

Technical Specifications of Meteorological Sensors

1. Wind Speed Sensor: -4 Nos

Sensor Type: Cup Anemometer
Measuring Principle: Magnetic.
Measuring Element: 3- Arm cup anemometer, Aluminium.
Measuring Range: 0.4 to 75m/s.
Starting Value: 0.4 m/s.
Accuracy: 0.1 m/s.
Operational Temperature: -40° C to +70° C.
Case: Sea Water resistant Aluminum or similar.

2. Wind Direction Sensor: - 4 Nos

Sensor type: Wind Vane
Measuring Principle: Magnetic.
Measuring Element: Aluminium/Stainless Steel Wind Vane.
Measuring Range: 0 to 360° (deg.).
Starting Value: 0.4 m/s.
Accuracy: 1-3° (deg.).
Operational Temperature: -40° C to +70° C.
Case: Sea Water resistant Aluminum or similar.

3. Air Temperature Sensor: - 4 Nos

Sensor Type: PT Type Sensor (Platinum Resistance Thermometer type).
Measuring Range: -40° C to +80° C.
Resolution: 0.01° C.
Accuracy: ±0.1° C.
Case: Sea water resistant polycarbonate or similar

4. Relative Humidity Sensor: - 4 Nos

Sensor Type: Capacitive Humidity Sensor.
Measuring Range: 0% to 100%.
Resolution: 0.1%.
Accuracy: ±2%.
Case: Sea water resistant polycarbonate or similar
Others: In addition to temperature and relative humidity, this sensor should also calculate the values for absolute humidity, dew point and mixing ratio.

5. Barometric Pressure Sensor: - 2 Nos

Sensor type: Piezo-resistive Pressure element built in temperature compensation.
Measuring Range: 500 to 1500 mb.
Accuracy: 0.1 % FS.
Resolution: 0.1 mb
Operational Temperature: -40° C to +100° C.
Case: Sea water resistant polycarbonate or similar

6. Solar Radiation Sensor: - 1 No

Sensor Type:Photo diode based pyranometer
Spectral Range: 400 to 1100 nm.
Sensitivity: 60 to 100 μ V/W/m².
Response time: <500ns.
Operational temperature: -40 \square C to +80 \square C.
Max. Solar irradiance: 2000 W/m².
Field of view: 180 \square (deg.).
Accuracy:<0.2 \square (deg.).

7. Net Radiation Sensor: - 1 No

Sensor type: Thermopile type
Spectral Range: 300 to 2800 nm.
Sensitivity: 5 to 20 μ V/W/m².
Response time: <18s.
Operational temperature: -40 \square C to +80 \square C.
Max. Solar irradiance: 2000 W/m².
Field of view: 180 \square (deg.).
Accuracy:<0.2 \square (deg.).

8. Rainfall Sensor: - 1 No

Sensor Type: Tipping Bucket.
Resolution: 0.2 mm or better.
Orifice diameter: 20cm.
Output: 0.1 Sec switch closure.
Outer Housing: Sea Water ProofStainless steel.

9. Data logger: - 1 No

- Must have support for SD or USB memory for data download, read/write setups or additional log memory.
- Must be able to retrieve data using any communication interface.
- Must have built-in 32MB internal flash memory and non-volatile memory: 65MB.
- Data logger must have 32-bit processor.
- Must able to store the data of average, maximum and minimum values – hourly: of the sensors connected.
- Must have 4 communications serial ports.
- Must have analog and digital I/O modules that plug into I²C port for sensors connect to the system.
- Must have RS232, RS485, and SDI-12 for sensors connect to the system.
- Must have wide operating temperature (-40 to +60 \square C).
- Data logger must have built-in Ethernet.
- Data logger must have built-in display/buttons to view data.
- Must have built-in 10 channels A/D, 8 channels DIO.
- Must have programmable measurement interval of 0.1 seconds to 24 hours.
- Must have unlimited number of measurements supported.
- Datalogger must have 10 analog channels and 8 digital inputs and outputs (6 Bi-Directional, 2 input only).

- Datalogger must have 3 buttons keypad type and LCD display operational.
- GSM/GPRS modem-based data transmission - ready to connect with server through a static IP & the system should be Solar Powered.

10. Data Acquisition System (Work Station)

Data acquisition system should be provided to store the data, processing of data & for modeling of the data collected. Required software should be provided for data logger end as well as work station/PC/Server end for processing of the data for modeling purpose.

11. Solar Power with Solar Panel and power backup with Battery

Solar Panel: 12 V - 60 Watts; Scratch & dust Free; It should be of Superior quality.

Battery: 12 V DC – 100 AH SMF Battery.

12. Weather Proof Enclosure

Stainless-Steel Weather-Proof Enclosures should be provided separately for Battery and Data Logger - Sea-Water proof resistant.

13. Lightning Arrester

Lightning Arrester has to be provided and installed in 30 m tower to protect the Micro-meteorological stations (Sensors) from Lightning damage. There should be 2 earth pits: one for the lightning and another for the electronic equipment with minimum 5 meters distance from each other. Civil works related to earth pits dimensions: 2' x 2' at the top and 5' depth. Chemical Earthing should be used rather than normal earthing.

A detailed documented procedure, on working, installation and commissioning of sensors and data logger is required. Test reports, Calibration certificates and warranty certificates may also be provided. Manual on procedures for electronic calibration of sensor channels of data logger also be provided.

14. Installation of instruments and establishment of data transfer facility:

- Installation and commissioning of Instruments (Sensors) at various levels (2m, 10m, 20m & 30m heights) must be carried out as per WMO/IMD guidelines for existing 30 m tall, lattice type triangular tower supported by guy ropes. Tower's design is ideal for wind monitoring system.
- Data transmission facility from data logger to data acquisition system through GSM/GPRS modem-based data transmission should be carried out.
- All cables and connectors required for installation of sensors at various levels (2m, 10m, 20m & 30m heights) should be provided.
- Mounting brackets, mounting fixtures, cross arms with mounting accessories should for installation of sensors should be provided.
- Any other mounting hardware, electrical components if required should be provided.
- Necessary civil works for 2 Nos of earthing pits for lightning & equipment

15. Annual Maintenance Contract: 2 years

Standby respective instruments must be supplied and installed in place if repairing/servicing/replacement of instrument is required.