INDIAN INSTITUTE OF TECHNOLOGY MADRAS
Chennai 600 036

Telephone: (044) 2257 4274
E-mail: ligy@iitm.ac.in

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Department of Civil Engineering

Corrigendum-2

Tender Reference no: **CE/2021/IOECOE/039/EDDYFLUX**

Name of the Item: **Complete Eddy flux / Covariance System Package**

Corrigendum details: **Changes in Technical specification.**

Changes in Technical specification:

Amendment Ref: CE/2021/IOECOE/039/EDDYFLUX Complete Eddy flux / Covariance System Package Amendment No. 2 (Date Feb.25, 2021)		
Complete Eddy flux / Covariance System Package		
System Component	**Original Specification**	**Modified Specification**
DATALOGGER	Measurement and Control Datalogger to log and store the data locally with SD memory card (16 GB or higher)	Measurement and Control to log and store the data locally with SD memory

		card (16 GB or higher). **Optional USB Drive.**
GSM / GPRS for remote monitoring and data acquisition	The GSM /GPRS system should be compatible with the mobile network systems in India. Including network service plan for 5 years	The GSM /GPRS system should be compatible with the mobile network systems in India. Including network service plan for 5 years
OPEN PATH CO2/H2O GAS ANALYZER ~~& 3D SONIC ANEMOMETER~~ (Integrated or Stand Alone 3D SONIC ANEMOMETER)	Operating Temperature Range: -30° to +50°C	Operating Temperature Range: **-25° to +50°C**
	Calibrated Pressure Range: 70 to 106 kPa	Calibrated Pressure Range: 70 to 106 kPa
	Measurement Rate: 60 Hz	Measurement Rate: 60 Hz
	Output Bandwidth: 5, 10, 12.5, or 20 Hz; user programmable	Output Bandwidth: **5, 10, or 20 Hz**; user programmable
	Output Options: SDM, RS-485, USB, analog (CO2 and H2O only)	Output Options: SDM, RS-485, USB / Ethernet **(CO2 and H2O Analog/Digital)**
	Auxiliary Inputs: air temperature and pressure	Auxiliary Inputs: air temperature and pressure
	Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more	Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more
	For Gas Analyzer	For Gas Analyzer
	Precision RMS (CO2) 0.2 mg/m3 (0.15 µmol/mol)	Precision RMS (CO2) 0.2 mg/m3 (0.15 µmol/mol)
	Precision RMS (H2O) 0.004 g/m3 (0.006 mmol/mol)	Precision RMS (H2O) 0.004 g/m3 (0.006 mmol/mol)

	Accuracy within 2%	Accuracy within 2%
	Calibrated Range (CO2) 0 to 1,000 µmol/mol	Calibrated Range (CO2) 0 to **at least up to 1,000 µmol/mol or more**
	Calibrated Range (H2O) 0 to 72 mmol/mol	Calibrated Range (H2O) 0 to **at least up to 60 mmol/mol or more**
3D SONIC ANEMOMETER (Either Standalone or Integrated with the CO2/H2O gas analyzer)	The specification of 3D anemometer was inadvertently missed out in the original specifications	The specification of 3D anemometer was inadvertently missed out in the original specifications. The specifications are given below.
		This anemometer should be of rugged built, particularly suitable for precision 3-axis wind measurement applications for data involving high wind speeds.
		Measurement:
		Sampling Rate: 30 Hz or better
		Unit of parameters: m/s
		Wind Speed:
		Measuring Range: 0 to at least 30 m/s or more
		Resolution: 0.01 m/s or better
		Wind Direction:
		Range: At least ± 170° or better

		Resolution: 1^0or better
		Sonic Temperature
		Range : -40 °C to + 60°C
	Standard Operating Temperature Range: -40° to +70°C	Standard Operating Temperature Range: **-40° to +60°C or more**
AIR TEMPERATURE & RELATIVE HUMIDITY SENSOR	Relative Humidity:	Relative Humidity:
	Measurement Range 0 to 100% RH	Measurement Range 0 to 100% RH
	Accuracy ±2% (at 25°C, over the range 80	**Accuracy ±2% or better**
	to 100% RH)	
	Air Temperature:	Air Temperature:
	Measurement Range -40°C to +70°C	Measurement Range **-40°C to +60°C**
	Accuracy ±0.2°C (over the range -40 to	**Accuracy ±0.5°C or better**
	+70°C)	
	Solar Radiation Shield (Necessary conductors, mounting brackets and Cables of Length: minimum 10m or more)	Solar Radiation Shield (Necessary conductors, mounting brackets and Cables of Length: minimum 10m or more)
	Wind Speed	

WIND SPEED & DIRECTION SENSOR (Optional)	Range 0 to 60 m/s	**The wind speed and direction sensor is optional with the same specification as per original**
	Accuracy ±2% (@ 12 m/s)	
	Resolution 0.01 m/s	
	Wind Direction	
	Range 0° to 359° (no dead band)	
	Accuracy ±3°	
	Resolution 1°	
	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)	
BAROMETRIC PRESSURE SENSOR	Pressure Range 600 to 1100 hPa	Either it can be standalone or System In-built as part of 3D sonic anemometer with the same specification as per original
	Resolution ±0.01 hPa	
	Accuracy ±2.0 hPa (@ -40° to +60°C)	
	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)	
RAINFALL SENSOR	Resolution 1 tip	Resolution 1 tip
	Accuracy 1.0% up to 50 mm/h (2 in./h)	Accuracy 1.0% up to 50 mm/h **or better**
	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)

Multi Profile SOIL MOISTURE & TEMPERATURE SENSOR	Measurements Made: Volumetric water content (VWC),	Measurements Made: Volumetric water content (VWC),
	electrical conductivity (EC), and temperature	electrical conductivity (EC), and temperature
	Operating Temperature Range: -40° to +60°C	Operating Temperature Range: -40° to +60°C
	Measurement Depths: 5, 10, 20, 30, 40, 50, 60, 75, and 100 cm	**Measurement at minimum 3 different depths**
	Electrical Conductivity	Electrical Conductivity
	Range 0 to 10 dS/m	Range 0 to 10 dS/m
	Accuracy ±2% (0 to 2.5 dS/m)	Accuracy **±5% or better**
	±5% (full range)	
	Volumetric Water Content	Volumetric Water Content
	Range 0 to 100%	Range 0 to 100%
	Water Content Accuracy ±1.5%	Water Content Accuracy **±2% or better**
	Soil Temperature	Soil Temperature
	Accuracy ± 0.15°C (between -30° and +40°C)	Accuracy ± **0.2°C or better**
	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)
SOIL HEAT FLUX SENSOR (Self Calibrating)	Temperature Range -30° to +70°C	Temperature Range -30° to +70°C
	Measurement Range ±2000 W m-2	Measurement Range ±2000 W m-2

	Accuracy: -15% to +5%	Accuracy: -15% to +5%
		Measurement at minimum 3 different depths
	(Necessary conductors and Cables of Length: Minimum 10m or more)	(Necessary conductors and Cables of Length: Minimum 10m or more)
PAR Sensor	Field of View (FOV) 180°	**Field of View (FOV): Hemispherical, 180°**
	Spectral Range 390 to 690 nm	**Spectral Range: Range encompassing 400 to 650 nm**
	Spectral Selectivity < 10%	Spectral Selectivity: < 10%
	Operating Temperature Range -40° to +70°C	Operating Temperature Range: **-40° to +60°C**
	Measurement Range 0 to 4000 µmol m-2 s-1	Measurement Range: 0 to 4000 µmol m-2 s-1
	Sensitivity 0.01 mV per µmol m-2 s-1	Sensitivity: 0.01 mV per µmol m-2 s-1
	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)	(Necessary conductors, mounting brackets and Cables of Length: Minimum 10m or more)
Four Component NET RADIOMETER	Sensor Two thermopile pyranometers, two pyrgeometers	Sensor Two thermopile pyranometers, two pyrgeometers
	Measurement Description Measures incoming and outgoing short-wave and long-wave radiation	Measures incoming and outgoing short-wave and long-wave radiation
	Pyranometer	Pyranometer

	Spectral Range	Spectral Range: Range Encompassing **300 nm to 2600 nm**
	385 to 2105 nm (upward-looking)	
	295 to 2685 nm (downward-looking)	
	Sensitivity	**Sensitivity: 150 µV/W/m2 or better**
	0.057 mV per W/m2 (upward-looking)	
	0.15 mV per W/m2 (downward-looking)	
	Pyrgeometer	Pyrgeometer
	Spectral Range 5,000 to 30,000 nm	Spectral Range: 5,000 to 30,000 nm **or better**
	Sensitivity 0.12 mV per W/m2	Sensitivity: **150 µV/W/m2 or better**
	(Necessary conductors, mounting brackets, ventilation units and Cables of Length: Minimum 10m or more)	(Necessary conductors, mounting brackets, ventilation units and Cables of Length: Minimum 10 m or more)
Infrared Canopy Temperature (2Nos.)	Wavelength Range 8 to 14 µm (corresponds to atmospheric window)	Wavelength Range 8 to 14 µm (corresponds to atmospheric window)
	Field of View (FOV) At least 20° (half angle)	Field of View (FOV) At least 20° (half angle)
	Absolute Accuracy ±0.2°C (-10° to +65°C)	Absolute Accuracy ±0.2°C (-10° to +65°C)
Software, Data Acquisition system and Online monitoring and control	All necessary software(s) to acquire, process and analyse the data including online monitoring and control should be provided	All necessary software(s) to acquire, process and analyse the data including online monitoring and control should be provided

MOUNTING HARDWARE	Heavy Duty Adjustable Tripod (2-10 Meters)	Heavy Duty Adjustable Tripod **(2m to at least up to 4m or higher)**
Necessary Enclosures for the data loggers, power supply, battery / batteries, solar panels	As needed should be provided	As needed should be provided
Comprehensive Warranty (5 years)	Full Comprehensive AMC (incluidng replacement of spare parts) for 5 years from the date of installation with field visits twice every year for 5 years	Full Comprehensive AMC (including replacement of spare parts) for 5 years from the date of installation with field visits twice every year for 5 years
Installation	The vendor should do the complete installation on-site	The vendor should do the complete installation on-site
Eligibility criteria for vendor	1. A list of at least 3 Institutions/R&D units where similar eddy flux / covariance system have been supplied in India, including contact details (name of the person-in-charge, email, and phone number), is to be provided.	1. A list of at least 3 Institutions/R&D units where similar eddy flux / covariance system have been supplied in India, including contact details (name of the person-in-charge, email, and phone number), is to be provided.
	2. Three performance certificates of the similar eddy flux / covariance system in reputed institutions in India should be enclosed duly signed and stamped by the concerned scientist.	2. Three performance certificates of the similar eddy flux / covariance system in reputed institutions in India should be enclosed duly signed and stamped by the concerned scientist.

Tender Inviting Authority:

Prof. Ligy Philip,
Department of Civil Engineering IIT Madras,
Sardar Patel Road, Chennai - 600 036.