0 to 100% RH Output Voltage: ±2% RH or better Accuracy: ±2% RH or better Response time : < 15seconds Input Power supply : 10V DC to 16V DC Time Constant: <10 s (63% response time in air moving at 1 m/s) Operating temperature : -40^{o}C to +60^{o}C Output: SDI12
F	**Rainfall sensor**
	Sensor type : Tipping bucket/Magnetic reed switch material: Anodized Aluminum Temperature: 0^{o} to +60^{o} C Resolution : 1 tip Rain fall per tip: 0.01(0.254mm) Orifice diameter : 6.06(15.4cm) **Accuracy** Up to 1 inch/hr: + or – 1% 1 to 2 inch/hr: 0-3% 2 to 3 inch/hr: 0-5%
G	**Four Component Net Radiation Sensor**
	Four-component net radiometer for accurate and reliable measurements of incoming and reflected solar radiation, 1. Number of signal outputs: 4 - incoming and reflected short-wave radiation downward and upward long-wave radiation 2. Pyre geometer temperature sensors: 10 K thermistor and Pt-100Response time (95 %): < 18 s 3. Non-linearity (over full range): < 1 % 4. Temperature dependence of sensitivity: < 5 % from -10°C to +60 °C 5. Sensitivity: 7 to 20 µV/W/m² short-wave, 5 to 10 µV/W/m² long- wave

	6. Operating temperature: -40°C to +60°C 7. Spectral range (50 % points): 305 to 2800 nm short-wave, 4.5 to 42 µm long-wave 8. Field of view: 180° short-wave upper sensor 170°, short-wave lower sensor 9. 180° long- wave upper sensor 150° long-wave lower sensor 10. Mounting rod: Screw-in, 350 mm long x 16 mm along with necessary mounting brackets Standard cable:50 m cable required to connect the sensor to a data logger /data storage devices Weight with rod (excluding cables): 850 g
H	**Soil Heat Flux Sensor & SOIL Heat flux plates (Self calibrating)**
	Soil heat flux sensor for high accuracy measurement of soil heat flux should be provided. **Heat flux sensors** 1. Sensitivity (nominal): 50 µV/ Wm^2 2. Resistance (nominal): 2 Ohm 3. Temperature range: -30 to +70°C 4. Expected accuracy: +/- 4%
I	**Soil moisture sensors**
	1. Probe-to-Probe Variability: ±0.6% VWC in dry soil, ±1.5% VWC in typical saturated soil 2. Accuracy: ±2.5% VWC using standard calibration with bulk electrical conductivity of ≤0.5 dS m^{-1}, bulk density of ≤1.55 g cm^{-3}, and measurement range of 0% VWC to 50% VWC 3. Precision: better than 0.2% VWC 4. Resolution: 0.2% VWC 5. Output: ±0.7 V square wave with frequency dependent on water content 6. Current Drain: 70 mA @ 12 Vdc (when enabled); 70 µA (quiescent typical) 7. Power Supply Voltage: 5 Vdc minimum; 14 Vdc maximum 8. Rod length: 300mm(11.8in) 9. Rod diameter: 3.2 mm(0.13in) 10. Rod spacing: 32mm(1.3in)
J	**Soil Temperature Sensor**
	The Soil Temperature sensor should provide temperature of the top 6 to 8 cm of soil for energy-balance in flux systems. It should parallel four thermocouples together into one wire. Each member of a thermocouple pair should be buried at a different depth. The two pairs are separated at a distance of up to 1 m. 1. Type: Chromel-Constantan 2. Typical Output: 60 µ V/°C **3.** Accuracy: ±0.3°C, **4.** Measurement range: -25° to 60°C
Kc	**Quantum Sensor with cable, sensor kit should include sensor mount and leveling fixture *etc***
	Specifications: Detector: High Stability Silicon Photovoltaic Detector Co-sign Correction: Cosine corrected up to 80° angle of incidence. PAR Range : 0 to 10,000 µ mol $s^{-1}m^{-2}$ Sensitivity : Typical 5µA per1000µmol $s^{-1}m^{-2}$
L	**Battery & Charging system**

<table>
<tr><td></td><td>1. Supplier should provide power budget calculations
2. The supplier will provide Sealed Maintenance Free Lead Acid (VRLA) Battery of 12V/100 AH.
3. A suitable in-built charge controller having over and under voltage protection should be provided in the DCP.
4. Solar panel-The capacity should be such that the battery can be charged with 30% to 50% sunshine and diffused light under cloudy conditions.
5. Solar charge controller & cable assembly.</td></tr>
<tr><td>M</td><td>Environmental specifications</td></tr>
<tr><td></td><td>1. The DCP, Antenna, Sensors, Cable, Connectors, Battery, Solar panel etc. should be able to operate at optimal efficiency and withstand the following environmental conditions
2. Storage Temperature:: -40°C to 50°C
3. Operating Temperature : -40°C to 50°C
4. Humidity : 10% to 100%
5. Wind Speed: Up to 50 m/s
6. The System should be hermetically sealed to avoid ingress of dust, rain and moisture.</td></tr>
<tr><td>N</td><td>Enclosure</td></tr>
<tr><td></td><td>1. 16" x 18" Enclosure suitable for data logger /data storage devices with a power supply and one or more peripherals.
2. NEMA 4X Enclosures
3. Non Corrosive, white with UV stabilized
4. Cable entry options One sealable conduit</td></tr>
<tr><td>O</td><td>Mounting Structure</td></tr>
<tr><td></td><td>1. A 6 meter height of triangular tower with the self-supporting/ guy wired structure should be provided with the system.
2. Individual mountings required for the sensor specific should also be provided with the system</td></tr>
<tr><td></td><td>Item No II</td></tr>
<tr><td>P</td><td>Open Path CH_4 Analyzer
The CH_4 Analyzer should be open path, in-situ methane density measurement system using laser spectroscopy. The analyzer should use a single-mode tunable near-infrared laser source using Wavelength Modulation Spectroscopy (WMS), 2f detection and Data output at 40Hz.
<table>
<tr><td>Detection method</td><td>Wavelength Modulation Spectroscopy 2f detection</td></tr>
<tr><td>Resolution (RMS noise):</td><td>5 ppb @ 10 Hz and 2000 ppb CH4</td></tr>
<tr><td>Measurement Range:</td><td>0 to 25 ppm @ -25°C, 0 to 40 ppm @ 50°C</td></tr>
<tr><td>Accuracy at constant temperature:</td><td>Typically, < 1%, maximum < 2%</td></tr>
<tr><td>Drift from -25 °C to +45 °C:</td><td>0.05% °C</td></tr>
<tr><td>Bandwidth:</td><td>1,2,5,10, or 20 Hz</td></tr>
<tr><td>Sensor Dimension</td><td>14.33cm diameter (5.64 in), 82.8cm height(32.6in)</td></tr>
<tr><td>Operating Pressure Range:</td><td>45 to 100 k Pa</td></tr>
<tr><td>Operating Relative Humidity Range:</td><td>0 to 100%</td></tr>
</table></td></tr>
</table>

Operating Temperature Range: Data	-15 to 60°C
Communication:	Ethernet (up to 40 Hz)
Detection method:	Wavelength Modulation Spectroscopy 2f detection
Power Requirements:	10.5 to 18 VDC
Power Consumption:	8 W nominal, 16 W during cleaning cycle
Dimensions: Sensor:	14.33 cm dia (5.64 in), 82.8 cm height (32.6 in.) Optical Path: 0.5 m physical path (1.65 ft), 30 m measurement path (98.4 ft)
Weight:	5.2 kg (11.5 lbs)

1. Must be interfaced with Analyzer Interface Unit on the eddy covariance system tower along with CO_2& H_2O Analyzer and 3D Sonic Anemometer.
2. Open Path Methane (CH4) Analyzer should be supplied with Power cable ,Ethernet Cable , Calibration Fixture, Washer Assembly, Mounting Hardware , Spare Kit, Carrying Case, Software CD and Instruction Manual.

Q **Automated soil CO_2 flux system to measure long term CO_2 fluxes** (Soil respiration unit) **(**MULTIPLEXED CHAMBERS SOIL CO_2FLUX SYSTEM)

Principle For measurement for soil CO_2 emission is infrared gas method

CO_2

Measurement Range: 0-20,000 ppm
Accuracy: 1.5% of reading

Calibration Drift

Drift at 0 ppm: < 0.15 p pm / ° C Span Drift 1 < 0.03 %/ °C
Total Drift at 370 ppm: < 0.4 ppm/ °C
RMS Noise at 370 ppm with 1 sec signal averaging: <1 ppm
Sensitivity to water vapor: < 0.1 ppm CO_2/mmol/mol H_2O

H_2O

Measurement Range: 0-60 mmol/mol
Accuracy: 1.5% of reading

Calibration Drift

Drift at 0 ppt: <0.003 mmol/mol/°C
Span Drift1: < 0.03 %/ °C
Total Drift at 10 ppt: <0.009 mmol/mol/°C
RMS Noise at 10 ppt with 1 sec signal averaging: <0.01 mmol/mol
Sensitivity to CO_2: <0.0001 mmol/mol H_2O/ppm $CO_2$1
Residual error after zero correction

Multiplexed Long-Term System
Long-Term Chamber

Volume: 4076.1 cm3
Soil Area Exposed: 317. 8 c m^2(49.3 in2)
Dimensions: 48.3cmL x38.1cmW x 33.0cm H (19”x15”x13”)

Multiplexer to multiplex to different long term chambers

long-term chambers should close automatically

Allows assessment of both spatial and temporal variability

Long-Term Chamber Includes gasket kit, spares kit and two soil collars.

Analyzer Control Unit

1. Includes Auxiliary Sensor Interface,
2. Serial Cable Interface,

	3. RS-232 Serial Cable, 4. RS-232 to USB Adapter, 5. Spares Kit, 6. Compact Flash Memory Card, 7. PC Card Adapter, 8. Shoulder Strap Kit, 9. Software CD (Windows® and Palm® Interface plus Data Analysis Software) and Instruction Manual (Chamber, Battery and Battery Charger not included) 10. Software for analyzing soil gas flux data from soil respiration system and also should be able to recomputed soil gas flux data. **Optional** Trace Gas Analysis kit for measurement of N_2o
R	**Scope of work**
	1. Supplier has to carry out the complete integration, installation & commissioning of the Flux monitoring system including necessary civil work required for the system. 2. In case supplier of items number 1 & 2 may be different, supplier of items number 1 i.e. Data collection platform, Infra-Red Gas Analyzer and 3D Sonic Anemometer and Slow sensors also needs to integrate and install item number 2. 10% final payment of supplier of item number 1 will be paid only after satisfactory integration and installation of item number 2 (open path CH_4 analyzer) along with item number 1. 3. Demonstration and training on data downloading and other necessary functionalities of the system should be provided by the supplier. 4. Supplier should give a **warranty** for **2 years** from the date of commissioning of the system and **4 years** annual maintenance contract charges may be included 5. Supplier should ensure the after sales support for the minimum period of 6 year from the date of commissioning of the system. 6. Supplier has to install the software on the data receiving computer and has to do the necessary settings to turn on the automatic data collection from the remote flux station.
S	**Eddy covariance software**

	1. For processing &interpretation of raw data recorded from the Gas Analyzer. Eddy covariance flux processing software should be included with the System and should be free downloadable. 2. Automated processing of raw data at the research site using eddy covariance processing software and software for analyzing soil gas flux data from soil respiration system and also should be able to recomputed soil gas flux data. 3. Fully corrected fluxes of sensible heat, latent heat, evapotranspiration, CO_2, H_2O, and CH_4 at the site and in real time. 4. Advanced, site-specific raw data processing (in-situ spectral correction, planar fit etc.). 5. GPS time synchronization to prevent clock drift, and keeps instrument clocks in sync within and across sites. 6. Should be able to view computed fluxes in real time, including sensible heat flux (H), latent heat flux (LE), evapotranspiration (ET), carbon dioxide flux (Fc), methane flux, and ambient concentrations of (CO_2, H_2O, and CH_4 number density) and a wind rose plot showing the predominant wind direction. 7. Software should be an autonomous system to collect data from the Analyzer Interface Unit, and it should be able to process it using eddy covariance software, incorporating corrections such as coordinate rotation, frequency response corrections, and synchronization of variables from all instruments. 8. Software should be able to provide a variety of outputs including random error estimates for fluxes, spectra and co-spectra, footprint estimates, and daily summary files well suited for system diagnostics. 9. The corrections implemented in software should enable optimal computation of fluxes to provide the best eddy covariance flux measurements.

* Item – wise compliance and actual specifications must be indicated.

Note :

Signature and Seal of the Bidder: _____

Business Address: _____

_____

(FINANCIAL BID)
(To be enclosed in a separate envelope and sealed)

PRICE SCHEDULE for Schedule – I

(To be filled in by the Tenderer duly printed on their letter head)

Schedule	Description of the goods offered	No.of units	Unit Rate (Rs.)	Amount (Rs.)
Schedule-I	**Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc**	**1No**.		
	Applicable Taxes			
a.	**Central Excise Duty / Customs, if any** _____ **%**			
b.	**Service Tax, if any** _____ **%**			
c.	**VAT, if any** _____ **%**			
	Grand Total			

(Shall be submitted by bidder on their letter head)

Gross total cost: Rs. _____ (in figures) Rupees _____ (in words)

We agree to supply the above **"Eddy Covariance Flux Tower Facility With Data Logging & Download Platform With Accessories, Spares etc"** in accordance with the technical specifications for a total contract price of Rs…… (in figures) (Rupees …… …… …… …… (in words) within the period specified in the Invitation for Quotations.

We also confirm that the warranty as specified in the Schedule of Requirements / Technical Specifications shall apply to the offered goods / equipment.

Signature: _____

Name: _____

Date: _____