

CORRIGENDUM

Revised Specification for the Automatic Weather Station at IIHR-CHES, Hirehalli

The Automatic Weather Station will comprise of weather sensors, particulate and air quality sensors, a drone for mapping, a large display system to provide pertinent information, data loggers and storage facilities. The weather observatory should have following items to measure the parameters of interest. The parameters and specifications are as given in below table.

Section 1 – Technical Specifications for Automatic Weather Station

	Parameter	Specification
	Wind Speed	<ul style="list-style-type: none">● Range: 1 to 200 mph, 1 to 173 knots ,0.5 to 89m/s, 1 to 322 km/h.● Accuracy: ± 2mph (3km/h, 1m/s) or ± 5 %,whichever is greater.● Resolution is 1mph (1knot, 0.1m/s, 1km/hr)
	Wind Direction	<ul style="list-style-type: none">● Operating Range: 360° mechanical; 355° electrical (5° open) Or● Range: 0°to 360°or 16 compass points.● Accuracy: +/- 7 degrees.● Resolution: 1 degree. 22.5 degrees between compass points.
	Air Temperature	<ul style="list-style-type: none">● Resolution is +/- 0.04 (min) to max +/- 0.01.● Typical accuracy is +/- 0.3 (maximal is +/- 1.5) .● Repeatability is (+/-) 0.1 Celsius.● Operating Range -40 to 123 Celsius.● Long term drift is < 0.04 Celsius/year.
	Relative Humidity	<ul style="list-style-type: none">● Range: 0 – 100%● Accuracy: + 1% RH from 3 to 95%.● Excellent linearity and sensitivity with fast response and long-term stability● Operating Temp. range: -10 to +60°C● Response time: less than 20s
	Solar Radiation	<ul style="list-style-type: none">● Range: 0-1800 W/m²● Drift: upto +/- 2% /year● Accuracy: +/- 5% of Full scale● Operating Temperature: -40 -65C● Spectral response: 400-1100 nm
	Rain (Precipitation)	<ul style="list-style-type: none">● Temperature: 0 to + 50 °C● Diameter of aperture: 225mm● Orifice: 400cm²● Resolution/Sensitivity: 0.2mm● Rainfall capacity: Unlimited● Capacity per Minute: Max. 30 tips (3 resp. 6mm)● Accuracy: $\pm 1\%$ (at 25 mm/hr.)

	Pressure	<ul style="list-style-type: none"> ● Range is 300-1100 hPa ● Resolution is 0.06 hPa to 0.02hPa. ● Operating range is -40C to 85C. Best results in 0C to 65C range. ● Long term stability is +/- 1 hPa/year.
	Soil Temperature Sensors and Soil Moisture	<p>Accuracy</p> <ul style="list-style-type: none"> ● Apparent Dielectric Permittivity (ϵ_a): $\pm 1 \epsilon_a$ from 1 - 40 (soil range); $\pm 15\%$ from 40 - 80 ● Soil Volumetric Water Content (VWC): Using TOPP equation: $\pm 0.03 \text{ m}^3/\text{m}^3$ ($\pm 3\%$ VWC) typical in mineral soils that have solution electrical conductivity $< 10 \text{ dS/m}$; using medium specific calibration, $\pm 0.02 \text{ m}^3/\text{m}^3$ ($\pm 2\%$ VWC) in any porous medium ● Temperature: $\pm 1^\circ\text{C}$ <p>Resolution</p> <ul style="list-style-type: none"> ● ϵ_a: $0.1 \epsilon_a$ from 1-20, $< 0.75 \epsilon_a$ from 20-80 ● VWC: $0.0008 \text{ m}^3/\text{m}^3$ (0.08% VWC) from 0 to 50% VWC ● Temperature: 0.1°C <p>Range</p> <ul style="list-style-type: none"> ● ϵ_a: 1 (air) to 80 (water) ● Temperature: $-40 - 60^\circ\text{C}^*$
	Evaporation pan sensor	<ul style="list-style-type: none"> ● Range : 0 to 250 mm water gauge ● Accuracy : 1 mm of water depth
	CO2	<ul style="list-style-type: none"> ● 300-5000 ppm ● Non -dispersive infrared (NDIR) sensor ● +/- 3% of reading or +/- 50 ppm ● Response time - 90 Seconds ● Communication type - UART or I2C.
	CO	<ul style="list-style-type: none"> ● 0-500 ppm ● Linearity ppm CO error at full scale, linear at zero, $15\text{ppm CO} - < \pm 1$ ● Sensitivity nA/ppm in 2ppm CO 220 to 375 ● Sensitivity drift % change/year in lab air, monthly test < 10 ● Temperature range $^\circ\text{C} -30$ to 50 ● Pressure range kPa 80 to 120 ● Humidity range % rh continuous 15 to 90

SO2	<ul style="list-style-type: none"> ● Range 0-50 ppm ● Resolution < .1 ppm ● Overgas limit - 75 ppm ● Operating life > 24 month. ● Temperature Range - -30 to 50 Degree. ● Humidity Range - 15% RH to 90% RH ● Pressure Range - 80-120 kPa
NO2	<ul style="list-style-type: none"> ● Range 0-20 ppm ● Resolution < 0.02 ppm ● Overgas limit - 100 ppm ● Operating life > 24 month ● Temperature Range - -30 to 50 Degree. ● Humidity Range - 15% RH to 90% RH ● Pressure Range - 80-120 kPa
PM2.5 and PM10	<ul style="list-style-type: none"> ● Detection limit - 0-1000ug/m3. ● Response time < 10 seconds ● Communication option - UART.
Drone	<ul style="list-style-type: none"> ● 1-inch 12 MP sensor ● titanium alloy and magnesium alloy construction ● 5 directions of obstacle sensing and 4 directions of obstacle avoidance ● 20 minute flight time. ● AIRCRAFT Weight (battery and propellers included): 1388g ● ascent speed: S-mode: 6m/s ● descent speed: S-mode: 4m/s; ● GPS / GLONASS GPS hover accuracy range: vertical: + / -0.1m (with Vision Positioning); + / -0.5m (with GPS Positioning); horizontal: + / -0.3m (with Vision Positioning); + / -1.5m (with GPS Positioning) ● On Board image and video recording with real time video and image data transfer.

Section 2 – Data Logger

The data is uploaded and retained via a GPRS logger, which will collect data from each of the sensor, store it locally on the SD card and push it to a server using GPRS technology. The following specifications are required for the data logger.

1. Local Storage 4GB SD card which can store data for 1 year as back-up.
2. Data synchronisation - In case of non-availability of network, data is stored locally which is pushed further when network is available

3. Local RTC - Local I2C based RTC with low drift with respect to time
4. PC software for SD card - PC software for reading data from SD card.
5. GPRS as a communication option
6. 8 Bit microcontroller with low power consumption and functionality to go in deep sleep mode so as to consume less power. Controller should have 10 bit ADC resolution, 8 Analog inputs I2C port, UART port, Ability to change data push interval.
7. Data protocol - BENCODE based data protocol should be used to transfer data from weather station to Web-server in real time.
8. Power It should run either from 12V DC power supply or Solar power.
9. Battery Backup - 7 days battery backup without recharge.
10. Enclosure - IP66 based weatherproof enclosure with weather proof connectors to connect the sensor so that the logger is totally insulated from the surrounding environmental conditions.
11. On Demand local data download.

Section – 3 Data Storage and Visualization

Section 3.1 – Web Dashboard and Web Server

1. Web server to receive, store and analyse data
2. Weekly and Monthly reports on the mail.
3. SMS / Email based alert mechanism.
4. REST API for further integration or development of institute own dashboard.
5. Visualisation of data on last 6 hour, last 24 hour, last week.
6. Functionality to download data between a specified date interval.

Section 3.2 – Reports

1. Reports on Daily, Weekly, Monthly and Yearly basis as per Industry standards.
2. Android application to display data on the 50 Inch LCD display installed at the reception.
3. Data Synchronisation - In case of unavailability of network, data is stored locally on a SD card and later synced to the server. SD card let you store almost two years of data.
4. One of its type observatory which comes with air quality sensors.
5. Daily SMS with Average of important parameters.
6. Drone with camera installed in it for aerial view of the agriculture land.
7. Facility to plug the weather data to Institute website using REST API's.
8. Access to Yuktix cloud with data visualisations and other reports.

Section 3.3 – Display specifications

1. Highly contrast 50 inch LCD display
2. OTT based Android application to display data from server
3. Real time weather station and air quality parameters display with visualisation.

Section 3.4 – Personal computer

Personal computer for data access with Windows and web-browser installed need to be provided to access the data.

Section 4 - Warranties

1. Comprehensive warranty with spares for 1year from the date of installation of the instrument should be covered. The complete service, maintenance, repair and calibration of the instruments shall be provided by the party on free of cost during warranty period. Also there is no limit of visit for attending any faulty during warranty period on priority.
2. AMC charges for 1 year after warranty should be mentioned separately.

Sd/-

ASSISTANT ADMINISTRATIVE OFFICER(SP)