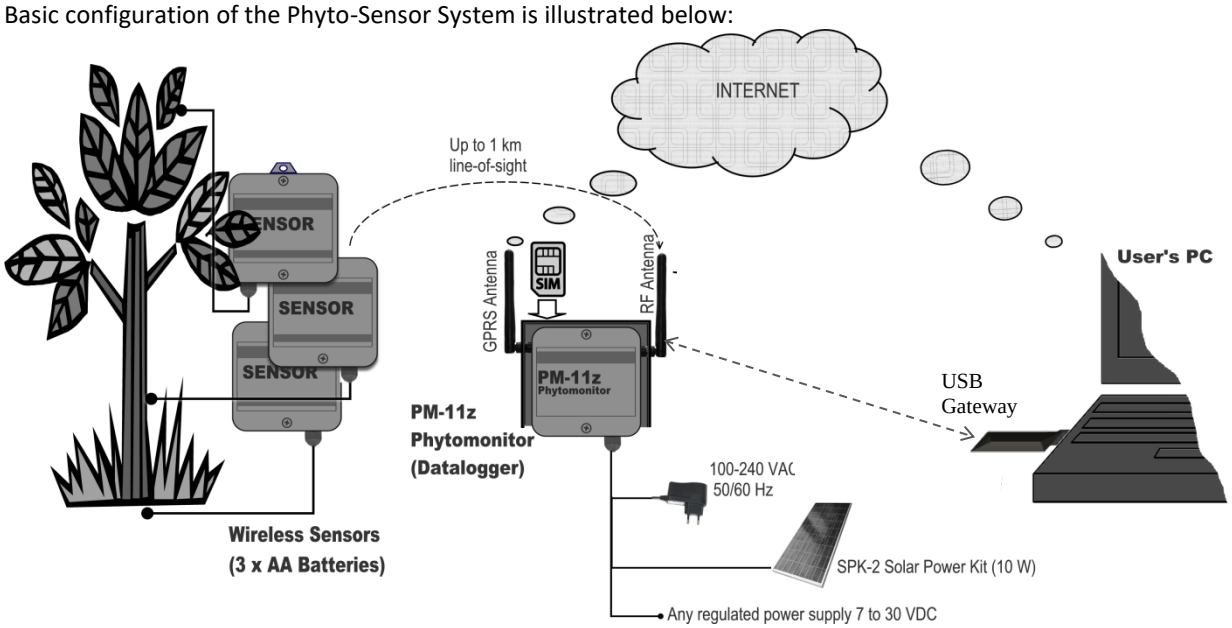
PHYTO-SENSOR™ GROUP
WWW.PHYTO-SENSOR.COM

PM-11z
Phyto-Sensor System™
Quick Start Guide

(Version 2019-DC)

ABOUT THE PHYTO-SENSOR SYSTEM

Basic configuration of the Phyto-Sensor System is illustrated below:



The System hardware includes a variety of wireless sensors for plant and environment, the data logging PM-11z Phytomonitor, USB Gateway, and several optional communication and powering accessories.

IMPORTANT NOTE: Communication distance between a sensor and the PM11-11z depends on the environment. It may be up to 1 km at free line-of-sight. In dense foliage, the distance may be reduced to 10-15 m.

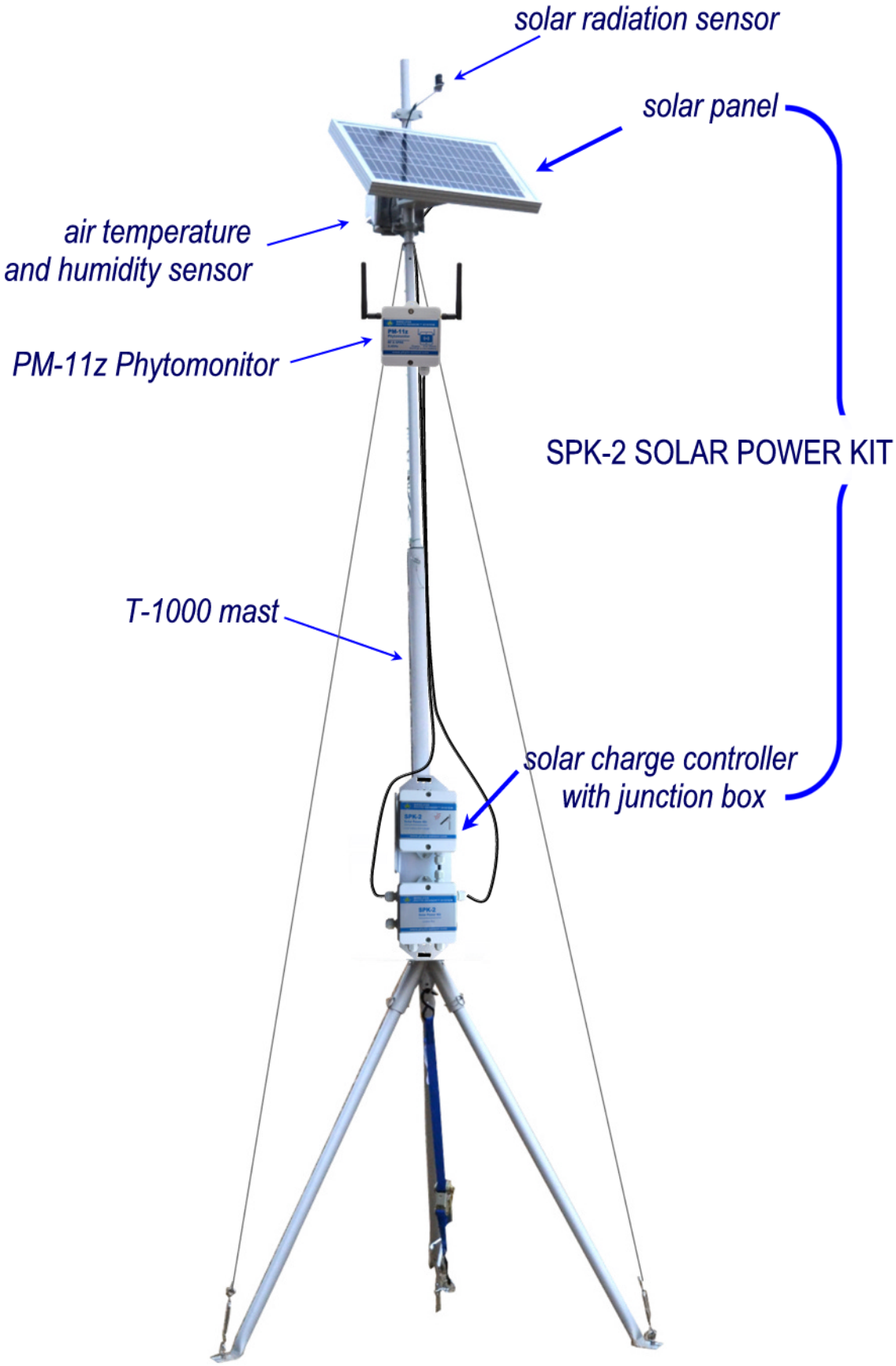
FIRST START

Congratulations! You have the up-to-date wireless battery operated Phyto-Sensor™ system that includes the PM-11z Phytomonitor, USB Gateway, Software CD, and the following optional parts: SPK-2 Solar Power Kit, T-1000 Tripod, Router, and a customized set of wireless Phyto Sensors. To put all these parts into operation, you need also a PC (or notebook), the software CD, which usually comes with the system, a hummer, a step-ladder, a cross-head screwdriver, and a couple of 10-mm wrenches.

It is recommended to do the first start on site keeping the sensors near the tripod.

Please follow the recommended procedure:

1. **Tripod .**
   a. At first, please look over the Tripod Model T-1000 Data Bulletin, which is enclosed in the package. Please identify parts of the Tripod (Cat.No. 88007) and the Tiedown Kit (Cat.No. 88008).
   b. Choose place for installation, locate the center, and screw the Anchor Screw into the soil.


solar radiation sensor
solar panel
air temperature
and humidity sensor
PM-11z Phytomonitor
SPK-2 SOLAR POWER KIT
T-1000 mast
solar charge controller
with junction box

c. Assemble the Tripod, extend the mast to the desired height, and fix by a retainer pin.

d. Anchor the tripod's legs to the ground using three anchors.

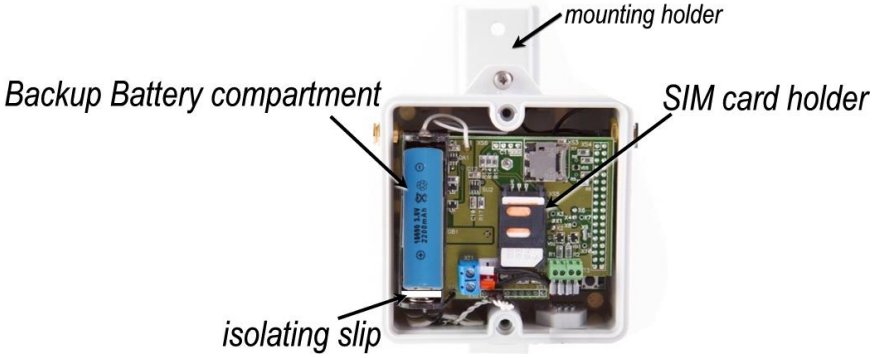
e. Fasten the Tiedown Kit.

f. Install and fasten three guy wires.

In case of using your own support instead of the T-1000 tripod, please try to allocate all parts similarly.

2. PM-11z Phytomonitor

a. Open the front lid of the PM-11z



b. Insert a local SIM card.

c. Remove the isolating slip from the battery compartment.

d. Close the lid.

e. Attach antennas matching the color-coded bands.

f. Mount the PM-11z using the mounting plate located at the rear side of the PM-11z. For best communication range, mount the PM-11z at the upper part of the tripod.

g. Mount the GPRS antenna not less than 1 m distance from the PM-11z to avoid interference.

NOTE: When necessary, the PM-11z may be reset same way as described in par. 5c.

3. SPK-2 Solar Power Kit.

Please see the attachment

4. PC and USB Gateway

a. Insert installation CD into your CD drive and install the program.

b. Insert the USB Gateway's plug into any free USB port of your PC. The green LED located at the USB Gateway indicates that it is activated.

c. Locate the PM-11z Phytomonitor program icon on desktop, and click it to run the program.

d. Follow on-screen instructions during program setup. Please select USB connection type on the first screen.

e. In the <System View> window click <Settings> button. Set 1 min measurement period and 1 in the <Go online after every> box. Click OK.

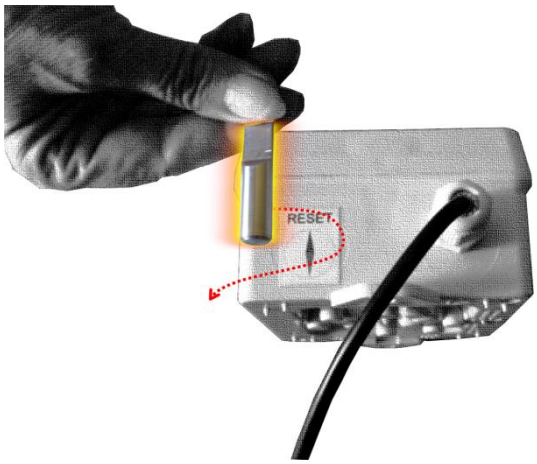
5. Sensors

a. Take a sensor, unscrew two screws and remove the lid. Please note that, at this stage, the sensor should be located close to the PM-11z Phytomonitor and your PC, i.e. within line-of-sight.

b. Remove the isolation slip from the battery compartment. This applies power to the sensor's electronics and starts activation procedure. The following light and beep indications represent progressive activation stages:

   i. Short light and beep – beginning of activation.
   ii. Searching network – continuous LED light and no beep. It may take about a minute.
   iii. The network is found – double LED blink and double beep. (If network was not found – continuous beep and LED blinking during 8-10 sec).
   iv. Representing index of communication quality – 1 to 6 beeps of higher tone. Six beeps correspond to excellent quality index. Three to five beeps – acceptable quality index. One or two – low index. If the quality index is low, the following measures are recommended: 1) to place a sensor closer to the PM-11z Phytomonitor; 2) to place a Router between the sensor and the PM-11z Phytomonitor. Important note: the higher the communication quality index, the lesser power is used during communication sessions, and the lifetime of batteries is longer.

c. You may repeat the activation process as many times as necessary by pressing a reset button. The stage 'iv' allows finding the best location and orientation of the sensor in terms of optimal communication quality. It is important to note that the next activation (i.e. reset) processes may be initiated with the lid closed. There is a magnet-operated switch inside the sensor's electronics. You may use the enclosed magnet stick to reset the sensor from outside as shown in the picture below.



d. When the sensor is activated, close and fix the lid by two screws.

e. Take next sensor and repeat steps 4a-4d.

f. When all sensors have been activated, open the PC program and check readings of all sensors in <Data View> window. The readings are updating every minute.

g. If the readings are reasonable, the startup procedure is completed. Now please go to <Settings> in the <System View> window, and set desired measurement period and communication interval. The recommended values are 30 min and 2 to 12, respectively.

h. Mount TIR-4z, PIR-1z, and ATH-3 sensors to the tripod using special holders. The ATH-3 sensor shall be located in shadow behind the Solar panel.

i. Now you may place sensors and other system parts where necessary. Please refer to a particular sensor's documentation to provide correct installation.

6. Router (optional)

The Router simply relays the signals between the PM-11 z and sensors. The Router may be used for two reasons: a) to extend the communication distance between sensors and the PM-11z. In that case, the Router shall be positioned somewhere between the PM-11z and a distant sensor (sensors), and b) to increase the total number of sensors in a single network above 15. The Router may be powered either from the Solar Power Kit or from any regulated power supply 7 to 30 Vdc.

NORMAL SHUTDOWN AND STORAGE

1. Sensors
    - Open a sensor's housing, and remove batteries from the battery compartment.
    - Close the lid and store the sensor and batteries separately in dry place.
2. PM-11z Phytomonitor
    - Open the Phytomonitor's housing, and remove the rechargeable battery.
    - Close the lid and store the Phytomonitor and its battery separately in fry place.
    - Disconnect the battery cable from the Solar charge controller.
    - Disassemble the Tripod.
3. SPK-2 Solar Power Kit
    - Open the lid of the upper box, disconnect and isolate the red cable of the battery.
4. USB Gateway
    - Disconnect the USB cable from a PC port. Keep the USB Gateway in dry place.
5. Batteries
    - Please check sensors' batteries with a tester after long-term operation and storage. Please use new standard AA Alkaline batteries when necessary.
    - The rechargeable battery has long lifetime comparable with the lifetime of the PM-11 Phytomonitor. Please contact your supplier for battery replacement if necessary.

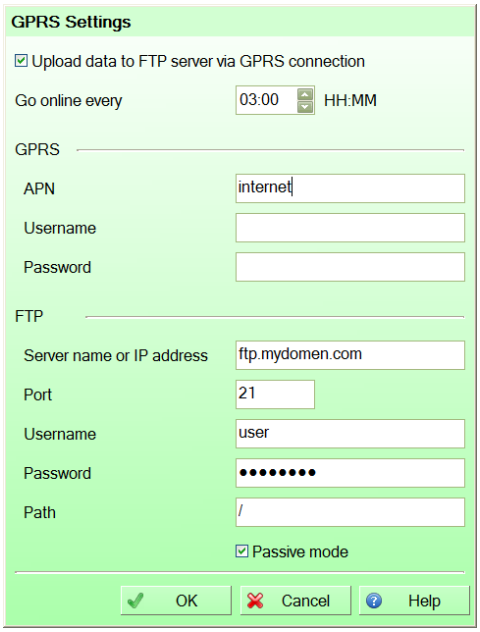
NEXT PUTTING INTO OPERATION

1. Please check batteries in insert them into appropriate battery compartment of each sensor.
2. Insert the rechargeable battery into the battery compartment of the PM-11z Phytomonitor.
3. Assemble Tripod and make all connections as described in the First start section.

ACTIVATION OF THE GPRS MODULE

Some PM-11z may come with the GPRS module to provide data transmission over Internet. The activation procedure is following:

- Make sure that the PM-11z is not powered on.
- Open PM-11z box
- Insert a local GPRS-enabled SIM card into the appropriate slot inside the PM-11z box.
- Power the PM-11z on. Establish communication via USB Gateway.
- Open the 'System view' window and click 'GPRS' button. Enter necessary information in empty fields:
    a. Check the 'Upload data…' box.
    b. Set the desired time interval for data transmission.
    c. The GPRS settings shall be acquired from a local GSM operator.
    d. The FTP settings shall be acquired from the appropriate provider. If you have no your own provider, please contact Bio Instruments S.R.L. at support@phyto-sensor.com for arranging data transfer via Bio's FTP server.



Customer Support

If you ever need assistance with your Phyto-Sensor™ System, or if you just have questions or feedback, please e-mail at support@phyto-sensor.com. Please include as part of your message your name, address, phone, and fax number along with a description of your problem.

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SPK-2 Solar Power Kit

The SPK-2 Solar Power Kit is designed for powering PM-11z Phytomonitor when the normal electric power is not available, in the open field, for instance.

Typical mounting of the SPK-2 Solar Power Kit is shown on Page 3.

The holder of the Solar panel shall be fixed on a mast by using four enclosed bolts. The panel must be oriented strictly to South (in Northern hemisphere).

The Solar Charge Controller with Junction Box shall be attached to the mast using a couple of enclosed cable ties.

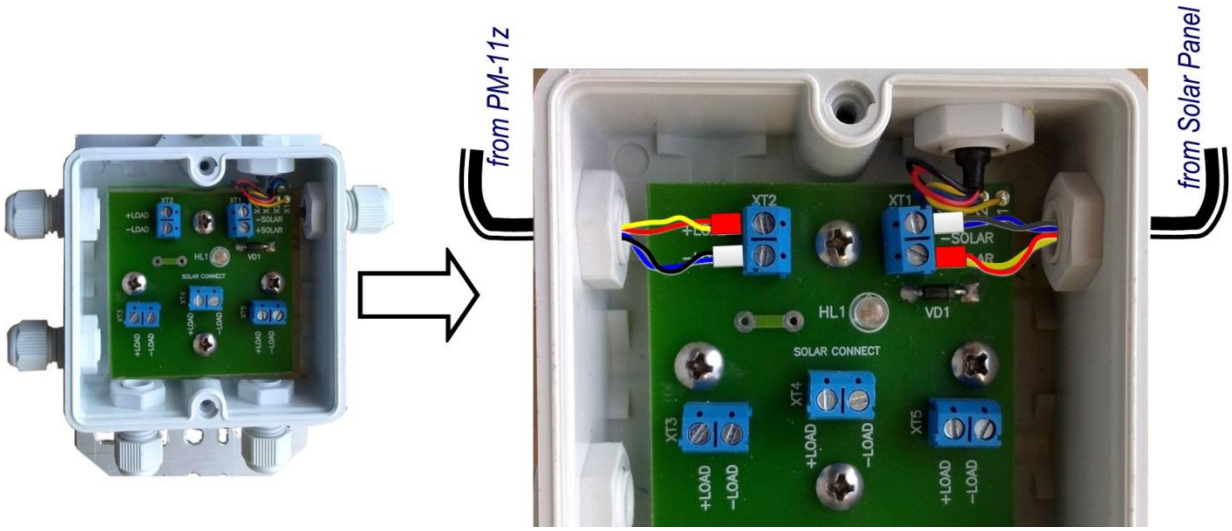
Connections

Precaution! All connections shall be made when the main power switch is in OFF position (see the photo below):

a. Remove the lid from the lower SPK-2 enclosure named as 'Junction box'.

b. Run the PM-11z Phytomonitor's cable through a left cable gland of the Junction Box (please note that this cable must be already connected to the PM-11z Phytomonitor), and connect the cable to the terminal block marked as "+LOAD","-LOAD" keeping correct polarity. Positive – Red end; Negative – White end.
NOTE: There are four terminal blocks for connecting external power loads. Some other devices may be powered form available terminals, a router, for instance.

c. Run the Solar Panel's cable through the right cable gland of the Junction Box, and connect the cable to the terminal block marked with "+SOLAR","-SOLAR" keeping correct polarity. Positive – Red end; Negative – White end. If a solar pane is exposed to the sun at this time, the HL1 LED shall be on.



d. Please prepare the PM-11z for operation: SD-card and SIM card must be inserted, and the internal battery must be activated.
e. Now you may switch the main power switch ON. The appropriate LED on the PM-11z's PCB shall be on.
f. Close and tighten the lids of the junction box SPK-2 and PM-11z.

Specifications

- Solar Panel Power Rate: 9V, 10 W
- Standard zenith angle: 45°
- Azimuth: 180° in Northern hemisphere, and 0° in Southern hemisphere
- Rechargeable battery capacity: 2.2 Ah 2xPack plus 0.9 Ah backup battery in PM-11z. Total: 3 Ah approx.
- Battery type: Li-ION 2.200 Ah 7.4V 2xPack plus Li-ION 0.9 Ah 3.7 V.
- Maximal depth of discharge: 0 %
- Cables length: 3 m typical