



# LoRaWAN® Soil NPK Sensor

## MacSync LSS X1

LoRaWAN® soil NPK sensor for real-time soil nutrient monitoring with long-range wireless connectivity and precision agriculture intelligence.



## Introduction

The MacSync LSS X1 is an industrial-grade LoRaWAN® Soil NPK Sensor designed for real-time monitoring of Nitrogen (N), Phosphorus (P), and Potassium (K) in smart agriculture and precision farming applications. Built for harsh outdoor environments, the sensor enables farmers and agricultural teams to optimize fertilizer usage, improve crop productivity, and monitor soil health remotely using long-range LoRaWAN® connectivity.

With ultra-low power operation, rugged IP-rated construction, configurable alerts, BLE-based configuration, and compatibility with public and private LoRaWAN® networks, the MacSync LSS X1 is ideal for greenhouses, irrigation systems, farms, and data-driven agricultural monitoring deployments.

## Features

- Real-Time Soil NPK Monitoring
- Simultaneous Nitrogen (N), Phosphorus (P) & Potassium (K) Detection
- Industrial-Grade & Reliable Soil Nutrient Sensing Technology
- Fast Soil Nutrient Response Characteristics
- Configurable Threshold-Based Nutrient Alerts
- Compatible with Public & Private LoRaWAN® Networks & Macnman MacTalk Protocol
- Designed for Outdoor Agricultural Deployments

## Key Advantages

- Supports Greenhouse, Plantation & Horticulture Applications
- Helps Reduce Over-Fertilization & Soil Degradation Risks
- Supports Smart Irrigation & Automated Farming Systems
- Enables Data-Driven Agricultural Decision Making
- Supports Precision Farming & Smart Agriculture Initiatives

## NPK Sensor Measurement Specifications

	Nitrogen	Phosphorus	Potassium
Range	0 – 1999 mg/kg	0 – 1999 mg/kg	0 – 1999 mg/kg
Accuracy	±2% F.S	±2% F.S	±2% F.S
Resolution	1 mg/kg (mg/l)	1 mg/kg (mg/l)	1 mg/kg (mg/l)
Response Time (T90)	< 10 Seconds	< 10 Seconds	< 10 Seconds
Operating Temperature	5°C ~ 45°C	5°C ~ 45°C	5°C ~ 45°C
Operating Humidity	5% ~ 95% RH	5% ~ 95% RH	5% ~ 95% RH

## Wireless Specifications

Wireless Protocols	LoRaWAN® (v1.0.4), Macnman MacTalk Protocol
Antenna	Internal high-efficiency antenna
Supported Bands	IN865 / RU864 / EU868 / US915 / AU915
Tx Power	23 dBm @ 865 MHz
Sensitivity	-137 dBm @ 300 bps
LoRaWAN® Class	Class A (Default), Configurable to Class C via Maya
Device Activation	OTAA
Supported LNS	Private LNS , ChirpStack ,The Things Network , MQTT, Orbiwise

## Device Management

Configuration Method	Via Macnman Maya Android App
Local Configuration	BLE-Based Local Configuration
Remote Configuration	Over-the-Air Configuration (Downlink Commands)
Status LED	1 × Internal Multi-Color LED

## Device Configuration Parameters

Data Reporting Mode	Periodic / Event-based / Hybrid
Transmission Interval	Independent uplink interval for optimized power consumption
Threshold-Based Alerts	Configurable Soil Thresholds for Event-Triggered Transmission
Sampling Interval	Configurable data acquisition interval (e.g., 1 min to 24 hours)

## Power & Battery Performance

Power Supply	Integrated Battery - 19,000 mAh
Battery Type	Lithium Thionyl Chloride (Li-SOCl <sub>2</sub> )
<b>Estimated Battery Life at 25 °C</b>	
5-minute reporting interval	~2 years
15-minute reporting interval	~4 years
60-minute reporting interval	~6+ years

## Physical & Environmental Specifications

### Enclosure & Mechanical

Material	Glass Filled Nylon
Protection Rating	IP65
Dimensions	152 mm X 62 mm X 43 mm ( Without Sensor Probe )
Weight	~175 g

### Mounting & Installation

Wall - Mounted Installation	Supported , With Clip
Pole - Mounted Installation	Supported , Without Clip

### Environmental Conditions

Operating Temperature	-40°C to +80°C
Operating Humidity	0% to 95% RH (Non-Condensing)

## Regulatory Certifications & Compliance

Wireless Certification	WPC
Environmental	RoHS Compliant

## What's in the Box?

- MacSync LSS X1 Sensor
- Mounting Clip
- User Manual
- Warranty Card
- IP68 Cable Extender \*
- Mounting Screws
- Power Adapters \*

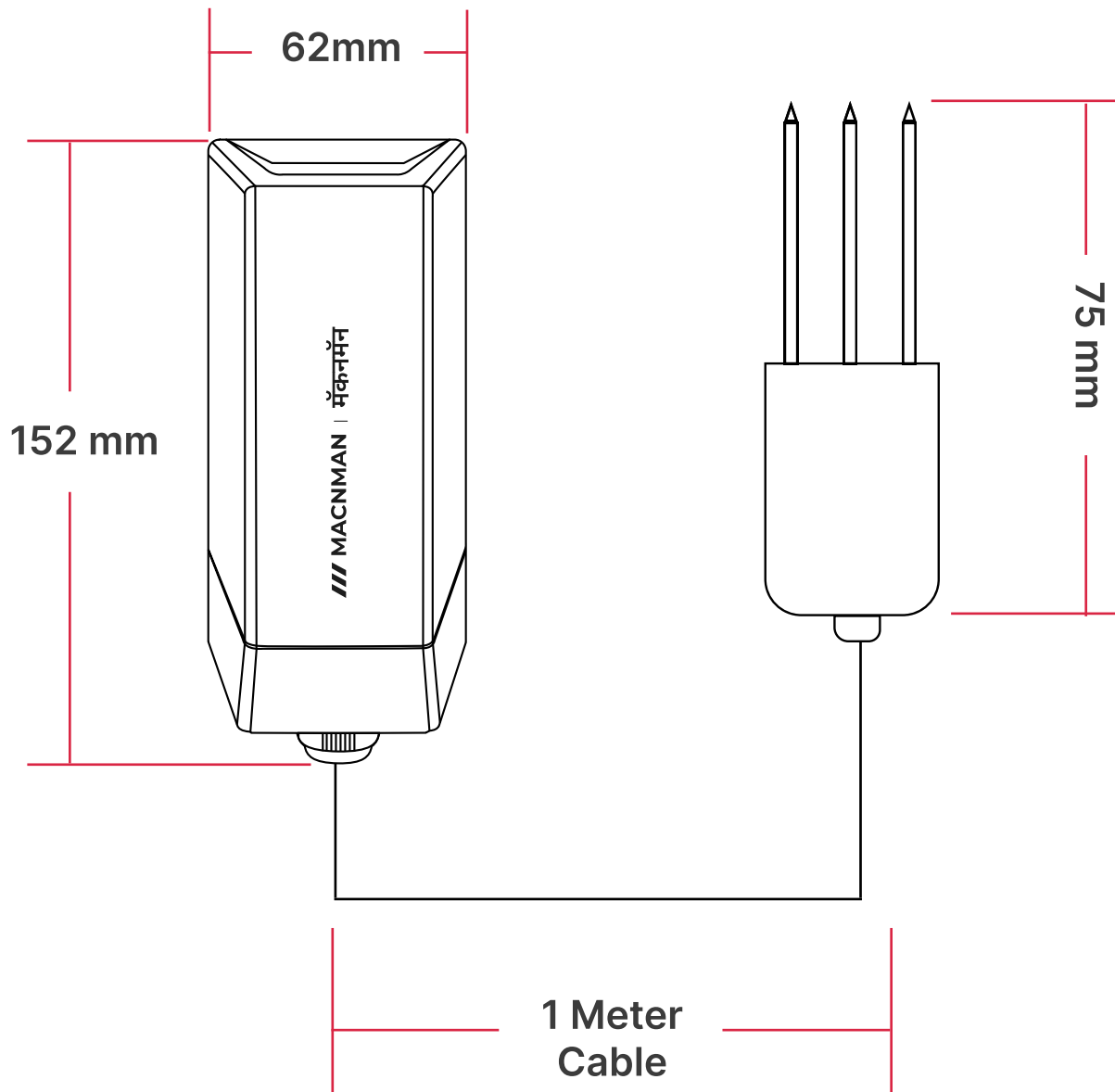
## Models & Ordering Information

Variant Name	Power Source	SKU
MacSync LSS X1 BO	Integrated Battery - 19,000 mAh	838
MacSync LSS X1 SO	20 W Solar Panel + 8000 mAh Battery	839

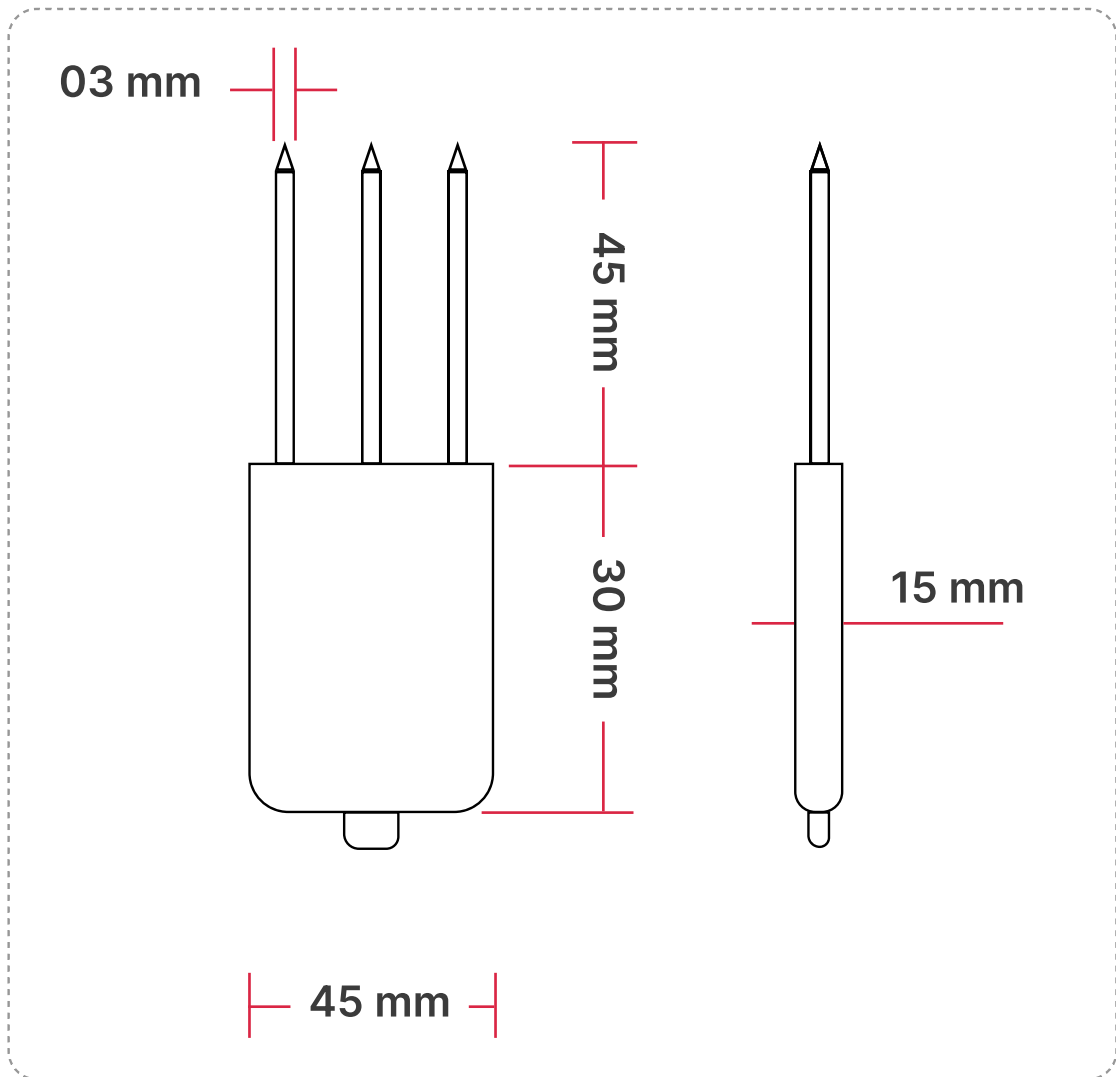
## Notes

- Power-operated variants require external DC power input & external sensor probe
- (\*) Marked accessories must be purchased separately

## Device Dimensions



## Device Dimensions






Sensor Probe

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के अवसर के लिए धन्यवाद भवतः सेवायाः अवसरस्य कृते धन्यवादः तमारी सेवा करवानी

## Say Hello 🙌

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