

### Annexure-1

S. No.	Item Name	Specifications	Quantity
1.	Outdoor LoRaWAN node	<p><b>General data:</b>            Microcontroller: ATmega1281, Frequency: 14.7456 MHz            SRAM: 8 kB, EEPROM: 4 kB, FLASH: 128 kB, SD card: 16 GB            Weight: 20 g            Dimensions: 73.5 x 51 x 13 mm            Temperature range: [-30 °C, +70 °C]            Clock: RTC (32 kHz)</p> <p><b>Consumption:</b>            On: 17 mA, Sleep: 30 µA, Deep Sleep: 33 µA, Hibernate: 7 µA</p> <p><b>Inputs/Outputs:</b>            7 analog (I), 8 digital (I/O), 1 PWM, 2 UART, 1 I2C, 1 USB, 1 SPI</p> <p><b>Physical</b>            Material: polycarbonate, Sealing: polyurethane, Cover screws: stainless steel            Ingress protection: IP65, Impact resistance: IK08            Rated insulation voltage AC: 690 V, Rated insulation voltage DC: 1000 V            Heavy metals-free: Yes            Weatherproof: true - nach UL 746 C            Ambient temperature (min.): -30 °C, (max.): 70 °C            Approximated weight: 800 g            Battery voltage: 3.3 – 4.2 V            USB charging: 5 V – 480 mA (max current input)            Solar panel charging: 6 - 12 V – 300 mA (max current input)</p> <p><b>Built-in sensors on the board:</b>            Accelerometer: ±2g/±4g/±8g</p> <p><b>LoRaWAN modules</b>            Protocol: LoRaWAN 1.0, Class A LoRaWAN-ready            Frequency: LoRaWAN IN module: 865-867 MHz ISM band            TX power: LoRaWAN IN module: up to 18.5 dBm            Sensitivity: down to -136 dBm            Range: &gt;15 km at suburban and &gt;5 km at urban area.            Chipset consumption: LoRaWAN IN module: 124.4 mA            Radio data rate: LoRaWAN IN module: from 250 to 12500 bps</p> <p>Sensor board included should allow to connect following sensors (Min 6 at once with right combination)</p> <ul style="list-style-type: none"> <li>• Soil / Water temperature</li> <li>• Solar radiation (PAR)</li> <li>• Trunk diameter</li> <li>• Stem diameter</li> <li>• Fruit diameter</li> <li>• Temperature, Humidity and Pressure</li> <li>• Soil moisture (1.5, 4.5, 8 m)</li> <li>• Leaf wetness</li> <li>• Anemometer + Wind vane + Pluviometer</li> <li>• Luminosity (Luxes accuracy)</li> <li>• Ultrasound (outdoor IP67)</li> </ul>	2
2.	Temperature, Humidity and Pressure probe	<p><b>Electrical characteristics</b>            Supply voltage: 3.3 V            Sleep current typical: 0.1 µA            Sleep current maximum: 0.3 µA</p> <p><b>Temperature sensor</b>            Operational range: -40 ~ +85 °C</p>	2



		<p>Full accuracy range: 0 ~ +65 °C  Accuracy: ±1 °C (range 0 °C ~ +65 °C)  Response time: 1.65 seconds (63% response from +30 to +125 °C).  Typical consumption: 1 µA measuring</p> <p><b>Humidity sensor</b>  Measurement range: 0 ~ 100% of relative humidity (for temperatures &lt; 0 °C and &gt; 60 °C see figure below)  Accuracy: &lt; ±3% RH (at 25 °C, range 20 ~ 80%)  Hysteresis: ±1% RH  Operating temperature: -40 ~ +85 °C  Response time (63% of step 90% to 0% or 0% to 90%): 1 second  Typical consumption: 1.8 µA measuring  Maximum consumption: 2.8 µA measuring</p> <p><b>Pressure sensor</b>  Measurement range: 30 ~ 110 kPa  Operational temperature range: -40 ~ +85 °C  Full accuracy temperature range: 0 ~ +65 °C  Absolute accuracy: ±0.1 kPa (0 ~ 65 °C)  Typical consumption: 2.8 µA measuring  Maximum consumption: 4.2 µA measuring</p>	
3.	Soil moisture 1.5 m sensor probe	<p>Measurement range: 0 ~ 200 cb  Frequency range: 50 ~ 10000 Hz approximately  Diameter: ~22 mm  Length: ~76 mm  Terminals: AWG 20  Probe length – 1.5 m</p>	1
4.	Soil moisture 4.5 m sensor probe	<p>Measurement range: 0 ~ 200 cb  Frequency range: 50 ~ 10000 Hz approximately  Diameter: ~22 mm  Length: ~76 mm  Terminals: AWG 20  Probe length – 4.5 m</p>	2
5.	Solar radiation (PAR) sensor probe	<p>Sensibility: 0.200 mV / µmol·m<sup>-2</sup>s<sup>-1</sup>  Calibration factor: 5 µmol·m<sup>-2</sup>s<sup>-1</sup> / mV  Non-linearity: &lt; 1% (up to 4000 µmol·m<sup>-2</sup>s<sup>-1</sup> / mV)  Non-stability (long-term drift): &lt;2% per year  Spectral range: 410 ~ 655 nm  Accuracy: ±5%  Repeatability: &lt;1%  Diameter: ~2.4 cm  Height: ~2.8 cm  Cable length: ~5 m of shielded, twisted-pair wire  Operation temperature: -40 ~ 70 °C  Operation humidity: 0 ~ 100% RH</p>	1
6.	Soil/Water temperature (Pt-1000) sensor probe	<p>Measurement range: 0 ~ 100 °C  Accuracy: DIN EN 60751  Resistance (0 °C): 1000 Ω  Diameter: ~6 mm  Length: ~40 mm  Cable: ~5 m</p>	1
7.	Soil temperature Probe	<p>Measurement range: [-55 °C,+125 °C]  Output voltage (0°C): 500 mV  Resolution: 12 bits (0.0625 °C)  Accuracy: ±0.5 °C (range -10 °C ~ +85 °C)  Supply voltage: 3.0 ~ 5.5 V</p>	1

		Response time: 1.65 seconds (63% response from +30 to +125 °C) Typical consumption: 1 mA Conversion time: 750 ms	
8.	Leaf wetness sensor probe	Resistance Range: 5 kΩ ~ >2 MΩ Output Voltage Range: 1 V ~ 3.3 V Length: ~5.5 cm Width: ~4 cm	2
9.	Anemometer + wind vane + pluviometer	<b>Sensor specifications (Anemometer)</b> Sensitivity: 2.4 km/h / turn Wind Speed Range: 0 ~ 240 km/h Height: 7.1 cm Arm length: 8.9 cm Connector: RJ11  <b>Sensor specifications (Vane)</b> Height: 8.9 cm Length: 17.8 cm Maximum accuracy: 22.5° Resistance range: 688 Ω ~ 120 kΩ  <b>Sensor specifications (Pluviometer)</b> Bucket capacity: 0.28 mm of rain	1
10.	External solar panel	Max power: 3 W Max power voltage: 5.8 V Max power current: 520 mA Dimensions: 234 x 160 x 17 mm	2
11.	Outdoor LoRaWAN gateway	<b>Processor &amp; Memory</b> ARM9 processor with 32-Bit ARM & 16-Bit Thumb instruction sets 400 MHz, 16K Data Cache, 256 MB Flash Memory, 16K Instruction Cache, 128X16M DDR RAM Packet Data Up to 100 Mbps downlink, Up to 50 Mbps uplink Radio Frequency LoRa 868 or 915 MHz – a proprietary Digital Spread Spectrum technique Storage: Micro SD Input Voltage Power over Ethernet (PoE) 48Vdc 25W compliant to IEEE802.3at Ethernet 1 RJ-45 Ethernet 10/100 port (PoE) Serial 1 Debug Serial: USB Micro-B Antenna Cell 3dBi (Qty2), LoRa 3dBi (Qty1), GPS (Qty 1) SIM Micro SIM (3FF)	1

**Terms and Conditions:**

**Technical Requirement:** The node/gateway preferably be capable of communicating in open-source data format like JSON or equivalent. The gateway device must be capable of on-site configuration, publishing and subscribing the data topics in MQTT or other such light-weight open-source IoT protocol. The supplier needs to install, demonstrate and provide on-site training for the working and configuration of the individual and integrated systems on-site.

**Warranty:** Minimum One Year OEM warranty on all the items

**Optional:** Bidder should quote the price for 2 years post-warranty AMC charges