



WS 100 WEATHER STATION



ELITE SCIENTIFIC INSTRUMENTS SDN BHD (Co.No.589388-H)

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What you should know about WS 100

WS 100 weather station is designed for remote deployment for local weather condition monitoring. They help to plan, control and manage complex meteorologically dependent processes. They are also designed for many different tasks in different climate zones. This weather station has state-of-the-art wireless connectivity options such as Long Range radio which is usually known as LoRa, Wireless Fidelity also known as WiFi and also Bluetooth BLE. This weather station is powered by low power Solar PV system and can be installed several kilometres away from the control center with the help of LoRa radio technology. Among the weather parameters that can be measured are outdoor temperature (Celcius) and humidity (%RH), air pressure (Pa), wind speed (kmh),

wind direction (degree), precipitation of rain (mm), indoor temperature (Celcius) and also indoor humidity (%RH).



WS 100 weather station transfers measuring data wireless to a safe internet database. This is a perfect platform for data storage and processing. The user gets password-secured access from any internet access point all over the world. WS 100 station is an autonomous and self-powered weather station. Many types of sensors can be used by connecting and combining them to the weather station. The plug and play operation even allows an easy subsequent extension of the station with further sensors connected to it.

Fields of Operation

- ✧ Monitoring, control of temperature and humidity in storage rooms
- ✧ Monitoring, documentation and control of light conditions in greenhouses
- ✧ Measurement and documentation of microclimate data
- ✧ Irrigation control and management
- ✧ Crop protection, plant diseases forecasts
- ✧ Temperature monitoring and control in greenhouses



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WS 100 Sensors Overview

Temperature and Humidity



Temperature range:	-40 to 100°C
Temperature accuracy:	5 to 60°C ±0.4°C(typ), -40 to 100°C ±1.2°C
Temperature resolution:	0.01°C
Humidity range:	5 to 95%RH
Humidity accuracy:	20 to 80%RH ±3% (typ), 5 to 95%RH ±5% (max)
Humidity resolution:	0.04%RH
Number of fins:	10
Material:	ABS

Barometer



Pressure range:	30000 to 110000Pa (300 to 1100 hPa)
Pressure accuracy:	-4 to +2 hPa
Pressure resolution:	0.01hPa
Operating Temperature:	0 to +65°C

Wind Speed



Wind speed range:	0 to 108 Km/h
Wind speed accuracy:	±5%
Wind speed resolution:	0.288 Km/h
Number of wind cup:	3 f.
Color:	Black
Cup material:	Aluminium
Dimension:	200 x 128 (mm)

Wind Direction



Wind direction range:	0 to 360°
Wind direction resolution:	22.5°
Number of position:	16
Output signal:	Analog
Color:	Black
Material:	Aluminium
Dimension:	230 x 155 (mm)

Rain Gauge



Bucket inner diameter:	159.6mm
Detection Range:	0 to 4mm/min
Accuracy:	±0.4mm(≤10mm), ±4%(≥10mm)
Resolution:	0.2mm
Operating temperature:	0 to 60°C
Material:	ABS plastic

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Weather controller



Connectivity option1:	LoRa
Operating frequency:	919 to 925 MHz (programmable)
Frequency resolution:	0.1 (MHz)
Frequency modulation:	FSK,GFSK,MSK,GMSK,LoraTM and OOK
Link budget:	168dB (max)
Receiver sensitivity:	-148dBm(min)
Peak transmit power:	+20dBm (programmable)
Data throughput:	300kbps (max)
Connectivity option2:	WiFi b/g/n/d/e/i/k/r
Operating frequency:	2400 to 2483.5 MHz (Auto channel)
WiFi security:	WPA/WPA2/WPA2-Enterprise/WPS
WiFi encryption:	AES/RSA/ECC/SHA
Network protocol:	IPV4, SSL, TCP/UDP/HTTP/FTP/MQTT
Peak transmit power:	+15dbm
Data throughput:	Up to 150Mbps
Connectivity option3:	Bluetooth v4.2 BR/EDR & BLE (Configuration Mode only)
BT Radio receiver:	NZIF receiver, -98dBm sensitivity
BT Radio transmitter:	Class-1, class-2 and class-3 transmitter
Main antenna:	8-dBi, omni-directional
Antenna type:	Glass, outdoor
Antenna SWR:	≤ 2.0
Processor:	32-bit, 80MHz, Ultra low power
Memory:	SD card slot (up to 8GB) for datalogging
Power consumption:	7.2 mW sleep, 180mW wakeup
Data sending interval:	10 min (default), programmable
Data Send retry:	Programmable
Power supply:	3.6V (3x nimH rechargeable batteries)
Battery life:	2 days without charge
Charging characteristic:	9V input from PV, 4 hours to full charge
User interface:	ON/OFF button, charge&status LED, OLED 0.96" display, Bluetooth button
IP rating:	IP65
Dimension:	ABS, 173 x 51 x 210 (mm)

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WS 100 Sensors Overview

Solar Panel



<i>PV type:</i>	<i>Polycrystalline, glass laminated</i>
<i>Voltage rating:</i>	<i>9V</i>
<i>Power rating:</i>	<i>3W</i>
<i>Peak current:</i>	<i>0.33A</i>
<i>Dimension:</i>	<i>255 x 145 x 17 (mm)</i>

Light Intensity Sensor



<i>Lux range:</i>	<i>0 to 167000 lux</i>
<i>Lux resolution:</i>	<i>0.005 lux</i>
<i>Wavelength range:</i>	<i>400 to 700 (nm)</i>
<i>Response time:</i>	<i><1μs (2m cable terminated into 604 ohm load)</i>
<i>Cosine correction:</i>	<i>Cosine corrected up to 82° angle of incidence</i>
<i>Size:</i>	<i>2.36cm diameter x 3.63cm</i>

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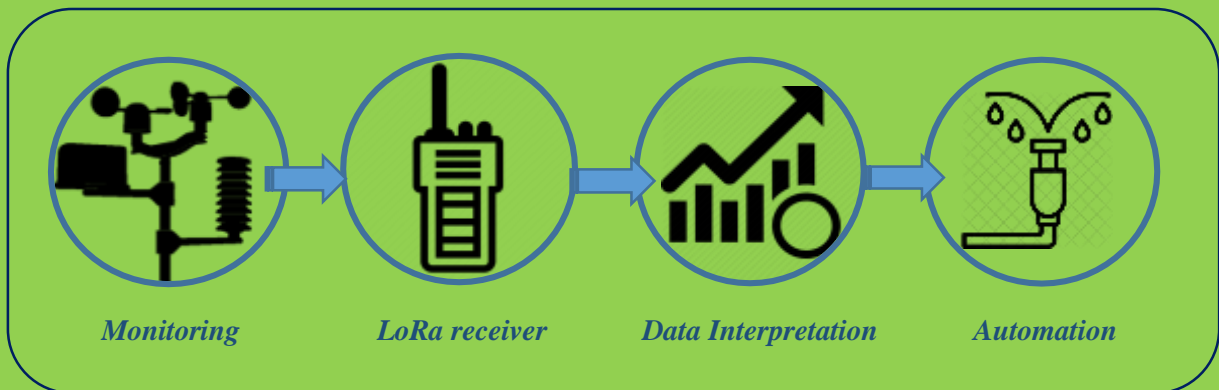
LoRa Receiver



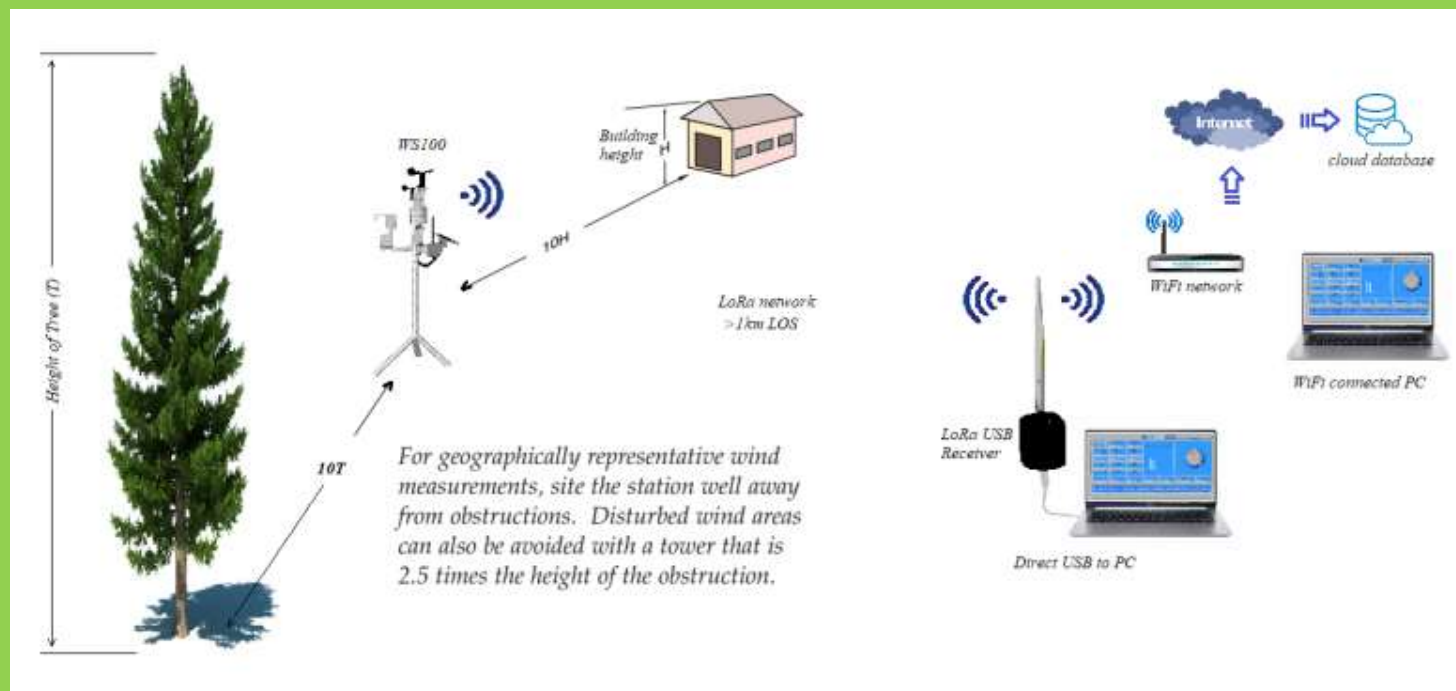
Long range radio technology which is also known as LoRa is a walkie talkie that offers a wide range of transmission and reception. Trees, buildings, hills and other obstructions all can significantly hamper range. In suburban and urban locations, it is common for range to be reduced to a mile or less. If you can actually get three miles in settings like these, you should be impressed. With the help of LoRa radio technology, sensors are able to be installed kilometres away from the control centre which is definitely more convenient for customers.

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How does it work?



All measured values can be combined with accurate microclimatic weather forecast, which is calibrated and localized on the monitoring site. Every results are be able to be accessed through the WS 100 software, which is a free software tool bundled with WS 100 weather station with no time limit and unlimited user. WS 100 software is designed for Windows7 onwards and it also capable to continuously log the transmitted data from respective weather stations.



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Sensor Options

Rain gauge



Temperature and Humidity



Light Intensity Sensor



Quantum Sun Radiation Sensor



Wind Speed & Direction



Leaf Wetness Sensor



Soil Moisture Sensor (DECAGON-5TE)



Applications

- ✓ Irrigation and fertigation management
- ✓ Irrigation in open areas
- ✓ Soil-less crops
- ✓ Gardening and residential landscape management
- ✓ Forest applications
- ✓ Flood wave monitoring and warning
- ✓ Eco-physiological studies

Advantages

- ✓ WS 100 station can be installed easily
- ✓ Full instruction and training will be provided to ease customers
- ✓ Brackets and hardware are included for mounting up the components
- ✓ Routine daily maintenance chores are done automatically (e.g. emptying rain gauge)
- ✓ Weather readings can be tracked from indoors at a glance, at any time

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WS 100 Configuration



WS 100 Weather Station

Below WS 100 weather stations are already pre-configured.

Art. No.	Description (s)
0100	WS 100 basic unit : stainless steel housing, solar panel with accumulator, weather controller with radio antenna, without sensors
0101	WS 101 : stainless steel housing, solar panel with accumulator, weather controller with radio antenna, temperature and humidity, rain gauge, light intensity sensor
0102	WS 102 : stainless steel housing, solar panel with accumulator, weather controller with radio antenna, wind speed and wind direction, temperature and humidity, rain gauge, light intensity sensor
0103	WS 103 : stainless steel housing, solar panel with accumulator, weather controller with radio antenna, temperature and humidity, rain gauge, soil moisture sensor, light intensity sensor
0104	WS 104 : stainless steel housing, solar panel with accumulator, weather controller with radio antenna, without sensors, barometer, rain gauge, light intensity sensor, temperature and humidity, wind speed and direction, soil moisture sensor

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WS 100 Software



With PC data logging tool software, you can configure weather station or download the weather data 24/7 via USB direct or over WiFi network.

The software tool supports multiple weather station on single LoRa receiver, store and display weather data in realtime manner.

PC Datalog :

No.	Date&Time	Station ID	Outdoor Temp(°C)	Outdoor Humid(%RH)	Windspeed(Kmh)	Wind Direction	Light Intensity(lux)	Sun Radiation(μmol)	Air Pressure(hPa)	CO2(ppm)
1	30-05-2019@22:20:23	WS001	25.68	42.62	3.02	N	45	0	1008	0
2	30-05-2019@22:27:39	WS001	25.58	61.76	3.15	N	43	0	1008	0
3	30-05-2019@22:37:27	WS001	25.87	58.81	3.28	N	47	0	1007	0
4	30-05-2019@22:47:39	WS001	25.62	47.06	2.9	N	42	0	1007	0
5	30-05-2019@22:52:44	WS001	25.31	46.79	2.77	N	46	0	1008	0
6	30-05-2019@23:02:28	WS001	24.85	47.81	3.28	N	44	0	1008	0
7	30-05-2019@23:12:27	WS001	24.79	60.73	3.46	N	47	0	1008	0

Rainfall(mm)	Rain Rate(mm/min)	Leaf Wetness	Soil Temp(°C)	Soil EC(dS/m)	Soil Moisture(%VWC)	Station Battery(%)	Indoor Temp(°C)	Indoor Humid(%RH)	Station RSSI(dBm)
0	0	Dry	0	0	0	3.34	25.58	42.93	-47
0	0	Dry	0	0	0	3.34	27.45	56.26	-47
0	0	Dry	0	0	0	3.34	27.53	50.89	-38
0	0	Dry	0	0	0	3.34	26.33	45.51	-41
0	0	Dry	0	0	0	3.65	26.04	45.14	-48
0	0	Dry	0	0	0	3.65	25.96	45.57	-48
0	0	Dry	0	0	0	3.65	26.98	54.26	-49

Weather data are logged in CSV format and separated into daily filename for easier post data analysis.

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SD Datalog :

Date&Time	Station ID	Outdoor_Temp(C)	Outdoor_Humid(%RH)	Wind_Speed(Kmh)	Wind_Direction	Light_Intensity(lux)	Sun_Radiation(umol)
30-05-2019@22:27:19	WS001	25.58	61.76	3.15	NNW	43	0
30-05-2019@22:37:07	WS001	25.87	58.81	3.28	NNW	47	0
30-05-2019@22:47:07	WS001	25.62	47.06	2.9	NNW	42	0
30-05-2019@22:52:24	WS001	25.31	46.79	2.77	NNW	46	0
30-05-2019@23:02:07	WS001	24.85	47.81	3.28	NNW	44	0
30-05-2019@23:12:07	WS001	24.79	60.73	3.46	NNW	47	0
30-05-2019@23:22:07	WS001	25.25	66.49	3.21	NNW	42	0

Air_Pressure(hPa)	CO2(ppm)	Rainfall(mm)	Rain_Rate(mm/min)	Leaf_Wetness	Soil_Temp(C)	Soil_EC(dS/m)	Soil_Moist(%VWC)	Station_Batt(%)
1008	0	0	0	Dry	0	0	0	3.34
1007	0	0	0	Dry	0	0	0	3.34
1007	0	0	0	Dry	0	0	0	3.34
1008	0	0	0	Dry	0	0	0	3.65
1008	0	0	0	Dry	0	0	0	3.65
1008	0	0	0	Dry	0	0	0	3.65
1008	0	0	0	Dry	0	0	0	3.65

SD card datalog are in similar CSV format, also separated into daily filename for easier post data comparison and analysis.

CONTACT INFORMATION:

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