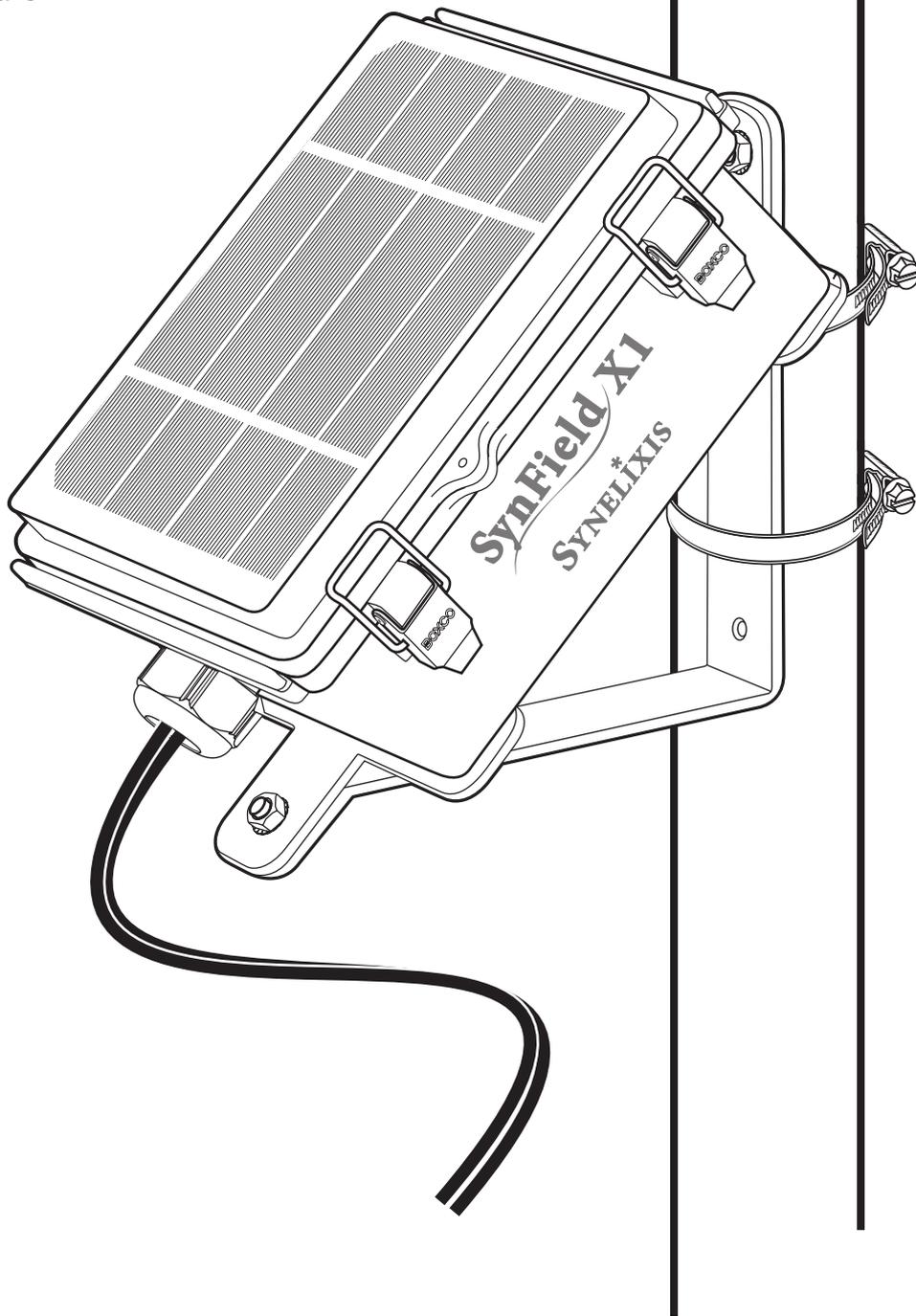


SynField X1

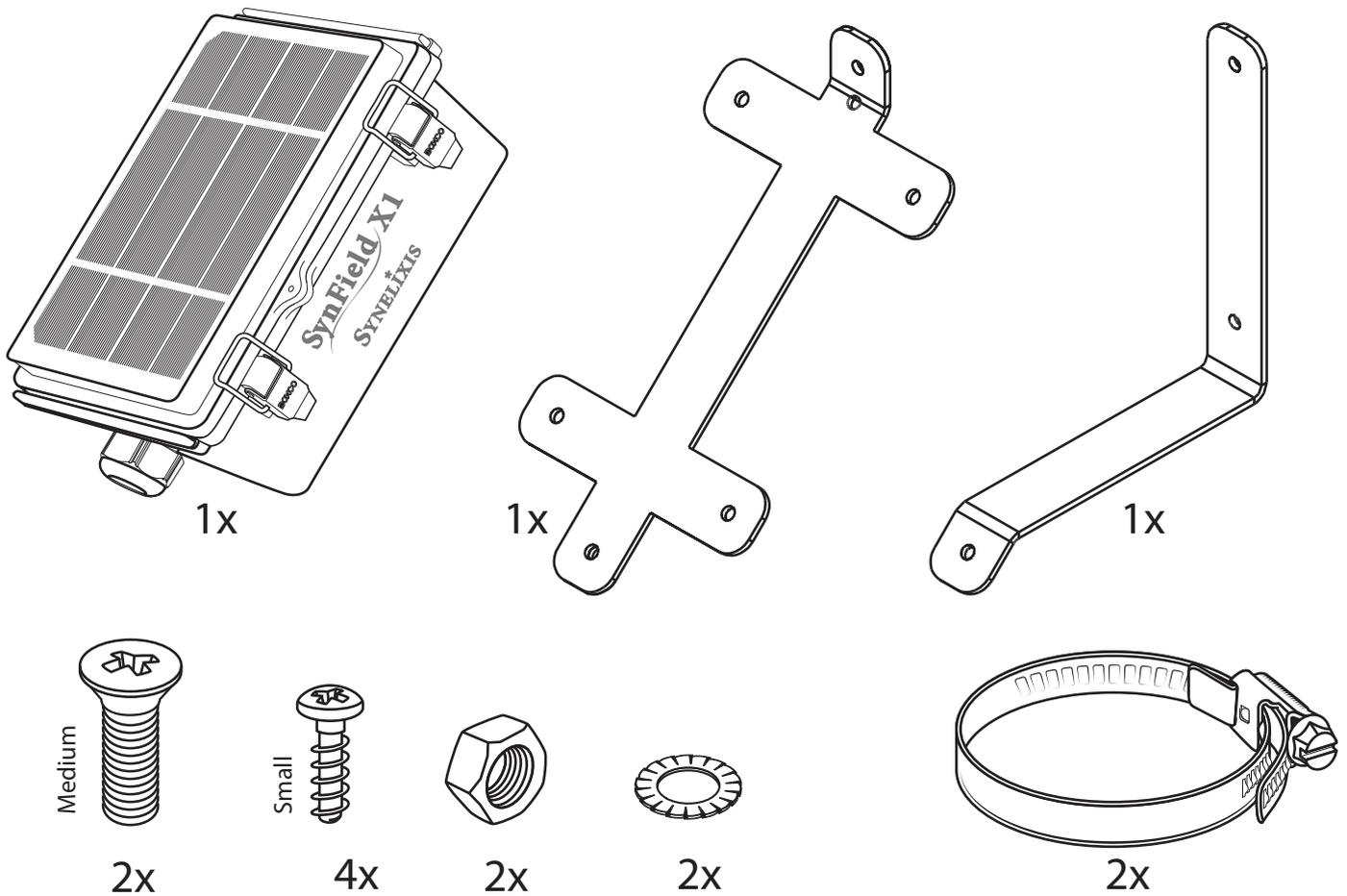
Installation Guide



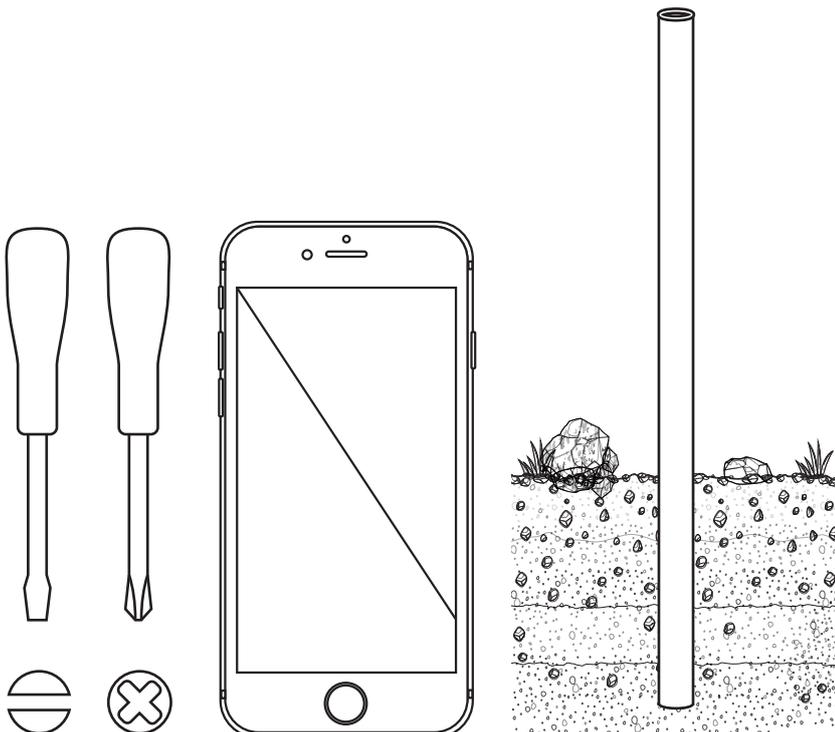
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Package content



Tools/equipment needed



Vertically installed rod on the field

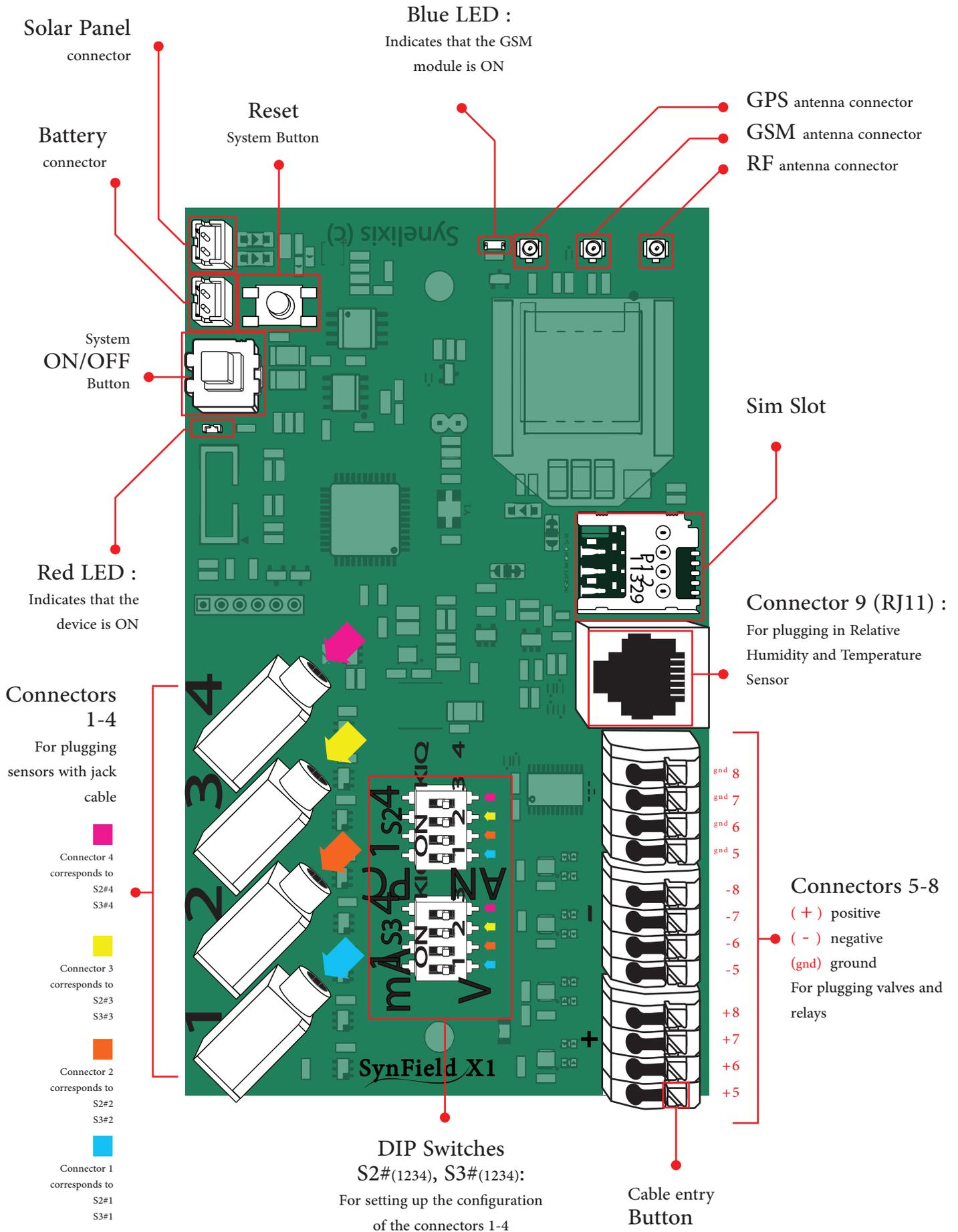
Height of the rod: about 2m above ground

Diameter of the rod: about 1-2 inches

Location of the rod:

- away from anything that would prevent the sunlight falling on SynField X1 (e.g. tall trees)
- maximum 30 meters away from the electrovalves or the relays to be connected with the node
- at the point where the connected soil sensors will be installed
- that has signal reception with strength higher than 3 (see Checking signal strength section)

Board Display



Checking signal strength

THE SYNFIELD CONTROL ANDROID APPLICATION IS AVAILABLE IN THE GOOGLE PLAY STORE:

<https://play.google.com/store/apps/details?id=com.synelixis.SynControl>

The SynField Control application allows you to connect directly to your SynField X1 and then, you are able to manage the sensors, actuators, network settings and potential peripheral nodes.

STEP 1

After the installation of the application in your smartphone (or tablet), enable your Bluetooth interface in your smartphone (or tablet).

STEP 2

Launch the mobile application and press the CONNECT button while in parallel power on the SynField X1.

STEP 3

After some seconds, the mobile application will ask you to type the Bluetooth pair code if you connect to the SynField X1 for the first time through your smartphone or tablet. The default pair code is: 1234.

STEP 4

As soon as the connection is established, the CONNECT button changes to CONNECTED.

STEP 5

In case that you obtain more than one SynField nodes, press the BLINK SYNFIELD button in the application. You must notice a blink in the RED led that SynField X1 node includes in the board.

STEP 6

In the CONTROL tab, it is recommended that the user presses the “CHECK SIGNAL STRENGTH” button, to verify adequate network coverage. Upon pressing the button, the device will try to establish a connection to the cellular network using the configured parameters. After connection establishment, the device reports the signal strength in accordance to the RSSI value. The signal strength is reported from a scale 1 to 10. In general a strength value equal or higher than 3 is adequate. If network coverage is poor, the user could try different locations and heights to select a more appropriate site for installing the device.

STEP 7

Press the RETURN button to go back in the main menu, especially in the CONTROL tab.

DO NOT FORGET TO PRESS THE FIRMWARE DISCONNECT BUTTON

So as to close the connection between the SynField X1 device and the mobile application and resume normal operation. Upon pressing the button, the LOG window appears that displays various firmware messages throughout the whole process (wake up, initialize, sensor reading, network connection and message exchange).

It is recommended that the user inspects the log messages for any warnings and errors (printed in orange and red respectively).

IF A WARNING AND/OR ERROR OCCURS

The user could FORWARD these messages to the SynField support team support@synfield.gr by pressing the relevant button on the bottom left. Please note that the “Device UNREGISTERED” error message is normal and means that the device is not yet registered in the portal. In this case, the user should register the new SynField X1 using the serial number shown in the MONITOR tab.

Bringing the cables/wires inside the SynField X1

1

Unscrew the cable nut.

2

Open the cap of SynField X1.

3

Push through the hole from the inside to the outside to get out the black base.

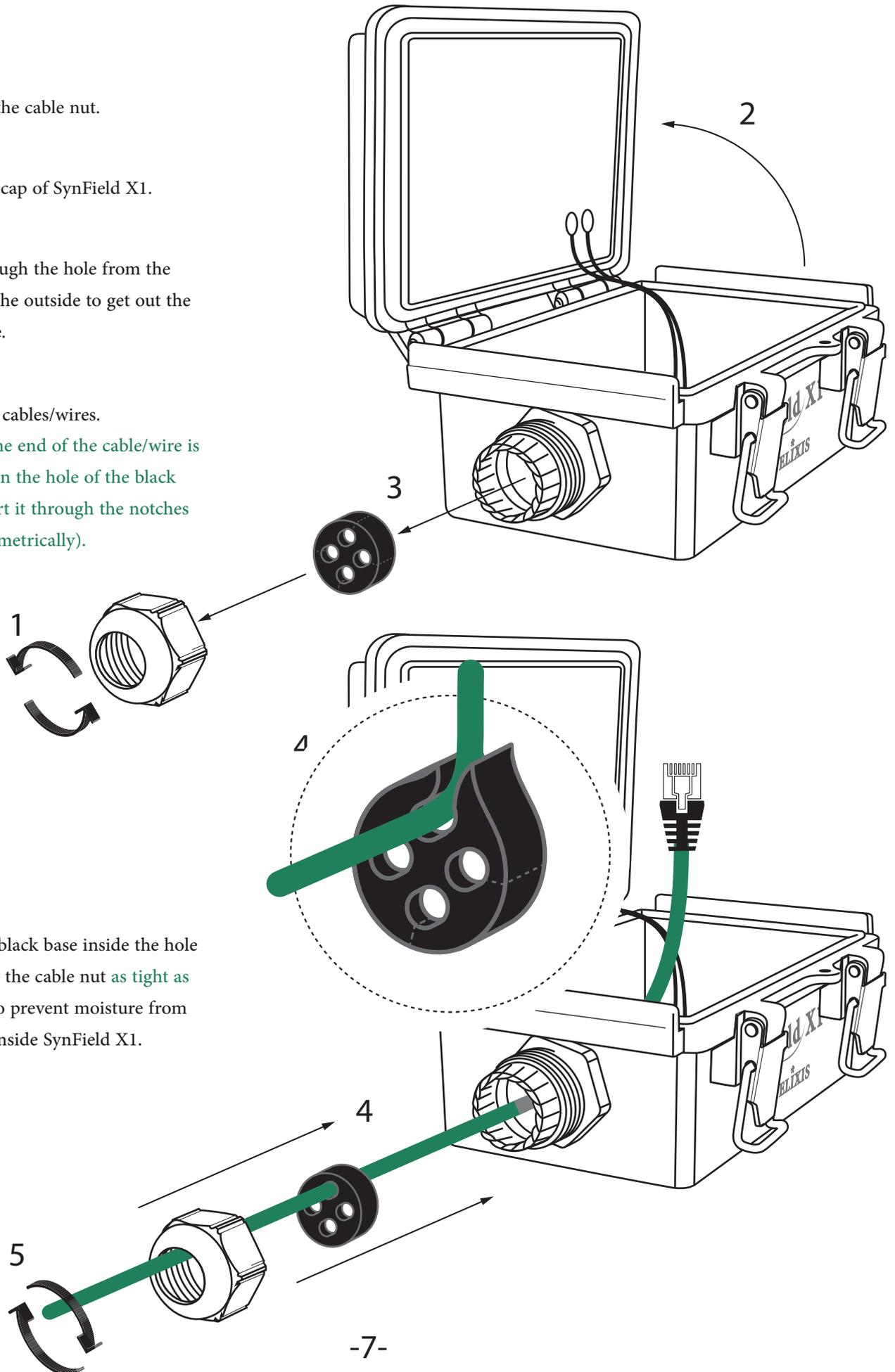
4

Insert the cables/wires.

(In case the end of the cable/wire is bigger than the hole of the black base, insert it through the notches lying perimetrically).

5

Place the black base inside the hole and screw the cable nut as tight as possible to prevent moisture from entering inside SynField X1.

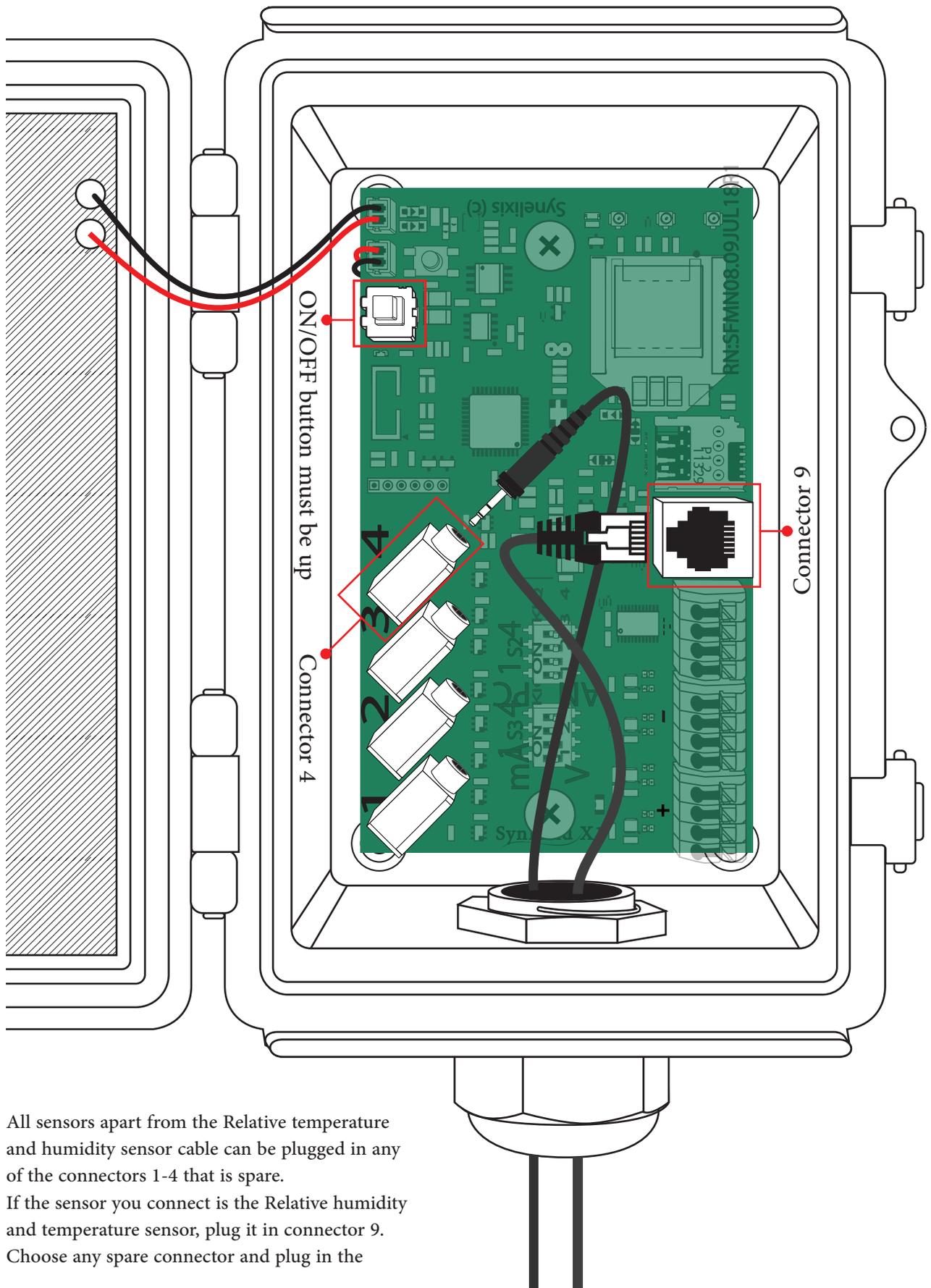


Connecting the Sensors

Plugging in the cables/wires



The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.



All sensors apart from the Relative temperature and humidity sensor cable can be plugged in any of the connectors 1-4 that is spare.
If the sensor you connect is the Relative humidity and temperature sensor, plug it in connector 9.
Choose any spare connector and plug in the

Connecting the Sensors

Identifying the sensor type



The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.

(This step does not apply for Relative humidity and temperature sensor)

Identify the type of the plugged-in sensor. A sensor can be either “Pulse counter”, “Unidirectional Serial”, “Analog (4-20 mA)” or “Analog (“Voltage)”. Look up the type of exact model of the sensor you have plugged in the table below or on the webpage www.synfield.gr/features/.

MODEL	MANUFACTURER	SENSOR TYPE
ECH2O 5TM	Decagon	Unidirectional Serial
Flow Meter (1 inch)	Sea	Pulse counter
Flow meter (USN - HS10TA, 1 inch)	Ultisolar	Pulse counter
Leaf Wetness (3.3V)	General	Analog (Voltage)
Leaf Wetness (5V)	General	Analog (Voltage)
Leaf Wetness (6420)	Davis	Analog (Voltage)
Leaf Wetness (LWS)	Decagon	Analog (Voltage)
Paddle wheel flow sensor (PW - 101)	OEM	Pulse counter
Photosynthetic Light (PAR) Sensor (SQ - 100 series)	Apogee	Analog (Voltage)
Pressure sensor (ABP/SSC series)	Honeywell	Analog (Voltage)
Rain Meter (7852 - EUR/US)	Davis	Pulse counter
Relative Humidity/Temp. (SHT1x)	Sensirion	I2C
Soil EC/VWC/Temp (5TE)	Decagon	Unidirectional Serial
Soil moisture (resistive)	General	Analog (Voltage)
Soil moisture/VWC (10HS)	Decagon	Analog (Voltage)
Soil moisture/VWC (EC5)	Decagon	Analog (Voltage)
Soil water potential (Watermark)	Irrrometer	Analog (Voltage)
Solar pyranometer	Davis	Analog (Voltage)
Temperature (LM35)	Texas Instruments	Analog (Voltage)
Temperature (RT1)	Decagon	Analog (Voltage)
Voltage meter	General	Analog (Voltage)
Water pressure sensor (ABP 10mH2O)	Honeywell	Analog (Voltage)
Wind Direction (6410)	Davis	Analog (Voltage)
Wind meter (6410)	Davis	Pulse counter

Connecting the Sensors

DIP switches setting

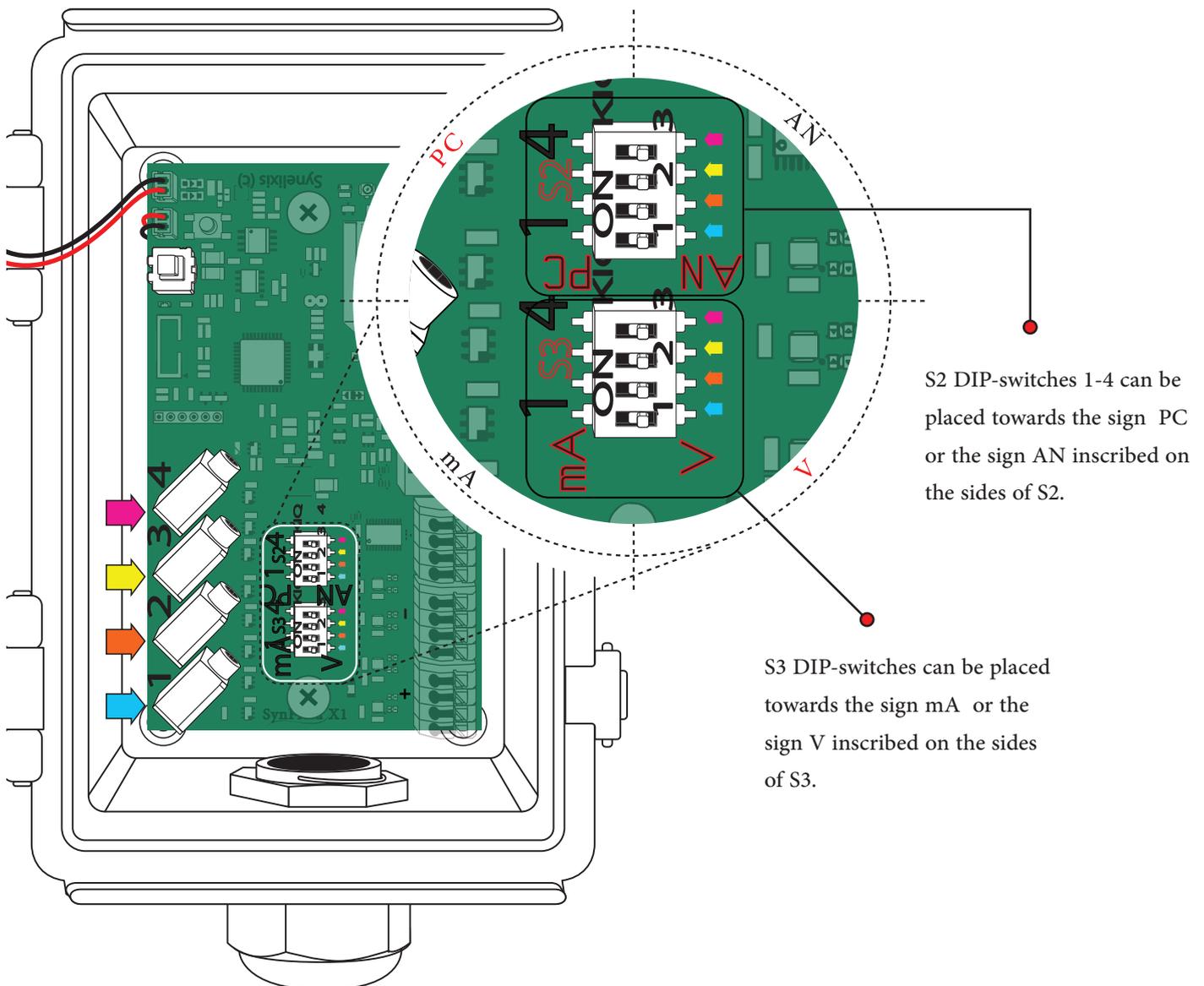


The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.

(This step does not apply for Relative humidity and temperature sensor)

After you have plugged in the sensor to a connector and you have identified sensor type, you have to setup both the corresponding S2 and S3 DIP switches according to the sensor type. The table below shows the correct S2 and S3 setup for each sensor type.

SENSOR TYPE	S 2	S 3
Pulse counter	PC	V
Unidirectional Serial	PC	V
Analog (Voltage)	AN	V
Analog (4-20mA)	AN	m A



Go through the two following pages. For illustration purposes two examples are provided with two different sensor types: Analog Voltage (Example 1) and Pulse counter (Example 2).

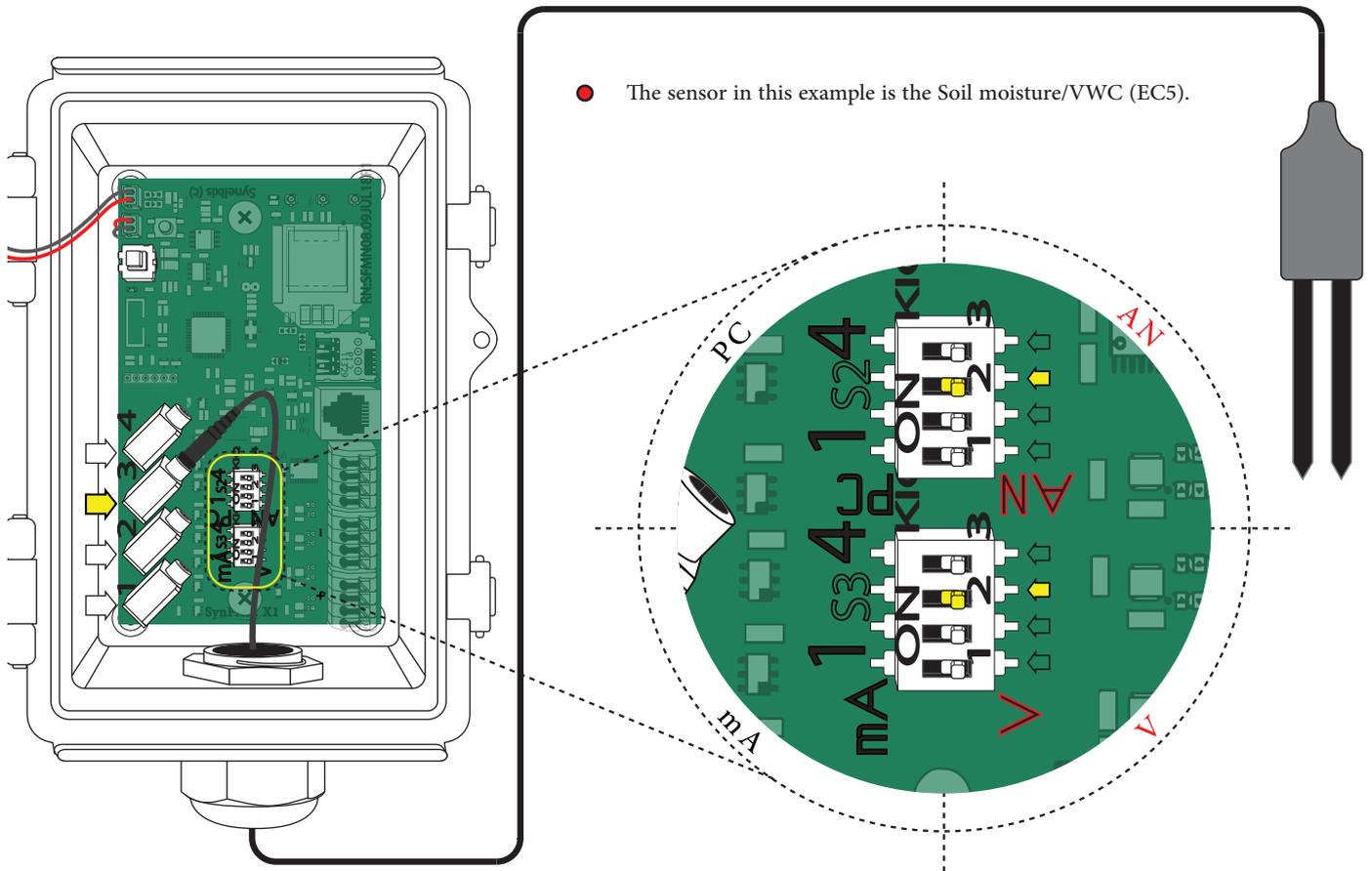
Connecting the Sensors

Example 1

Connecting Soil Moisture EC5



The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.



● The sensor in this example is the Soil moisture/VWC (EC5).

● According to the table in pg. 9 this sensor is an Analog Voltage sensor. Below you see again a part of this table and the row with this sensor marked.

MODEL	MANUFACTURER	SENSOR TYPE
Soil moisture/VWC (10HS)	Decagon	Analog (Voltage)
Soil moisture/VWC (EC5)	Decagon	Analog (Voltage)
Soil water potential (Watermark)	Irrrometer	Analog (Voltage)

● According to the table in pg. 10 an Analog(Voltage) sensor must have the corresponding S2 DIP switch turned to AN and the corresponding S3 DIP-switch turned to V. Below you see again this table and the row with this type marked.

SENSOR TYPE	S 2	S 3
Pulse counter	PC	V
Unidirectional Serial	PC	V
Analog (Voltage)	AN	V
Analog (4-20mA)	AN	m A

● In this example the chosen connector is connector 3. Notice in the magnified part of the picture that the DIP-Switch #3 from S2 is turned to AN and DIP-switch #3 from S3 is turned to V.

Connecting the Sensors

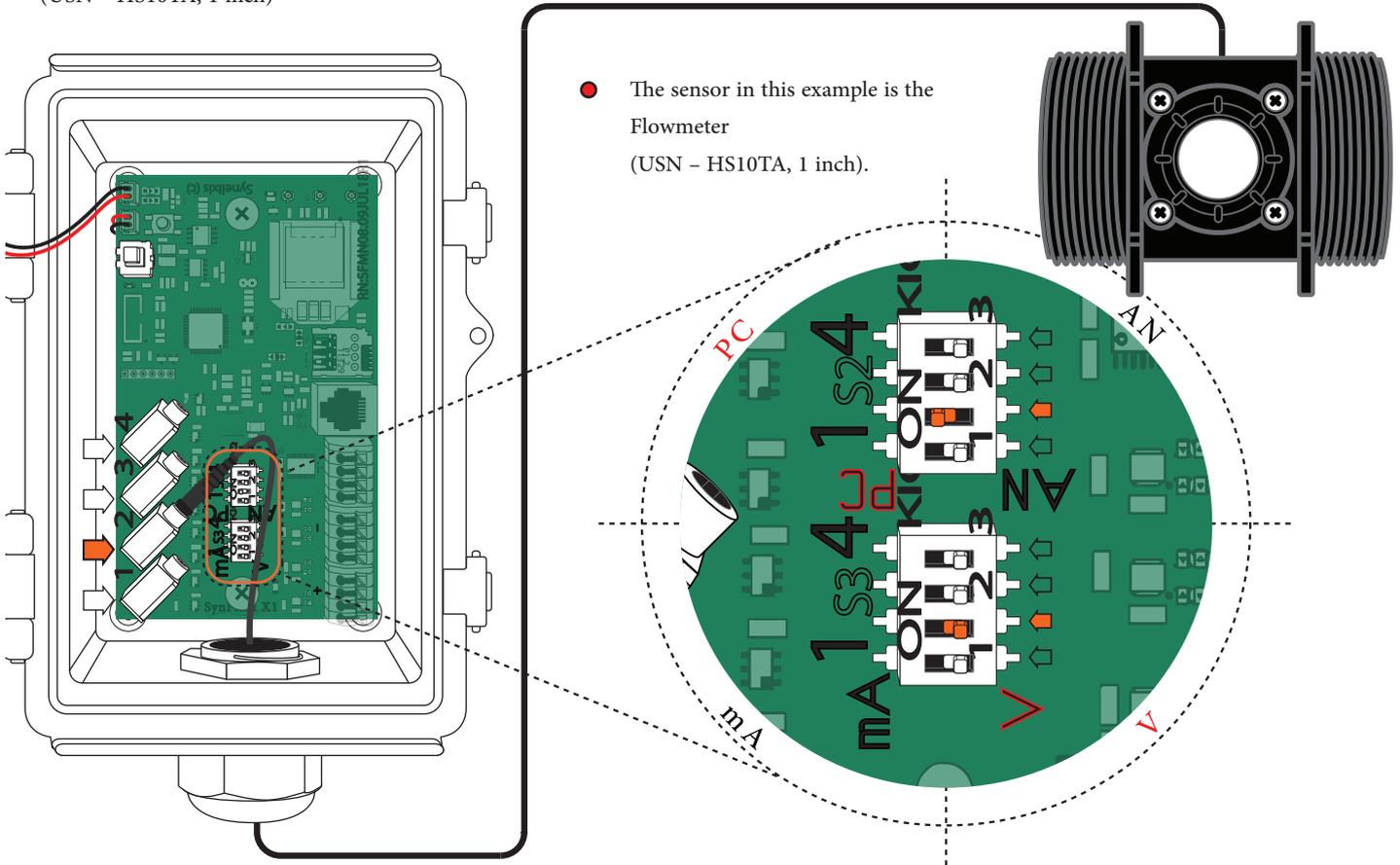
Example 2

Connecting Flowmeter

(USN - HS10TA, 1 inch)



The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.



- The sensor in this example is the Flowmeter (USN - HS10TA, 1 inch).

- According to the table in pg. 9 this sensor is Pulse counter sensor. Below you see again a part of this table and the row with this sensor marked.

MODEL	MANUFACTURER	SENSOR TYPE
ECH2O 5TM	Decagon	Unidirectional Serial
Flow Meter (1 inch)	Sea	Pulse counter
Flow meter (USN - HS10TA, 1 inch)	Ultisolar	Pulse counter

- According to the table in pg. 10 a Pulse counter sensor must have the corresponding S2 DIP switch turned to PC and the corresponding S3 DIP-switch turned to V. Below you see again this table and the row with this type marked.

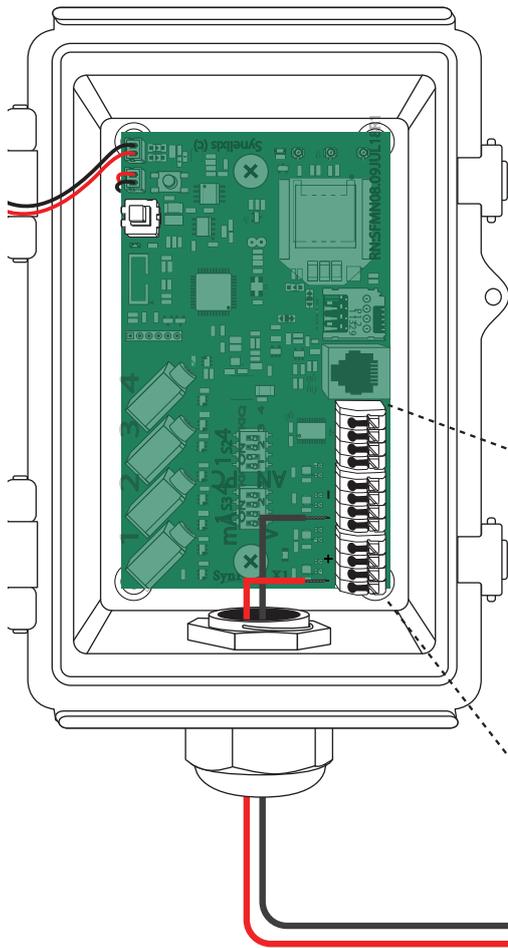
SENSOR TYPE	S 2	S 3
Pulse counter	PC	V
Unidirectional Serial	PC	V
Analog (Voltage)	AN	V
Analog (4-20mA)	AN	mA

- In this example the chosen connector is Connector 2. Notice in the magnified part of the picture that the DIP-Switch #2 from S2 is turned to PC and DIP-switch #2 from S3 is turned to V.

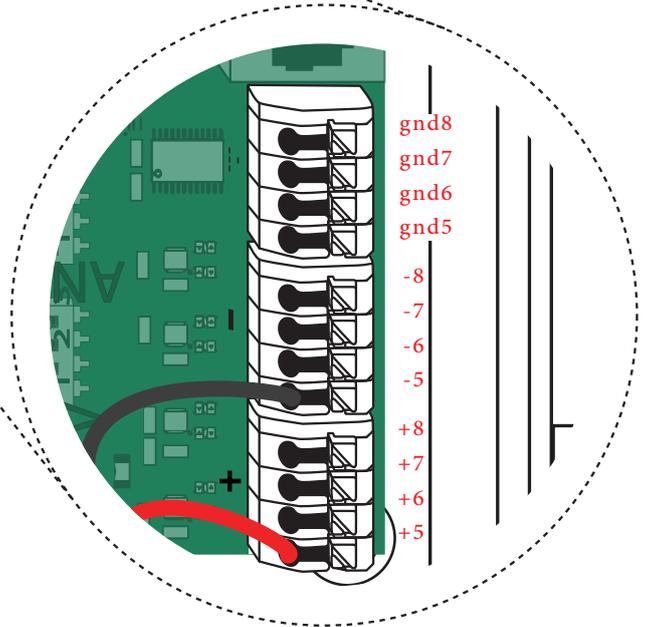
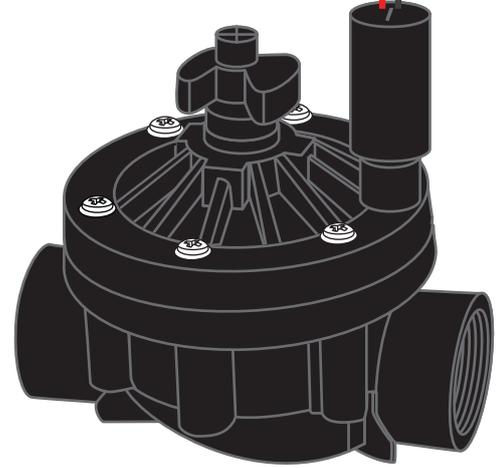
Connecting the Electrovalves



The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.



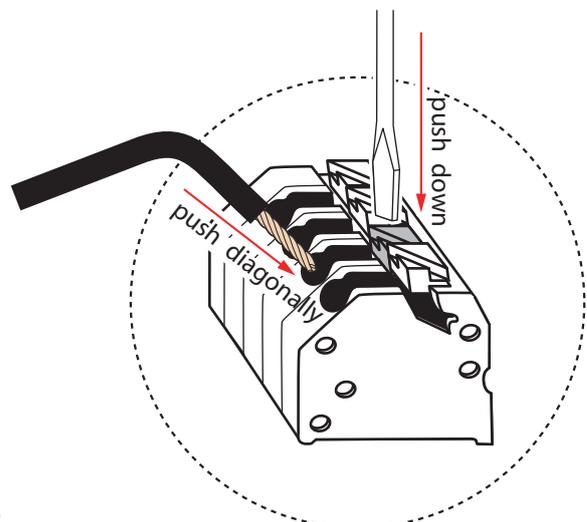
- First, choose any of the connectors 5-8 that is spare.
- Second, plug the red wire in the positive pole of the chosen connector and the black in the negative pole of the connector.



- In this example, this electrovalve is plugged in connector 5. Notice in the magnified part of the picture that red wire is plugged in the pole +5 and the black wire in the pole -5.

- To plug the valve or relay wires properly you have to push firmly, diagonally and downwards the stripped part of the wire inside the slot and at the same time push down the cable entry button.

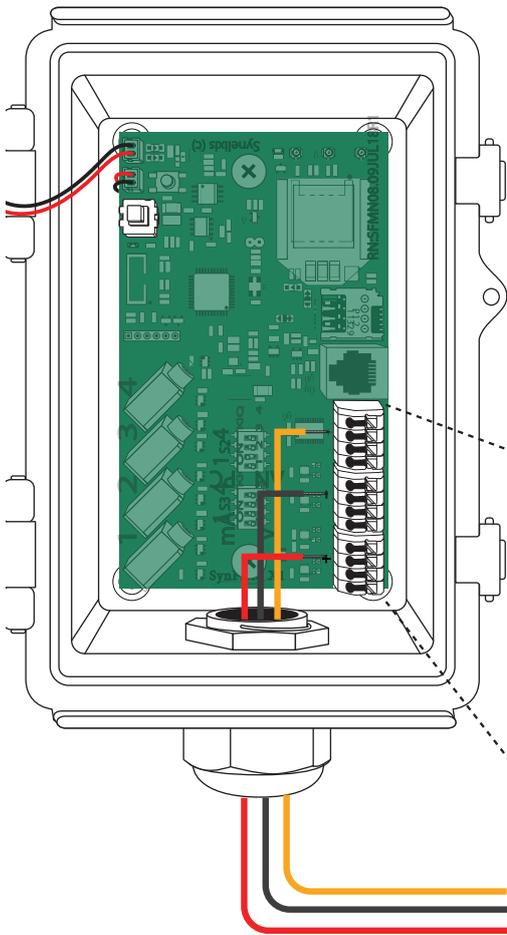
In order to plug out you have to push down the cable entry button and pull out the wire.



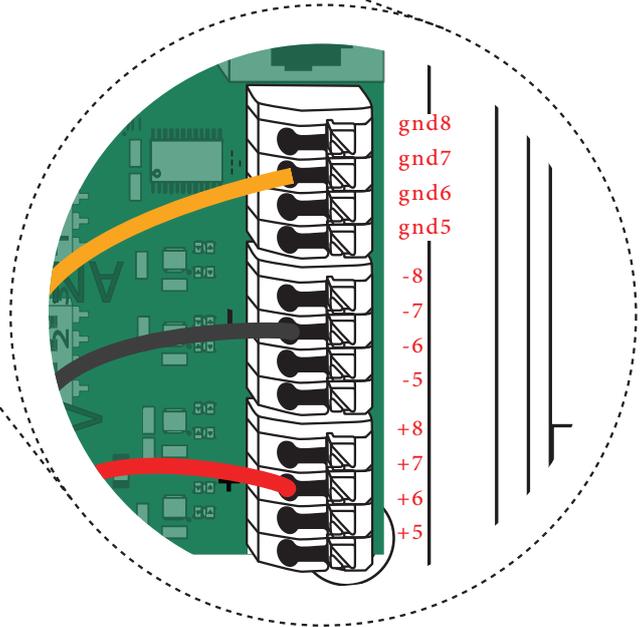
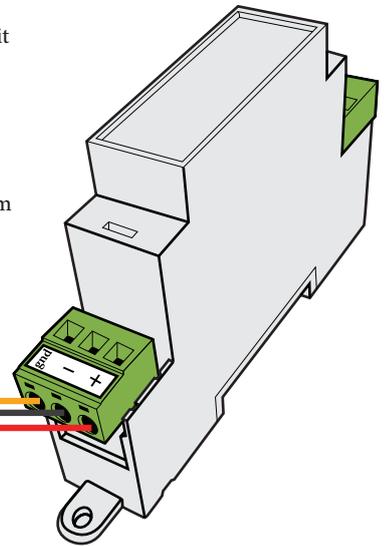
Connecting the Relays



The system must be off (ON/OFF button must not be pressed) while connecting the Sensors/Electrovalves/Relays.



- First, choose any of the connectors 5-8 as long as it is spare.
- Notice that three wires exit from the relay: one from a positive pole (under the sign "+"), one from a negative (under the sign "-") and one from the ground (under the sign "gnd").

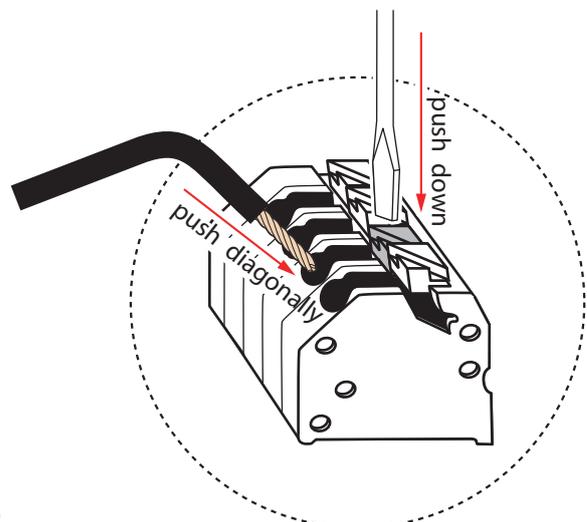


- Plug the wire exiting from the positive pole in the positive pole of the chosen connector, the wire exiting from the negative pole in the negative pole of the chosen connector and the wire exiting from the ground in the ground of the chosen connector

- In this example the connector chosen is connector 7. Notice in the magnified part of the picture: the wire which comes out of the positive pole of the relay is plugged in +7 pole, the wire which comes out of the negative pole of the relay is plugged in -7 pole and the wire which comes out from the ground is plugged in the ground of connector 7.

- To plug the valves or relays wires properly you have to push firmly, diagonally and downwards the stripped part of the wire inside the slot and at the same time push down the cable entry button.

In order to plug out you have to push down the cable entry button and pull out the wire.



Configuration

1. Download SynControl and connect directly to SynField X1 following the first 5 steps of the instructions in page 6.
2. Then, press the CONFIGURE button to manage the sensors, actuators and network settings:
3. In the SENSORS tab, pick your sensors and actuators in the connector number that you want to attach them in the SynField X1. For instance, select the EC5 sensor in Connector 1 if you want to attach physically the device in this connector.
4. In the ADVANCED tab, you are able to manage the network settings of the SynField SynField X1. If the SynField X1 uses WiFi, enter the name of the WiFi in the field WiFi SSID and the password of the WiFi in the field Network Password. In case that your SynField X1 uses GPRS connection, enter the APN of the telecom operator in the field GPRS APN and the PIN number of the SIM card in the field SIM Card PIN. If the SIM card does not have PIN number, leave the field SIM Card PIN empty.
5. After the settings completion, press the SEND button and choose the option Only updated to publish the new settings in the SynField X1.
6. Press the RETURN button to go back in the main menu, especially in the CONTROL tab.
7. Then, press the MONITOR tab to access the Serial number and the Firmware version of the SynField X1, the value of each sensor and the state of each actuator.
8. To retrieve the above details, press the refresh button
9. Be sure that the applications reports correct information for the sensors' value and the actuators' state.
10. Press the RETURN button to go back in the main menu, especially in the CONTROL tab.

DO NOT FORGET TO PRESS THE FIRMWARE DISCONNECT BUTTON

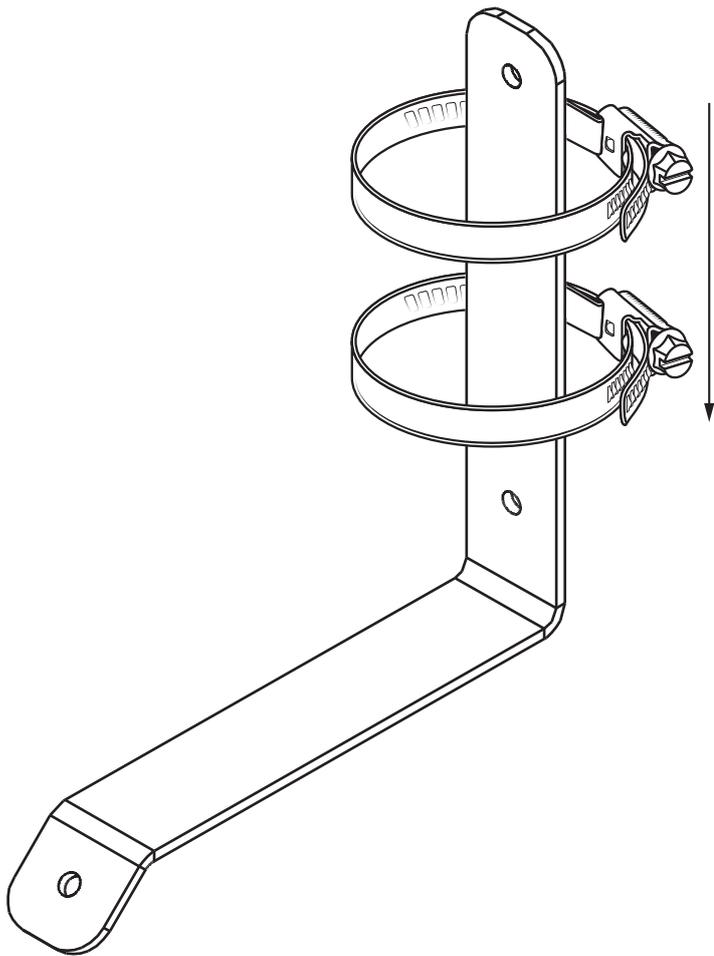
So as to close the connection between the SynField X1 device and the mobile application and resume normal operation. Upon pressing the button, the LOG window appears that displays various firmware messages throughout the whole process (wake up, initialize, sensor reading, network connection and message exchange).

It is recommended that the user inspects the log messages for any warnings and errors (printed in orange and red respectively).

IF A WARNING AND/OR ERROR OCCURS

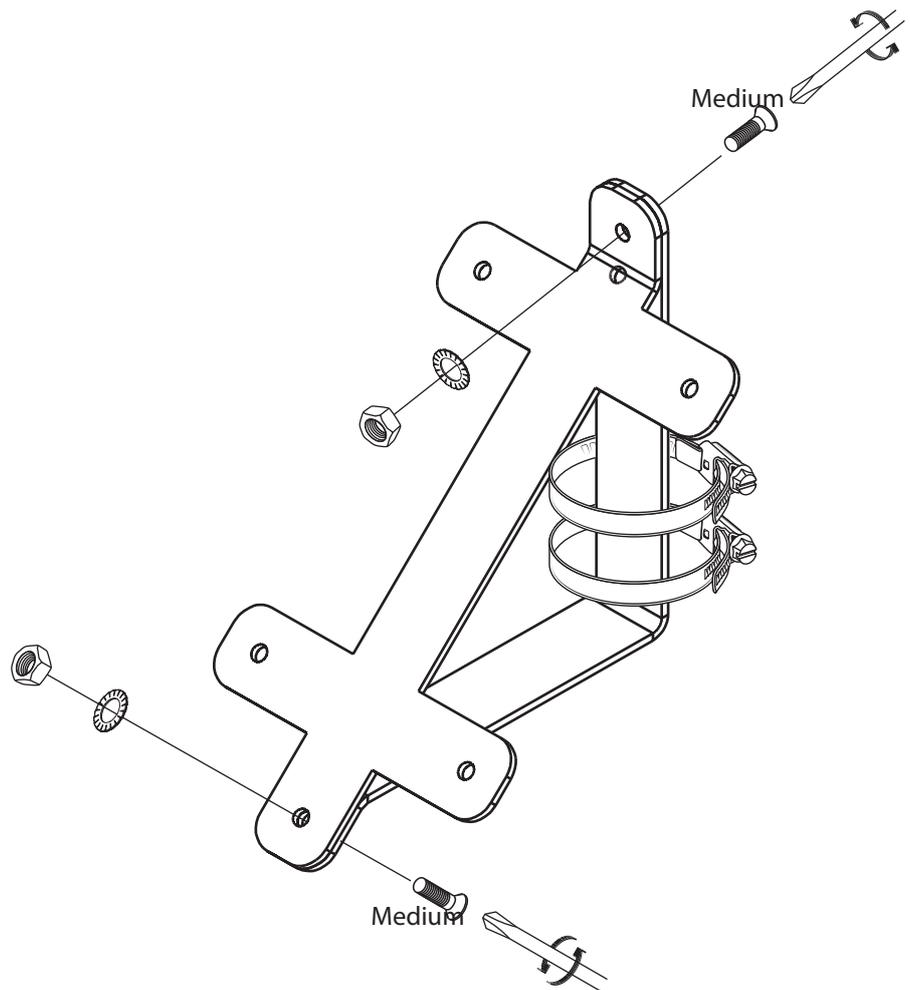
The user could FORWARD these messages to the SynField support team support@synfield.gr by pressing the relevant button on the bottom left. Please note that the "Device UNREGISTERED" error message is normal and means that the device is not yet registered in the portal. In this case, the user should register the new SynField X1 using the serial number shown in the MONITOR tab.

Attaching the mounting base to SynField X1



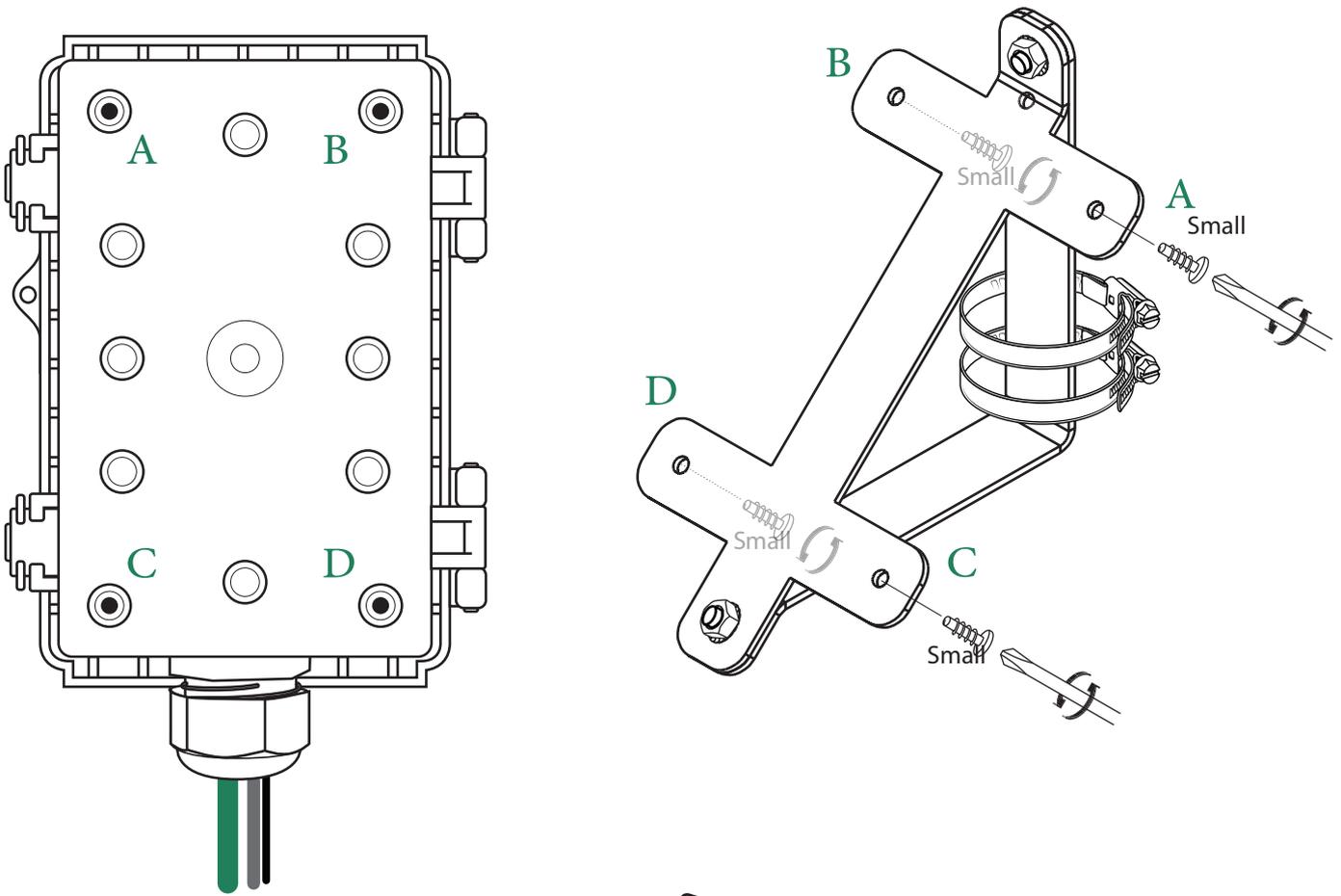
- 1 Put the rings in the middle of the triangle fixture.

- 2 Attach the triangle fixture to the cross fixture using the medium screws, the grommets and the lock washers in order to assemble the mounting base.



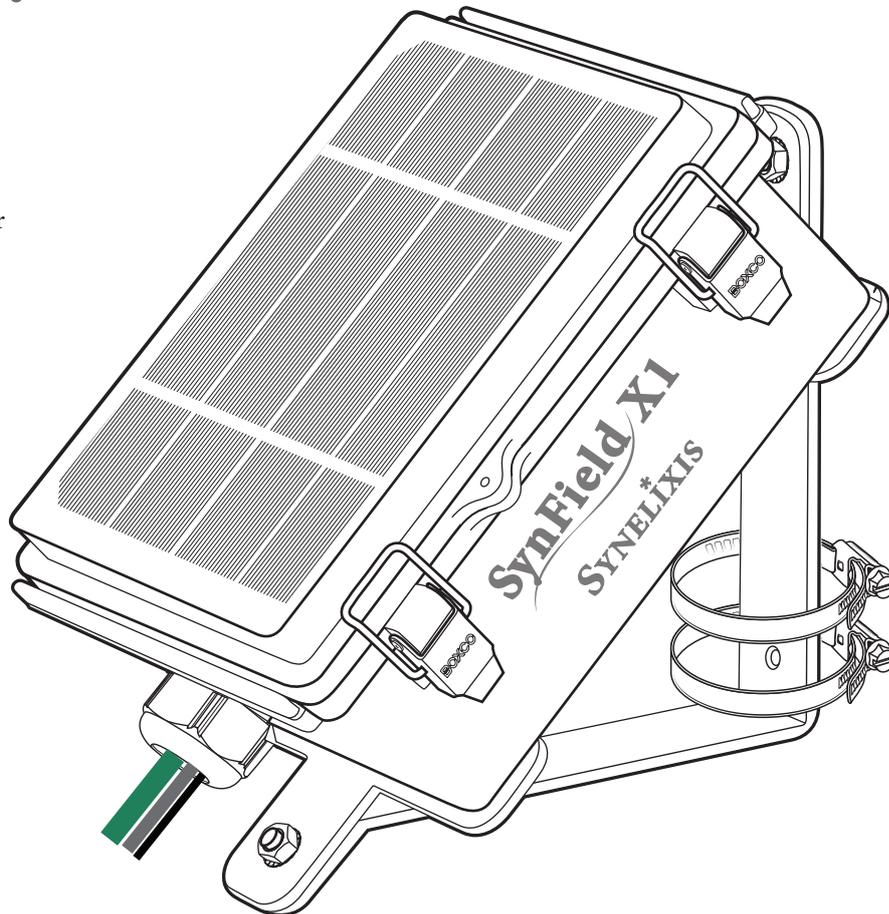
3

Attach the mounting base to the back of the SynField X1 using the small screws.



4

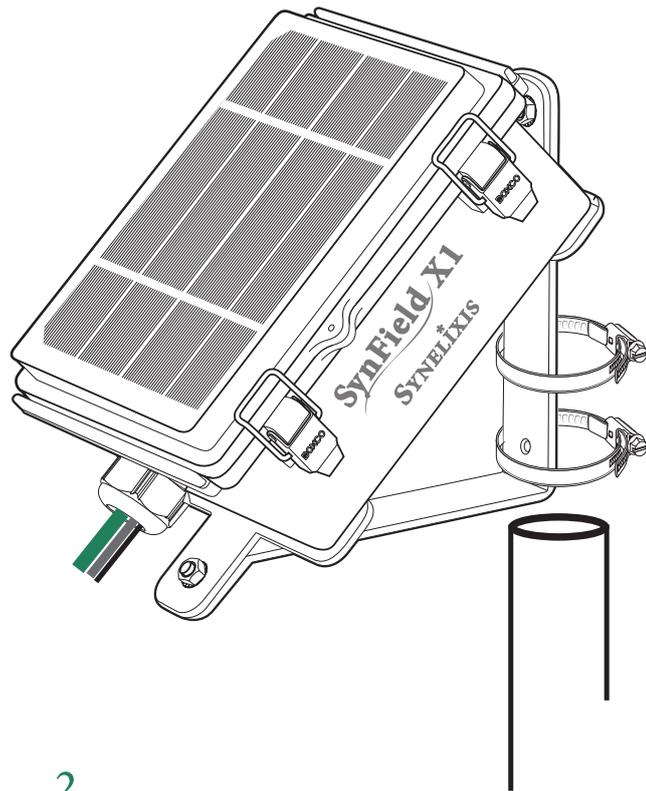
Ready for outdoor installation.



Placement on metal rod

1

Place the device on the top of the metal rod.



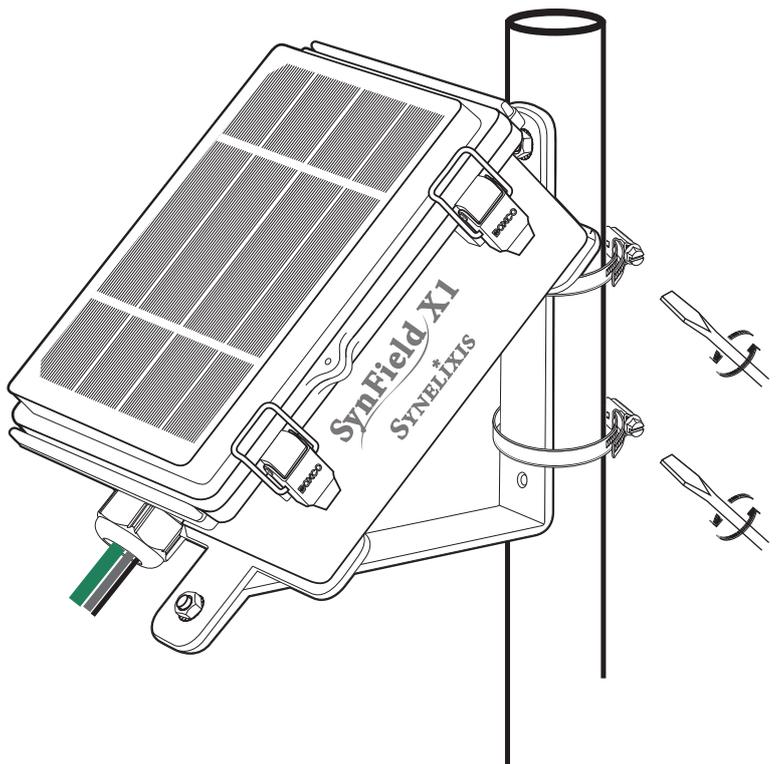
2

Ensure that the cap of the SynField X1 is facing to the South. By doing so it will get properly charged.



3

Fasten the metal clumps using a screwdriver.



Maintenance

SYNFIELD X1 MAINTENANCE

- Check battery voltage (through the portal) regularly for strange battery behavior (i.e. low battery levels: < 3.8V).
- Check solar panel and clean if required.
- Make sure solar panel is facing south and is not shaded by branches/leaves.
- Check sensor cabling for signs of wear.

SENSOR MAINTENANCE

For each sensor please follow the maintenance instructions provided in their own manuals. Especially for the rainmeters ensure that the rain bucket is clear of leaves and debris.

Troubleshooting

BATTERY LEVEL IS LOW (< 3.8V)

- Inspect solar panel and make sure is clean and receives adequate sunlight (i.e. 4-5 hours daily).
- If battery is fully charged (> 4.15V) but drains quickly, check for damaged sensor and/or sensor cabling (that could cause external shortcircuit).
- Check the internal of the device for excess moisture.

DEVICE DOES NOT SENT DATA

- Check that the device is turning on: power-off the device using the on-board switch, wait for 10 seconds and then turn the device back on. Check the on-board red LED, if it is not lighting, then the device is not functioning. This is most probably due to a “dead” battery. Contact Synelixix for replacement and further support.
- If the device is turning on (on board red LED lights on), then try to connect to the device using the SynControl application. If the application fails to conect, then contact Synelixix for further support.
- If the SynControl application manages to connect to the device, firstly run Diagnostics (menu item on the upper right). On the Diagnostics tab, check all but “port” and GPS related diagnostic items. Run a diagnostics check.
- If a diagnostic item, other that the “network check”, fails, contact Synelixix for further support.
- If “network-check” diagnostics’ item fails, then make sure that the GSM antenna is plugged firmly, the device is located at a site with adequate cellular coverage and try again. Check “LOG” for debugging messages. If problem persists, contact Synelixix for further support.

Contacting Synelixis

IF YOU HAVE QUESTIONS ABOUT THE SYNFIELD X1, OR ENCOUNTER PROBLEMS INSTALLING THE SYNFIELD X1 PLEASE CONTACT SYNELIXIS TECHICAL SUPPORT.

Please do not return items for repair without prior authorization

TECHNICAL SUPPORT

+30 210 2511 584
Monday – Friday
10.00 a.m. – 5.00 p.m.
Eastern European Time
support@synfield.gr

