



ಭಾ. ಕೃ. ಅನು. ಪ - ಭಾರತೀಯ ತೋಟಗಾರಿಕಾ ಸಂಶೋಧನಾ ಸಂಸ್ಥೆ
ಹೆಸರಗಟ್ಟ ಕೆರೆ ಅಂಚೆ, ಬೆಂಗಳೂರು-560 089

भा.कृ.अनु.प.- भारतीय बागवानी अनुसंधान संस्थान
हेसरगट्टा लेक पोस्ट, बेंगलूरु - 560 089

ICAR-Indian Institute of Horticultural Research
Hesaraghatta Lake Post, Bengaluru - 560 089



EPABX: 080-23086100 Extn: 218 & 217

Email: purchase.ihr@icar.gov.in

F.No.18-01/2024-25/BS/IIHR/340876

Dated: 07.12.2024

NOTICE FOR INVITING TENDER THROUGH E-PROCUREMENT

Online Bids are invited from interested firms under **two bid systems (Technical bid/financial bid)** for **Procurement of Eddy Covariance Measurement System (01 no) at ICAR-IIHR H'ghatta**, Manual bids will not be entertained.

Tender documents may be downloaded from e-procurement website of CPPP <https://eprocure.gov.in/eprocure/app> as per the schedule given in CRITICAL DATE SHEET as under:

CRITICAL DATE SHEET

Tender No.	F.No. 18-01/2024-25/BS/IIHR/340876
Name of Organization	ICAR- INDIAN INSTITUTE OF HORTICULTURAL RESEARCH, Hesaraghatta, Lake Post, Bangalore
Date and Time for Issue/Publishing	07.12.2024 at 05:30 PM
Document Download/Sale Start Date and Time	07.12.2024 at 05:30 PM
Bid Submission start Date and Time	07.12.2024 at 05:30 PM
Bid Submission End Date and Time	27.12.2024 at 03:00 PM
Date and Time for Opening of Technical Bids	30.12.2024 at 10:00 AM
Address for Communication	Senior Administrative Officer (Purchase), IIHR, Hesaraghatta Lake Post, Bangalore

Sd/-
CHIEF ADMINISTRATIVE OFFICER (SG)

INSTRUCTIONS FOR ONLINE BID SUBMISSION

1. The Tender form/bidder documents may be downloaded from the <https://eprocure.gov.in/eprocure/app>. **Online submission of Bids through** Central Public Procurement Portal (<https://eprocure.gov.in/eprocure/app>) is mandatory. Manual/Offline bids shall not be accepted under any circumstances.
2. Tenderers/bidders are requested to visit the website <https://eprocure.gov.in/eprocure/app> regularly. Any changes/modifications in tender enquiry will be intimated by corrigendum through this website only.
3. In case, any holiday is declared by the Government on the day of opening, the tenders will be opened on the next working day at the same time. The Council reserves the right to accept or reject any or all the tenders.
4. The Firms are required to deposit (in original) **EMD of Rs.2,10,000/-** in the shape of Demand Draft in favour of **THE DIRECTOR, ICAR, UNIT-IIHR payable at Bangalore** may be addressed to **Senior Administrative Officer(Purchase), IIHR, Hesaraghatta Lake Post, Bangalore-560089** on or before **27.12.2024 by 3:00 PM**.
5. **Please note that only online Bids will be accepted.**
6. Bidders need not to come at the time of Technical as well as Financial bid opening at IIHR. They can view live bid opening after login on CPPP e-procurement portal at their remote end. If any dispute arises, Within Bengaluru Jurisdiction only.
7. The firms are also required to upload copies of the following documents for Technical eligibility and Evaluation: -

Technical Bid

1. **Scanned copy of MSME or UdyogAadhar or NSIC is a must for EMD Exemption if eligible, otherwise firms have to furnish EMD.**
2. Scanned copy of valid firm's registration certificate from registered of companies,
3. PAN Card copy
4. GST Number with Registration Certificate
5. Bank details of the firm.
6. Income Tax Returns for the last three years (2021-22,2022-23,2023-24).
7. Profit and loss account & Balance Sheet which are audited & duly certified by the Chartered Accountant for the last three years (2021-22,2022-23,2023-24).
8. Turnover of the business should be Rs.2.10 Crore per year (2021-22,2022-23,2023-24)(Average will be considered). And Chartered Accountant certified profit and Loss account; Balance sheet to this effect may be enclosed.
9. **Tender acceptance letter (Annexure-V) is mandatory.**
10. **Latest copies of the GST return for six months (January,2024 to June,2024)**
11. **Technical Certification:**

- a) Successful Training and Demonstration for 05(five) working days at the host Institutes.
- b) Telemetric reception of Quality Data at the recipient location for 07(seven) days by recipients.
- c) Testing of Setting Changes with Data Logger
- d) Certificates of Calibration for all the sensors

12. Technical Evaluation:

- a) Necessary prescribed documents like Certificate so incorporation and Experience.
- b) Audited Statement for evidence of a minimum average annual turnover of INR 100 Lakhs in the past three years
- c) Certificates of authorization from OEM for the sensors quoted (desirable) and at least for the H₂O, CO₂ and the Data Logger (mandatory).
- d) Past Experience Certificate for installation of at least one system installed in the past five years
- e) Sensor Ecosystem Schematic for the Site
- f) Detailed compliant Specifications
- g) On-site Demonstration of Telemetry with data logger: Telemetric Reception
- h) On-site Demonstration of programmability of Data Logger for algorithm, add/delete Table
- i) On-site Demonstration of Automatic alarm (email/SMS) to multiple users (threshold-based)
- j) Power Budget Calculations
- k) Evidence of Expandability of the system to add sensors like CH₄ and N₂O
- l) Technical presentation on system integration, data management and expansion (CH₄, NO₂ etc).

13. Warranty and Maintenance:

Warranty period will be for Two Year from the date of installation and the Bidder will quote a comprehensive AMC onsite replacement warranty for three years, with a commitment to an extended service warranty if required.

- a) Remote support to resolve the issue should be provided within 24 (twenty-four) hours of the report of trouble.
- b) Onsite maintenance with replacement/repair should be provided within 72 (seventy-two) hours of the report of failure.
- c) Penalty will levied at Rs1000/- (INR one thousand only) per day which will increase upto INR 5000/- per day for downtime above three days beyond the initial response time of three days.
- d) The Bidder should arrange sufficient spares for prompt service and maintenance

14.

Financial Bid:-

- a) Price Bid as BOQ XXX.xls
- b) **Evaluation criteria: Tender will be awarded to the lowest quoted Firm among those firms qualified in the Technical Bid. In case, two or more firms quote the same amount in r/o all the items work together as a whole, then the tender will be awarded to the Firm which has got more average turnover in the last 3 years,**

**based on IT returns/Profit & Loss account/Turnover duly certified by the CA
and uploaded along with Tender through CPPP.**

**S/d
CHIEF ADMINISTRATIVE OFFICER (SG)**

Annexure-II

Terms & Conditions

1. The tenderer shall quote rates, which will include the supply, installation & other incidental charges. GST, if any, should be indicated separately.
2. The rates should be quoted as per the BOQ uploaded on the CPP Portal (reference may be obtained from Annexure-III). GST, if any, should be indicated separately. It must be noted that the contract shall be awarded to the firm which fulfils all the required terms and conditions and remains L-I for **Total cost**.
3. The firm must also possess valid PAN No. & GST registration number and a copy of the same must also be enclosed with the tender document.
4. **Latest copies of the GST return for six months (January,2024 to June,2024)**
5. Copy of Income Tax Return Statement may be furnished for the Financial year 2021-22,2022-23,2023-24.
6. Profit and loss account & Balance Sheet which are audited & duly certified by the Chartered Accountant for the last three years (2021-22,2022-23,2023-24).
7. **Turnover of the business should be Rs.2.10 Crore per year (2021-22,2022-23,2023-24). And Chartered Accountant certified profit and Loss account; Balance sheet to this effect may be enclosed. (average will be considered)**
8. Modification in the tender documents after the closing date is not permissible.
9. The successful firm shall **commence work** within 10 days from the date of confirmed **work order** and if the work not completed in time then EMD shall be forfeited. The rates quoted shall be valid for one year from the date of opening of tender.
10. The contractor/bidder or his representative may contact the undersigned at **Tel. No. 080-23086100 Extn: 217 & 211** for any further clarification. No variation in terms and quality of the items/specifications shall be entertained or else EMD/Security deposit shall be forfeited.
11. The bidder is advised to visit the site of works at his own expenses and obtain all information that may be necessary for preparing the quotation. Submission of quotation is acceptance by the tenderer that he has inspected the site or he is aware of all conditions.
12. The Director, ICAR-IIHR, shall have the right to reject all or any of the offers, accept more than one offer, and assign part of the job without assigning any reason.
13. Merely quoting of lowest rates does not mean that order shall be given to that firm. The competent authority will finally decide on the basis of quality & performance of past installations.
14. The Firms are required to deposit (in original) an **Earnest Money Deposit of Rs.2,10,000/-** amount mentioned against item in the form of Demand Draft from any of the Commercial Bank in favour of **THE DIRECTOR, ICAR, UNIT-IIHR payable at Bangalore** may be address to Senior **Administrative Officer (Purchase), IIHR, Hesaraghatta Lake Post, Bangalore-560089 on or before 27.12.2024 by 03:00 PM.** No quotation shall be considered without the earnest money deposit. Demand draft drawn in favour of any officer other than 'THE DIRECTOR, ICAR UNIT-IIHR payable at Bangalore' will not be accepted and the tender will be rejected. The earnest money will be refunded only after the finalization of the procurement and no interest will be paid on earnest money. The request letter for refund of EMD & performance security is to be submitted by the firm.
15. Rates once finalized will not be enhanced/reduced during the currency of the contract.
16. In case, the successful bidder shows inability at any stage, after the contract is finalized and awarded, for whatsoever reason(s), to honour the contract, the earnest money /performance security deposited would be forfeited.

17. The Director, ICAR-IIHR reserves the right to cancel the contract at any time during the currency period of the contract without giving any reason.
18. The firm, to whom the tender will be awarded, will have to deposit the performance security equal to 3% of the total amount at the time of installation of equipment. If the services are not found to be satisfactory, the performance security is liable to be forfeited. No interest will be paid on performance security. If the services are not found to be satisfactory, the performance security is liable to be forfeited. No interest will be paid on performance security.
19. If any dispute(s) arises between IIHR and the firm with reference to the contract, IIHR will decide it and its decision will be binding on the firms.
20. Bid Validity: 90 days
21. Payment:- No advance or part payment will be given. The payment will be released after satisfactory completion of the work and certificate from the Indentor/Engineer.
22. **The supplier/firm has to submit the GST return for having remitted the GST amount paid by the institute to the concerned authority within 30 days from receipt of payment from IIHR, otherwise their EMD and SD/PS will not be released and such firms shall be blacklisted.**
23. **GST extra as applicable should be indicated separately in the column provided. Otherwise such quotes will be rejected.**

Payment Terms: In order to facilitate for speedy settlement of payment you are requested to Furnish the following details as below:

1. **Name of the firm:**
2. **Name of the Bank:**
3. **IFSC Code of Bank:**
4. **Name of the Account & Account No.:**
5. **Branch Code:**
6. **Amount to be paid:**
7. **E-mail address of the party:**
8. **GST No. and Pan No. Copies**

‘Terms & Conditions are acceptable’

Dated

(Authorized signatory of the firm)

Annexure-III

(Reference for BOQ) (To be quoted in format provided on CPP Portal)

Price bid for: **Procurement of Eddy Covariance Measurement System (01 no) @ ICAR-IIHR H'ghatta.**

Sl. No.	Name of item	Quantity	Per unit price* (in figures/words) (as per BOQ)
01	Procurement of Eddy Covariance Measurement System (01 no) @ICAR-IIHR H'ghatta	01 Unit	

*Annexure-VIII

- Items should be of reputed make and suitable for high end elite users
- GST extra as applicable should be indicated separately in the column provided. Otherwise such quotes will be rejected.**
- **ICAR-IIHR , Bangalore.**

Note: The above mentioned Financial Proposal/Commercial bid format is provided as BoQ_XXXX/xls along with this tender document at <https://eprocure.gov.in/eprocure/app>. Bidders are advised to download this BoQ_XXXX.xls as it is and quote their offer/rates in the permitted column and upload the same in the Financial bid. **Bidder shall not tamper/modify downloaded price bid template in any manner.** In case if the same is found to be tempered/modified in any manner, tender will be completely rejected and EMD would be forfeited and tenderer is liable to be banned from doing business with IIHR.

Annexure-IV

EPABX: 080-23086100 Extn: 218 & 217

FAX: 080-28466291 - Email: purchase.iihr@icar.gov.in



ICAR-INDIAN INSTITUTE OF HORTICULTURAL RESEARCH

HEGDE RAGHATTA LAKEPOST, BANGALORE-560 089

**भारतीय
ICAR**

Name of the Firm _____

Registered/Postal Address _____

1	Permanent Account Number (PAN)	
2	GST Registration No.	
3	Bank Details	
a	Bank Name	
b	Branch Address	
c	Account Number	
d	Type of account (current/saving) MICR No.	
e	IFSC Code	

Date:

Name of the Authorized Signatory

Place:

Stamp & Signature

TENDER ACCEPTANCE LETTER
(To be given on Company Letter Head)

Date:

To,
The Director,
ICAR-IIHR,
Hesaraghatta Lake Post,
Bangalore-560089.

Sub: Acceptance of Terms & Conditions of Tender.

Tender Reference No. _____

Name of Tender/Work:

Dear Sir,

1. I/ We have downloaded/obtained the tender document(s) for the above mentioned 'Tender/work' from the web site(s) namely:

As per your advertisement, given in the above mentioned website(s).

2. I/We hereby certify that I/We have read the entire terms and conditions of the tender documents from Page No. ____ to ____ (including all documents like annexure(s), schedule(s), etc...) which form part of the contract agreement and I/We shall abide hereby the terms/conditions/clauses contained therein.
3. The corrigendum(s) issued from time to time by your department/organization too have also been taken into consideration, while submitting this acceptance letter.
4. I/we hereby unconditionally accept the tender conditions of above mentioned tender documents/corrigendum(s) in its totality/entirely.
5. I/we do hereby declare that our Firm has not been black-listed/debarred by any Govt. Department/Public sector undertaking.
6. I/we certify that all information furnished by our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then your department/organization shall without giving any notice or reason therefore or summarily reject that bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said earnest money deposit absolutely.

Yours Faithfully,

(Signature of the Bidder, with Official Seal)

INSTRUCTIONS FOR ONLINE BID SUBMISSION

The bidders are required to submit soft copies of their bids electronically on the CPP Portal, using valid Digital Signature Certificates. The instructions given below are meant to assist the bidders in registering on the CPP Portal, prepare their bids in accordance with the requirements and submitting their bids online on the CPP Portal.

More information useful for submitting online bids on the CPP Portal may be obtained at <https://eprocure.gov.in/eprocure/app>.

REGISTRATION

- Bidders are required to enroll on the e-Procurement module of the Central Public Procurement Portal (URL <https://eprocure.gov.in/eprocure/app>.) by clicking on the link ‘**Online bidder Enrollment**’ on the CPP Portal which is free of charge.
- As part of the enrolment process, the bidders will be required to choose a unique username and assign a password for their accounts.
- Bidders are advised to register their valid email address and mobile numbers as part of the registration process. These would be used for any communication from the CPP Portal.
- Upon enrolment, the bidders will be required to register their valid Digital Signature Certificate (class II or Class III certificates with signing key usage) issued by any certifying authority recognized by CCA India (e.g. Sify/nCode/eMudhra etc.) with their profile.
- Only one valid DSC should be registered by a bidder. Please note that the bidders are responsible to ensure that they do not lend their DSC’s to others which may lead to misuse.
- Bidder then logs in to the site through the secured log-in by entering their users ID/password and the password of the DSC/e-Token.

SEARCHING FOR TENDER DOCUMENTS

- There are various search options built in the CPP Portal. To facilitate bidders to search active tenders by several parameters. These parameters could include Tender ID, Organization Name, Location, Date, Value etc. There is also an option of advanced search for tenders, wherein the bidders may combine a number of search parameters such as Organization Name, Form of Contract, Location, Date, Other keywords etc. to search for a tender published on the CPP Portal.
- Once the bidders have selected the tenders they are interested in, they may download the required documents/tender schedules. These tenders can be moved to the respective ‘My Tenders’ folder. This would enable the CPP Portal to intimate the bidders through SMS/e-mail in case there is any corrigendum issued to the tender document.
- The bidder should make a note of the unique Tender ID assigned to each tender, in case they want to obtain any clarification/help from the Helpdesk.

PREPARATION OF BIDS

- Bidder should take into account any corrigendum published on the tender document before submitting their bids.
- **Bidder are requested to visit the site at the Institute ICAR-IIHR, Bangalore, Karnataka and discuss with Dr K V Ramesh, Scientist, ICAR-IIHR, Bangalore before preparing the bid to clarify the doubts and understand the requirements.**
- Please go through the tender advertisement and the tender document carefully to

understand the documents required to be submitted as part of the bid. Please note the number of covers in which the bid documents have to be submitted, the number of documents- including the names and content of each of the document that need to be submitted. Any deviations from these may lead to rejection of the bid.

- Bidder, in advance, should get ready the bid documents to be submitted as indicated in the tender document/schedule and generally, they can be in PDF/XLS/RAR/DWF/JPG formats. Bid documents may be scanned with 100 dpi with black and white option which helps in reducing size of the scanned document.
- To avoid the time and effort required I uploading the same set of standard documents which are required to be submitted as a part of every bid, a provision of uploading such standard documents (e.g. PAN card copy, annual reports, auditor certificates etc.) has been provided to the bidders. Bidders can use 'My Space' or 'Other important Documents' area available to them to upload such documents. These documents may be directly submitted from the 'My Space' area while submitting a bid, and need not be uploaded again and again. This will lead to a reduction in the time required for bid submission process.

SUBMISSION OF BIDS

- Bidder should log into the site will in advance for bid submission so that they can upload the bid in time i.e. on or before the bid submission time. Bidder will be responsible for any delay due to other technical issues.
- The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- Bidder has to select the payment option as 'offline' to pay the tender fee/EMD as applicable and enter details of the instrument.
- Bidder should prepare the EMD as per the instructions specified in the tender document. The original should be posted/couriered/given in person to the concerned official, latest by the last date of bid submission or as specified in the tender documents. The details of the DD/any other accepted instrument, physically sent, should tally with the details available in the scanned copy and the data entered during bid submission time. Otherwise the uploaded bid will be rejected.
- Bidders are requested to note that they should necessarily submit their financial bids in the Format provided and no other format is acceptable. If the price bid has been given as a standard BoQ format with the tender document, then the same is to be downloaded and to be filled by all the bidders. Bidders are required to download the BoQ file, open it and complete the white coloured (unprotected) cell with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.
- The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
- All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128 bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric, encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid openers public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- The uploaded tender documents become readable only after the tender opening by the

authorized bid openers.

- Upon the successful and timely submission of bids (i.e. after clicking 'Freeze Bid Submission' in the portal), the portal will give a successful bid submission message and a bid summary will be displayed with the bid no. and the date and time of submission of the bid with all other relevant details.
- The bid summary has to be printed and kept as an acknowledgement of the submission of the bid.

ASSISTANCE TO BIDDERS

- Any queries relating to the tender documents and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contract person indicated in the tender.
- Any queries relating to the process of online bid submission or queries relating to CPP Portal in general may be directed to the 24x7 CPP Portal Helpdesk.

Annexure-VII

Details of Equipment& EMD

Sl. No.	Purchase of item	Qty	Earnest Money in INR	File. No. for reference
01	Procurement of Eddy Covariance Measurement System (01 no) @ICAR-IIHR H'ghatta	01 UNIT	Rs.2,10,000/-	F.No. 18-01/2024-25/BS/IIHR/340876

Note:

- 1) EMD defined on to the Portal is MINIMUM. Bidder has to submit the EMD as per item for which quoting for.
- 2) **Scanned copy of MSME or Udyog Aadhar or NSIC is a must for EMD Exemption if eligible, otherwise firms have to furnish EMD**

* ICAR-IIHR, Bangalore, Karnataka.

Annexure-VIII

TECHNICAL SPECIFICATION FOR: Procurement of Eddy Covariance Measurement System (01 no) @ ICAR-IIHR H'ghatta, Bangalore.

A: MAIN COMPONENTS:

1. Meteorological: Rainfall, Temperature & Humidity, Wind Speed & Direction, Pressure, Evaporation.
2. Soil and Radiation: Temperature, moisture, heat flux, Net Radiation, IR thermometers
3. Vegetation: Leaf Wetness, PAR
4. Fast Response Sensors (10-20Hz, or higher):3-DUltrasonicAnemometer
5. Sonic Air Temperature
6. Eddy-Covariance System Flux: OpenpathCO₂-H₂Oinfraredgasanalyzer
7. Data acquisition system and Communication: Data logger, battery, charge controller, etc.
8. Power Supply: Input Power Supply: 10VDC to 24VDC: Output: Modbus /SDI12
9. Installation to wer:10-meter-high,self-supported and guy wire supported
10. Enclosure with protective fencing and Monkey/Bird net
11. Analysis Algorithms and Software

B: TECHNICAL SPECIFICATIONS

Fast Response Sensors

1. Sonic Anemometer: Wind Speed

(a) Range:0- 65m/s(full scale wind)

(b) Resolution:0.001-0.01m/s(for_xu), 0.0005m/s(for_yu), 0.0005m/s(for_zu)

Accuracy:<1.5%RMS@12m/s

2. Sonic Anemometer: Wind Direction

(a) Range:0–360°

(b) Resolution:<0.1°(u_x=u_y≤1ms⁻¹) Accuracy:<1.5%RMS@12m/s

(c) Accuracy:±1°orbetter@12m/s

3. Sonic Temperature

- (a) Range: - 30°C to +60°C
- (b) Resolution: 0.002°C RMS (at 25°C) - 0.01°C

Speed of Sound (Determined from three acoustic paths. Corrected for cross wind effects)

- a) Range: 300-366 m/s
- b) Resolution: 0.01 m/s
- c) Internal Sample rate: 10 to 20 Hz or better
- d) Output parameters : up to 20 Hz or better

Output: Digital/Analogue Output

- (a) Communication: SDM, USB, 485, Analog
- (b) Baud rates: 1200 – 57600
- (c) Format: ASCII

4. Open Path CO₂ Analyzer

- (a) Calibration Range: 0 to 1000 $\mu\text{mol mol}^{-1}$
- (b) Accuracy: Within 1-2% of reading
- (c) Zero Drift (per °C): 0.3 $\mu\text{mol mol}^{-1}$
- (d) Gain Drift (% of reading per °C): $\pm 0.1\%$ of reading $\cdot \mu\text{mol CO}_2 \cdot \text{mol}^{-1} \cdot \text{C}^{-1}$ (maximum)
- (e) Sensitivity to H₂O: $\pm 1.1 \times 10^{-4} \mu\text{mol CO}_2 \cdot \text{mol}^{-1} \text{mmol H}_2\text{O}$ (max)

5. Open Path H₂O Analyzer

- (a) Calibration Range: 0 to 60 mmol mol^{-1} or higher
- (b) Accuracy : Within 2% of reading
- (c) Zero Drift (per °C): $\pm 0.05 \text{mmol mol}^{-1}$ maximum
- (d) Gain Drift (% of reading per °C): $\pm 0.30\%$ maximum
- (e) Sensitivity to CO₂ ($\text{mol H}_2\text{O mol}^{-1} \text{CO}_2$): $\pm 0.1 \text{mmol H}_2\text{O} \cdot \text{mol}^{-1} \mu\text{mol CO}_2^{-1}$ maximum

Slow response Sensors:

6. Wind Speed: Cup Type

- (a) Range: 0 to 50 m/s
- (b) Accuracy: ± 0.5 m/s
- (c) Threshold: 0.5 m/s

7. Wind Direction

- (a) Range Mechanical: 360°
- (b) Accuracy: $\pm 5^\circ$

8. AT and RH Sensor

Relative Humidity Sensor

- (a) Range:0to100%RH
- (b) Accuracy:±1-2%RH
- (c) Resolution:0.001%RH
- (d) Response Time:<20Sec

Air Temperature Sensor Details

- (a) Range:-30to+70°C or better
- (b) Accuracy:±0.1°C or better (at 25°C)
- (c) Resolution:0.001°C

9. Barometric Pressure Sensor:

- (a) Pressure Range:500to1100hPa
- (b) Long-Term Stability:±0.1 h Pa/yr
- (c) Uncertainty:±0.5hPa
- (d) Resolution:0.1hPa

10. Net Radio meter(incoming and reflected short-waved own ward and upward long-wave radiation)

- (a) Number of signal outputs:4
- (b) Response time(95%):<18 seconds
- (c) Temperature dependence of sensitivity:<5%from-10°Cto+40°C
- (d) Pyrano meter
 - I. Spectral Range:285to2800nm
 - II. Uncertainty in Daily Total :< 5 %(The uncertainty values are for a 95% confidence level.)
 - III. Output Range: 0 to 15m V(The output range is typical for atmospheric applications.)
- (e) Pyrgeometer
 - I. Temperature sensors:10K thermistor and Pt-100RTD
 - II. Spectral Range:4500to42,000nm
 - III. Uncertainty in Daily Total:<10%(For a 95% confidence level)
 - IV. Output Range:±5mV

11. Rain gauge

- (a) Sensor Type: Tipping bucket with magnetic reeds witch
- (b) Material: Anodized aluminum /Stainless-Steel
- (c) Operating Temperature Range: 0°to50°C
- (d) Rainfall pertip:0.1–0.25mm
- (e) Orificediameter:200mm or more
- (f) Accuracy:upto 2inch/h±1%

12. Soil Heat Flux Plate

- (a) Sensor type: self-calibrating thermopile
- (b) Measurement range:-2000to2000W/m² or better
- (c) Sensitivity (nominal):60μV/(W/m²) or better

- (d) Rated operating temperature range: -20 to +60°C or better
- (e) IP protection class: IP67 or better
- (f) Accuracy: $\pm 3\%$
- (g) Sensor thermal resistance: $< 6.25 \times 10^{-3} \text{K/m}^2/\text{W}$

13. Soil Moisture and Temperature Sensor Soil Moisture

- (a) Measurement range: 0% to 100% of VWC
- (b) Accuracy: $\pm 3.0\%$
- (c) Precision: $< 0.1\%$

Soil Temperature

- (a) Measurement range: -40°C to +60°C
- (b) Accuracy: 0.5°C
- (c) Precision: $< 0.04^\circ\text{C}$

Conductivity

- (a) Measurement range: 0 to 3 dS/m
- (b) Accuracy: 5%
- (c) Precision: $< 0.5\%$

Electrical

Input voltage: 10 to 14 VDC max. 18 VDC
 Operating temperature: -40°C to 60°C

14. Leaf Wetness Sensor (Dry, frosted, wet)

- (a) Response Time: $\leq 10 \text{ms}$
- (b) Output Range: 250 to 1500 mV
- (c) Output (Sensitivity): 0.1 mV per μm^{-2} ;
- (d) Operating Environment: 0°C to 60°C or higher

15. Photo synthetically Active Radiation (PAR) Sensor

- (a) Spectral range (50% points) : 389 to 692 nm $\pm 5 \text{nm}$
- (b) Sensitivity : 0.01 mV per $\mu\text{mol m}^{-2} \text{s}^{-1}$
- (c) Response time (95%) : $< 1 \text{ms}$
- (d) Spectral Selectivity : $< 10\%$ from 412 to 682 nm $\pm 5 \text{nm}$
- (e) Long term drift : $< 2\%$ per year
- (f) Uncertainty in Daily total : $< 5\%$
- (g) Temperature response : $-0.11 \pm 0.04\%$ per $^\circ\text{C}$
- (h) Field of view : 180°
- (i) Operational temperature range: -40°C to +70°C

16. IR Thermometer: The sensor should be able to provide remote measurements of surface temperature of plant canopy or soil surface continuously.

- (a) Operating wavelength: 8–14 μm or better.
- (b) Response time $< 1 \text{sec}$
- (c) Measurement range: -10°C to 50°C, or higher

- (d) Accuracy of measurement: $\pm 0.2^{\circ}\text{C}$
- (e) Precision: 0.05°C
- (f) Correction for sensor body temperature variations

17. Data Logger: A single data logger should connect Alfa stands low sensors, with the following properties

- (a) Appropriate ports to interface storage modules as necessary and module should have capability to store large amount of data, of the order of a few GB.
- (b) **Number of Channels:** Sufficient number of Channels, with additional four channels
- (c) Provisions for connections to PC or laptop using RS232/USB/Ethernet.
- (d) Provisions for multiplexers, relay drivers, serial and pulse input expansion modules, control output expansion module etc. in order to expand the data logger's measurement and control.
- (e) **Sampling Rate:** 100 Hz or higher, Programmable (User Configurable). Data acquisition device should higher rate than 10Hz or 20Hz.
- (f) The Data logger should be programmable and capable of telemetry and mobile /laptop interfacing.
- (g) **Analog Channel:** 8 differential or 16 single ended
- (h) **Input range:** multiple input ranges to measure the sensors accurately without any loss of accuracy. Should have this input range: $\pm 5000\text{mV}$, $\pm 1000\text{mV}$, $\pm 200\text{mV}$: 0 to 5 V DC.
- (i) Current loop measurement: Provision for up to 2 qty 4 to 20 mA signal/ Digital.
- (j) **Digital Channel:** Frequency Type: 04 Channel, Counter Type: 02 Channel and the facility to convert counter channels to frequency channels & vice versa should be provided.
- (k) **RS485(Half Duplex):** Minimum 4 channels shall be supported RS485 inputs
- (l) **Analog Voltage Accuracy:** $\pm 0.08\%$ of reading + offset
- (m) CE Compliant with IP65 Protection
- (n) **Analog to Digital Conversion:** Resolution 24 Bit or more; Conversion Accuracy $\pm 1\text{LSB}$
- (o) Watch dog Timer: to reset the system and restore the previous set-up in case of microprocessor resets and power glitches.
- (p) **Real Time Clock:** The normal time clock of the system should be derived from TCXO with an accuracy of ± 3 min/yr. In addition.
- (q) **Data Storage:** The system should have an in-built facility to store about for a minimum duration of more than one year in at least 50 MB memory.
- (r) Android and iPhone applications to monitor real-time data and to download historical data.
- (s) Password-protected access to data at multiple levels for different users
- (t) Data logger should user-programmable in readable language

18. Telemetry:

- (a) **Communication port:** 1 Type CU SBport, 5 RS232 Port, 1 Ethernet Port ;to connect computer, sensor, or communication devices serially
- (b) Store 30-minute flux data and 20Hz/10Hz time series data simultaneously in different tables.
- (c) 4G modem which shall transmit the daily data on Emails and the FTP server
- (d) The system should be able to send the text message on the user's cell phone in case of any alarm.

19. Analysis/Visualization Software:

- (a) Necessary software to download and visualize data and to calculate the Flux data
- (b) Calculation of time – averaged fluxes which shall be store dinaseparatetable that can be transmitted over the FTP server at the prescribed interval and appended in a single file.
- (c) Real-time data visualization through mobile/ laptop without the need for static IP connection.

20. Power System:

- a. **PowerSupply:**10to36VDC
- b. Current Drain in Sleep Mode: ~2 mA or better 1 Hz Scan (8 diff. meas. 60 Hz rej., 2 pulse meas.): 3 m A. 12 V switched DC with a maximum current supplying capacity of 1.0A during the measurement period for powering up the sensors. Short circuit and overload protection
 - (a) **Battery** (SMF type) should be chargeable with Solar panels. The system should run using Sealed Maintenance Free battery(s), rechargeable through solar panel(s).
 - (b) Should be capable of running the system for a minimum period of 10 days on full load without charging through the solar panel.
 - (c) Solar panels should be sufficient to fully charge the battery during one day time in all seasons and weather conditions.
 - (d) Charge controller should be able to properly charge the battery from the power received from the solar panels as well as from any external power source.

21. Installation Tower

- a. Self-supported Steel Tower of 10 meters height with necessary foundation work and guy wire support
- b. Weather-proof painting in the prescribed color
- c. Adjustable mounting of sensors according to the crop/ can copy height.
- d. Height graduation marks for the above-ground part in0.5-meter graduation

22. Enclosure with Safety Net: The bidder will install a safety enclosure with a safety net without inter fering with the sensors, along with covering nets to prevent birds/ monkeys from damaging the sensors and the installation.

23. Accessories: All accessories, including Booms, cable set necessary to make the system fully and properly functional shall be supplied by the Bidder as a part of the Supply and Installation

- 24. Warranty and Maintenance:** Warranty period will be for Two Year from the date of installation and the Bidder will quote a comprehensive AMC onsite replacement warranty for three years, with a commitment to an extended service warranty if required.
- a. Remote support to resolve the issue should be provided within24 (twenty-four) hours of the report of trouble.
 - b. Onsite maintenance with replacement/repair should be provided within 72 (seventy-two)hours of the report of failure.
 - c. Penalty will levied at Rs1000/- (INR one thousand only) per day which will increase upto INR 5000/- per day for downtime above three days beyond the initial response time of three days.
 - d. The Bidder should arrange sufficient spares for prompt service and maintenance

C: TERMS AND CONDITIONS:

1. General:

- (a) The system should be robust with low power consumption and amenable to long-period unattended operation in an open field.
- (b) The entire system, including supply, installation, commissioning, maintenance and calibration, will be considered as a single delivery; component quote/delivery shall not be accepted.
- (c) The installation should be as per an approved and mutually agreed Sensor Ecosystem Schematic.
- (d) Electronics/clock for fast sensors (gas and wind) should be the same or synchronized. Data and power units for the fast response sensors should be the same
- (e) Gas analyzer and 3D soni canemo meter should be collocated; and integrated as a single unit
- (f) The system should be expandable to integrate additional sensors like CH₄ and NO₂. The Bidder shall undertake to carry out such integration within the Warranty period at no additional cost if required.
- (g) Interested bidders are encouraged to visit the installation sites at their own cost in due coordination with the project team.
- (h) Any subsequent changes/ addendum /corrigendum etc shall be only through the ICAR-IIHR website; interested vendors are hereby advised to follow the ICAR-IIHR website regularly.

2. Technical Evaluation:

- (a) Necessary prescribed documents like Certificate so incorporation and Experience.
- (b) Audited Statement for evidence of a minimum average annual turnover of INR 100 Lakhs in the past three years
- (c) Certificates of authorization from OEM for the sensors quoted (desirable) and at least for the H₂O, CO₂ and the Data Logger (mandatory).
- (d) Past Experience Certificate for installation of at least one system installed in the past five years
- (e) Sensor Ecosystem Schematic for the Site
- (f) Detailed compliant Specifications
- (g) On-site Demonstration of Telemetry with data logger: Telemetric Reception
- (h) On-site Demonstration of programmability of Data Logger for algorithm, add/delete Table
- (i) On-site Demonstration of Automatic alarm (email/SMS) to multiple users (threshold-based)
- (j) Power Budget Calculations
- (k) Evidence of Expandability of the system to add sensors like CH₄ and N₂O
- (l) Technical presentation on system integration, data management and expansion (CH₄, NO₂ etc).

The Bidder should arrange all equipment and accessories for a successful Technical Evaluation

Failure to comply with any of the Technical evaluations shall lead to disqualification and summary rejection of bid. Only Technically qualified Bids shall be considered for Commercial Evaluation.

3. Technical Certification:

- (a) Successful Training and Demonstration for 05(five) working days at the host institute.
- (b) Telemetric reception of Quality Data at the recipient location for 07(seven) days by recipients.
- (c) Testing of Setting Changes with Data Logger
- (d) Certificates of Calibration for all the sensors

Sd/-

CHIEF ADMINISTRATIVE OFFICER(SG)