

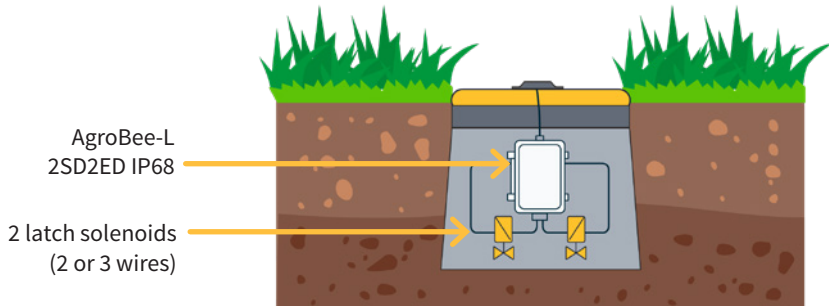
## AgroBee-L Manual

# AgroBee-L 2SD2ED IP68 System

Very low consumption radio modules and integral components of the AgroBee-L system for the activation of latching solenoids and reading of digital and analog sensors.

The AgroBee-L 2SD2ED IP68 model offers the following:

- 2 2-wire or 3-wire latch solenoids
- 2 counters or digital sensors or rain gauges



This type of module is internally resin-coated (IP68), so they are suitable for the gardening sector: modules designed to be installed at ground level, such as irrigation canals in urban areas.

This type of module, unlike the rest, offers much more limited radio coverage due to the fact that it is meant to be installed on the ground, so it should be placed much closer to the AgroBee-L Coordinator.

In terms of power, these modules are powered by an internal 19 Ah battery, which is provided with the controller. This battery is designed to provide more than 5 years of life to said module (according to working conditions).

There are 2 types of antenna for this module according to the requirements of each installation:

- An external antenna to be mounted on the box's lid.
- An internal adhesive antenna.

2-wire or 3-wire latch solenoids can be used at 6 Vdc, 9 Vdc, 12 Vdc or 19 Vdc. The type of solenoid, as well as the trigger voltage, can be configured using a Module Reader of the module itself, or from the controller to which said module is associated.

Within the configuration options of the module itself, a general output can be configured. In this case, the general one will always be the R2 output.

## Technical characteristics

Power supply		
Power supply:	2SD2ED IP68: Lithium Battery → 3.6V	Lithium Battery 19 Ah
Energy consumption: 2SD2ED IP68	Average consumption: 0,45 mW (TBC)	

Outputs		Inputs	
Number	2	<b>Maximum distance between sensor and AgroBee-L: 50m</b>	
Type	6 Vdc, 9 Vdc, 12 Vdc, 19 Vdc Trigger time: 80 ms Capacitor charge: 4700 µF	Number	2
		Type	For potential-free contacts

Environment		Box dimensions 2SD2ED IP68	
Temperature	-10 °C a +60 °C	Height	150 mm
Moisture	< 95 %	Width	100 mm
Altitude	2000 m	Depth	70 mm
Pollution	Grade II	Weight (approx.)	0,4 Kg

**Declaration of conformity**

This system conforms with the regulations and other regulatory documents in the following list:



Electrical safety	UNE EN 60950-1:2007+ CORR:2007	Information technology controller. Safety. Part I: General requirements
	UNE EN 60215:1995 + A2:1995	Safety requirements for radiotransmission controller
EMC	ETSI EN 301 489-17 v1.3.2 based on ETSI EN 301 489-1 v.1.7.1:	
	UNE-EN 55016-2-3:2007	Radiated radio frequency emissions (30-1000MHz). Class B
	UNE-EN 61000-4-2:1997 + A1:1999 + A2:2001	Electrostatic discharge
	UNE-EN 61000-4-3:2007 + A1:2008	Electromagnetic field immunity
	UNE-EN 61000-4-4:2005	Transient/burst immunity
Radio spectrum protection	UNE-EN 61000-4-6:2008	Current injection: 150KHz-80MHz
	ETSI EN 300 328 v1.7.1 (Decision ERC/DEC/(01)07 and Recommendation CEPT ERC/REC 70-03)	Spurious issuer emissions Coordinator and Module 2SD2ED IP68.



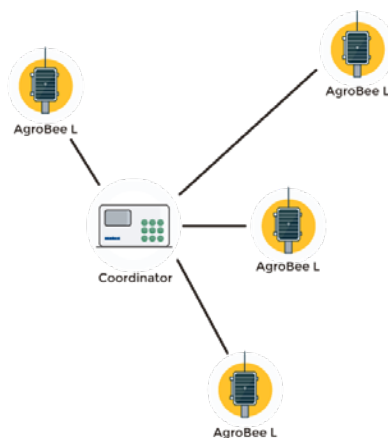
This symbol indicates that electrical and electronic controller must not be disposed of along with household waste at the end of its useful life. The product must be taken to the corresponding collection point for the recycling and proper treatment of electrical and electronic controller in accordance with national legislation.

## AgroBee-L System Operation

The AgroBee-L radio modules are used for the activation of valves and other irrigation elements, as well as the reading of sensors and meters. It is very low consumption and follows the LoRa radio modulation, which operates in the 868MHz, 433 MHz and 915 MHz, free bands, obtaining radio coverage of up to 2500 m between two points (depending on the orography).

Currently, they can be incorporated into the Agrónic 2500, Agrónic 5500 and Agrónic Bit Con fertirrigation controllers.

The AgroBee-L system consists of a coordinator device (located in the Agrónic 2500, Agrónic 5500 or Agrónic Bit Con controllers) and by field elements with different functions, depending on the model in question. This system does not include the use of repeater elements, so all modules must connect directly with their coordinator. The field modules manage their consumption by activating the communication in the precise time of the exchange; the rest of the time, they are asleep or attending to irrigation control.



Its low consumption allows it to operate with a solar panel integrated into the module and supercapacitors or battery (depending on the model). The solar panel stores the energy in the supercapacitors/battery, offering a long operational life. It is only necessary to replace batteries in models that include batteries instead of supercapacitors.

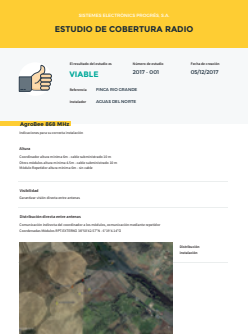
The maximum number of modules that an Agrónic controller can manage is 20 units in standard mode, which can be configured as modules of any of the available types. There is also a priority mode, which makes it possible for the modules to communicate more often: in this case, the number of modules (10) is halved.

To use AgroBee-L modules, it is necessary to assign their outputs to the sectors or generals of the controller in question, and their inputs to the digital, analog, or counters sensors.

The AgroBee-L system has the following features, among others:

- Operation in 868 MHz, 433 MHz and 915 MHz free bands.
- Availability of 13 communication channels plus 18 transmission modes, which allow for the operation of more than one network in the same area working on the same channel.
- Availability of network code, which allows for filtering the information of several networks configured with the same parameters.
- Self-adjustable communication rate according to the chosen transmission mode and the timing mode:

- Timing in standard mode (60 –200”). Up to 20 modules.
- Timing in priority mode (30 –100”). Up to 10 modules.
- Distances of up to 2500 metres between any module and its coordinator (depending on the orography).
- Manual actions, consultations, and configuration of the network number, channel, transmission mode, and communication timing (standard/priority):
  - In-situ: Through the Module Reader
  - From a distance: Through the Agrónic
- Battery/charge level reading and solar panel (if any).
- Reading SNR level (signal-to-noise ratio) reception in the module and coordinator (in [%]).
- Reading the status of the last 16 communications and remaining time indicator until the next communication.



## Installation

For the supply of radio controller, it is essential to have a coverage study. This study verifies the viability of the system according to the profile of the terrain, the location of the points to be controlled, and the distance between them. The study is delivered along with the controller offer.

### MODULES INSTALLATION

The AgroBee-L 2SD2ED IP68 module is designed to be mounted at ground level. It can be installed, for example, in irrigation boxes in urban garden areas. This means that the coverage range of this module is much lower compared to the rest of the models.



The maximum coverage range to expect with this module is about 500 metres, which is limited because it is to be installed on the ground. In addition, it is vitally important that the communicating modules are clearly visible to each other, since any obstacle can make the quality and durability of the communications difficult to some extent.

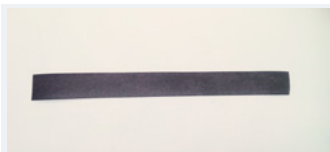
This module can be mounted with two different antennas, depending on the place and situation in which it is to be installed:

- Internal adhesive antenna:** This antenna is not externally visible, as it is inside the module. When a module has this type of antenna and is set up in an irrigation box, the cover of said box should never be metallic, since the communication of said module will be practically impossible, given that any obstacle (especially if it is metallic) will gravely worsen the range of radio coverage. When setting up a module with this antenna, it is recommended to place the module inside the box as close as possible to the surface. In the following image, you can see the internal part of a 2SD2ED IP68 module with this antenna.



Antenna

- External antenna for the cover:** This is the best option of the two in terms of coverage range. This antenna must be screwed onto the lid of an irrigation box so that, as it is on the exterior, it will obtain a more optimal range of coverage. When mounting this type of antenna, it is recommended that the lid of the box be metallic. When the module is supplied with this antenna, a 25 cm strip of vulcanized tape will also be delivered with the set.



Once the module is situated in the box and the antenna is screwed into the cover, you must connect the antenna to the controller: you can simply screw the antenna's cable connector into the connector located on the side of the module.

Once the antenna connector is screwed in to the controller, the tape will be used to isolate said connection: this connection is already watertight, but this additional insulation will add greater protection in case the module accidentally gets wet.

To place the tape, simply proceed as indicated in the image: place the tape on the connector and wrap it around while pulling it so that it is firmly affixed.

# Inputs and Outputs

## DIGITAL OUTPUTS

The trigger voltage of the solenoids (digital/latch outputs) is programmable through the Reader or from the Agrónic, which may be 6, 9, 12 or 19 Vdc. The default voltage is 12 Vdc.

You can also choose the action that a module will perform with the digital outputs if the settings are lost. The options are:

- Do not perform any action
- Deactivate all outputs immediately after losing communication
- Deactivate all outputs after about 15 minutes after losing communication.

The 2SD2ED IP68 model can work with two- and three-wire latch solenoids:

- **2/3 wire latch solenoids:** these modules can drive up to 2 solenoids of this type. The solenoids must be connected as defined in the wiring table in the next section.








## DIGITAL INPUTS

There are up to 2 digital inputs that can work as a digital input or counter input. When the input is connected to a counter, the minimum time between pulses must be 0.1 seconds and an anti-bounce filter may be enabled in order to avoid accumulating undesired pulses. Maximum allowed distance between AgroBee-L module and a digital sensor or meter is 50m.

## CONNECTION

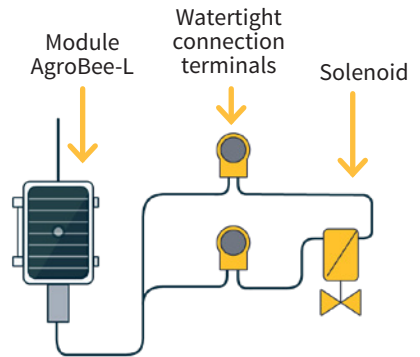
The 2SD2ED IP68 module is provided with a 1-metre cable hose that allows different connections to be made more easily without the need to access the interior of the module. The 7-wire cables come identified by colours. Connect them as shown in the table according to their functions.

To ensure the tightness of the module's cable connections, it is recommended to use watertight terminals. The connection through these terminals must be made without stripping the cable's wires.

2SD2ED IP68			
Wire colour		Function 1 (2-wire latch)	Function 2 (3-wire latch)
	White		R1
	Brown		R2
	Green	Common (CR-2F)	Common Stop (CP)
	Yellow	-	Common Activate (CM)
	Grey	Digital Input 1 (D1)	
	Pink	Digital Input 2 (D2)	
	Blue	Common input (CD)	

The watertight connection terminals must also be installed on the wires that do not connect externally and remain open to the air: this way, they will be protected against moisture and corrosion.

The 3M Scotchlok series ([www.3m.com](http://www.3m.com)), ES Caps from TYCO Electronics ([www.tycoelectronics.com](http://www.tycoelectronics.com)), or Cellpack resin splicing and junction kits ([www.cellpackiberica.com](http://www.cellpackiberica.com)) can be used as connecting elements.



## Settings

For any AgroBee-L module to enter the correct operating mode, you must have an Agrónic controller (Agrónic 2500, Agrónic 5500 and Agrónic Bit Con) with the AgroBee-L option installed, which includes the internal coordinator and an antenna with 10 metres of cable. This can be verified by doing the following in the controller:

Consult → Communication → AgroBee-L → Status: Correct








In the same way, a module must be configured to communicate with the Agrónic with which you want to associate it. To do this (if the module is not already configured at the factory) you must use the Module Reader (or Agrónic Radio Reader, LAR) consisting of a screen and four keys, that is connected to the AgroBee-L module through the only connector visible on the inside.

A wireless module reader is also available that allows you to perform functions without the need for a cable. Consult the wireless AgroBee Reader manual to learn about the steps to link it to the controller.

You will see the following options in the main menu:

- Consult controller
- Consult communications
- Consult digital output
- Consult digital and analog inputs
- Communication parameters
- Input-Output parameters
- Output manual
- Various parameters

Press the  key to enter the main menu. Use the  and  keys to change the options within the menu. Use the  key to enter the selected menu option. Use the  key to return to the previous hierarchy's menu.

## NOTE

Once the AgroBee-L module is linked with an Agrónic, all the consultations and parameters are accessible through the Agrónic.

## CONTROLLER QUERY OF AN AGROBEE-L MODULE

General query menu of the module, where the following parameters are displayed:

- Module and serial number:
  - Module: It refers to the module number (1 to 20) according to the established communication parameters. There can only be one same module number for each Agrónic device.
  - Serial number: Information regarding the controller. It comes from the factory.
- Battery voltage and solar panel:
  - Vbat: Battery voltage:
    - Lithium battery: Maximum value 3.6 V; Minimum value 2.2 V

These same data can be viewed in the Agrónic by accessing “Consult - Communications - AgroBee,” as you will see in the next section.

## CONSULT COMMUNICATIONS IN AN AGROBEE-L MODULE

Communication consultation menu of the module, where the following parameters are displayed:

- Transceiver: Type of emitter installed in the module. It tells you if the module works at 868MHz/433MHz or 915MHz
  - RN2483 (868MHz/433MHz)
  - RN2903 (915MHz)
- Band and transmission mode:
  - Band: 868MHz, 433MHz, 915MHz
  - Transmission Mode: 1 to 18 (mode 5 will be set by default)
- Consult parameters of the communication type:
  - Channel: 1 to 13
  - Network code: It is usually the associated Agrónic serial number
  - BW: Bandwidth of the radio modulation (125KHz, 250KHz, 500KHz). It is set according to the transmission mode chosen in the communication parameters.



- Radio modulation factor: SF7, SF8,..., SF12. It is set according to the transmission mode chosen in the communication parameters.
- Communication status:
  - Status message:
    - Correct Communication
    - Network error
    - Communication error
    - Model error
    - Does not communicate
  - Signal-Noise ratio of the last received message: Reliable communication if >40%.
- Time until next radio emission: time in [s]
- Status of the last 16 communications (the previous communications appear on the right side of the screen):
  - 1: It indicates that the emission has been made and the correct information received in the last communication
  - 0: Indicates that the radio emission has been made, but the correct data has not been received or no data has been received

Part of this information is available through the Agrónic by accessing “Consultation | Communications | AgroBee”, where you can also see the query regarding the controller and the parameters of the communication.

CONSULT COMMUNICATIONS

AgroBee-L 868

Status: Correct

Timing: 60”

Channel: 01 TX Mode: 05

Network code: 00001

CONSULT COMMUNICATIONS

M01 (ns. 236) V1.00

Status: Correct (40”)

Level: 80% / 82%

Vbat: 04.0V Vsol: 05.8 V

1111111111111111

### CONSULT THE AGROBEE-L MODULE DIGITAL OUTPUTS

Menu that shows the status of each of the outputs, one by one.

The states that can be shown for each digital latch output are the following:

- Activated
- Stopped
- Latch tension load (running)
- Latch tension load (stopped)
- Running time
- Stopped time

The status of the digital outputs (latch) can also be displayed through the Agrónic: see the next section.

## CONSULT THE AGROBEE-L MODULE DIGITAL INPUTS

Menu to check the status of digital inputs, counters, and analog inputs (not applicable for this model).

The information shown on the different screens is as follows:

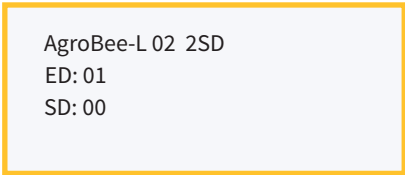
- Check digital inputs: For each of the digital inputs available to the module in question, its status is shown either as '0' (open contact) or '1' (closed contact)
- See accumulated counter sensors: The total number of pulses detected will be displayed for each digital input configured as a counter sensor. If this entry is not configured as a counter, the text 'N-A' (Not-Activated) will appear.
- See instant flow rate (time between pulses): The time in [ms] between the last 2 pulses detected will be displayed for each digital input that is configured as a counter sensor. If this entry is not configured as a counter, the text 'N-A' (Not-Activated) will appear.

Press the '1' key in the module's consultation screen on the Agrónic so you can visualize the values of the module's analog/digital inputs and outputs.

Nomenclature used in these queries:

- **ED**: status of digital inputs. With a '1' indicating that the contact is closed and a '0,' that it is open. The digit on the far right corresponds to input 1.
- **SD**: status of digital outputs (latch valves). With a '1' indicating that the valve is open and a '0,' that it is closed. The digit on the far right corresponds to output 1.
- **EA**: Not applicable

Below is an example of the screens you can see, depending on the model:









```
AgroBee-L 02 2SD
ED: 01
SD: 00
```

## COMMUNICATION PARAMETERS OF AN AGROBEE-L MODULE

The following parameters are in the Communication Parameters menu of the Module Reader, which allow you to establish the communication of a certain AgroBee-L module with a controller:

- **Module** Module number in the network. It is used to distinguish all modules that may be associated with an Agrónic. The module number cannot be repeated in the same Agrónic:
  - 1 to 20 (timing in normal mode)
  - 1 to 10 (timing in priority mode)
- **Band** Frequency Band:
  - 868MHz or 915MHz (default value, depending on the model)
  - 433MHz (only available in models that also support 868MHz band)
- **Channel** Frequency channel number:
  - 1 to 13 (independent from the band used)
- **TX Mode** Transmission method. Set the radio's transmission and reception parameters.
  - 1 to 18 (mode 5 set by default):
    - Mode 1: The shortest coverage length permitting the lowest lag time
    - Mode 18: The greatest coverage length, but with the most lag time
- **Timing** 2 timing modes:
  - Normal mode (recommended): It is automatically set according to the chosen transmission mode, but always includes the communication of up to 20 modules. Value between 60" and 200".
  - Priority mode: It is automatically set according to the chosen transmission mode and includes the communication of up to 10 modules. Value between 30" and 100".
- **Network code** It differentiates the information from several controllers with the same communication parameters (band, channel, and transmission mode). The Agrónic serial number is assigned by default.

To modify any of the sub-menu's fields, press . The screen will display that you are in edit mode. Use the  and  keys to set the desired value. Confirm with  or dismiss with . Press  to exit the menu and access the previous hierarchy's menu, which will change the parameters and let them take effect.







For an AgroBee-L module to establish communication with a certain Agrónic, you must set, through the reader, the parameters that have just been described, according to those established in the Agrónic in question. In the Agrónic, you can modify these parameters in 'Parameters | Installer | Communications | AgroBee | Coordinator':

AgroBee-L  
Channel: 01  
Network code: 00001  
Timing: standard  
Band: 868MHz  
TX Mode: 05

## INPUT/OUTPUT PARAMETERS OF AN AGROBEE-L MODULE

In the Input-Output Parameters menu of the Module Reader, you can set the parameters of the AgroBee-L module's different inputs and outputs, available through the following sub-menu:

- **Digital Inputs** Configuration of digital sensors or counters.
  - Configuration of functions of each of the available digital inputs:
    - Digital input
    - Counter
  - Anti-bounce filter: only applicable when digital input is setup as counter. A filter time between 0.0" and 10.0" can be fixed, and it represents the minimum time that a contact must be closed to count a new pulse. Same time is considered for all the inputs of the module. This filter time can only be setup by using the Module Reader (it cannot be setup from the programmer to which this module is linked).
- **Digital outputs** Configuration of latch outputs:
  - Latch trigger voltage: 6V, 9V, 12V (default), 19V
  - Latch valve: 2 wires, 2 wires-inverted (default), 3 wires
  - Number of fires: 1 (default) or 2 It refers to the number of activations that take place when an action is performed on an output. Only modifiable through the module reader.
- **Analog Inputs** (Not applicable for this module).
- **General Parameters** It allows you to establish the last output of the module as a general output of the module itself. This output will be activated whenever any of the other outputs of the module is activated. There is configurable hammer, from 1" to 250", between the activation of the general systems and the sector parts. First activate the sector part and then the general system:
  - General module YES or NO (default, NO).
  - Stop-Sector: YES or NO (by default, NO). Action to be taken when there is a general module action and the module receives the order for the last sector that is active:
    - YES: First for the general, and then the sector after the seconds set
    - NO: First for the sector, and then the general after the seconds set
- **Action Error** indicates what action the module will take with the digital outputs when the radio communication between the module and Agrónic fails:
  - It does not close: the output state remains as it is
  - Close immediately: all outputs close immediately upon losing communication with the Agrónic
  - Close 15 min: all outputs close after 15 minutes of the module being unable to communicate with the Agrónic

To modify any of the sub-menu's fields, press . The screen will display that you are in edit mode. Use the  and  keys to set the desired value. Confirm with  or dismiss with . Press  to exit the menu and access the previous hierarchy's menu, which will change the parameters and let them take effect.

**IMPORTANT** The detailed input/output parameters can also be entered in the Agrónic. In this case, the module will receive the parameters upon communicating with it. If not, and these parameters have been changed through the Module Reader in the same module, the Agrónic will receive and update said parameters.

To modify these parameters from the Agrónic, you must access “Parameters | Installer | Communications | AgroBee | Module.” Specify the module number in the Agrónic network in question, after which you will see the following screens to modify the detailed parameters (see the Agrónic manual in question for more details).



(\*) As many screens as there are sensors in the module

#### AGROBEE-L MODULE MANUAL OUTPUTS

In this sub-menu, you can carry out the start and stop actions of the different outputs without accounting for the timings of the sectors that may be defined. The following options are available:

- Output Test: starts/stops all of the module’s outputs. It cannot be carried out if any of the outputs is active at the time of the test.
- Start/Stop each of the outputs individually. It cannot be carried out if the specific output is active at the time of the test.

From the reader, you cannot leave this menu if all of the outputs have not been stopped.

If, in this menu, the module reader is disconnected, all outputs will be deactivated immediately.

These same actions can be carried out from the corresponding Agrónic menu: in this case, it must be taken into account that said action will not be carried out until the module communicates with the Agrónic.

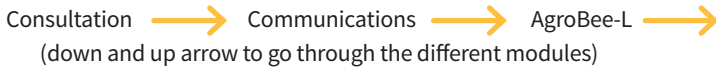
#### VARIOUS PARAMETERS OF AN AGROBEE-L MODULE

In the Various Parameters menu of the Module Reader, you can select the language among Spanish, Catalan, English, French, Italian, and Portuguese.

From this menu, you can also completely erase the module’s data, restoring it to factory settings, maintaining the serial number and the model.

## Battery levels and radio signal/quality

You have already seen how to consult the different parameters of an AgroBee-L module through the Module Reader. In the Agronic to which the AgroBee-L module is associated, it also shows the battery information and radio link performance of said module.



The information provided is:

- Module number, serial number, and firmware version
- Signal level received by the Agronic and the module. It is displayed in % and indicates the level of the signal-to-noise ratio.

Advisable/recommended value > 40%

- Vbat: Battery level in mV:
  - Module with Lithium Battery 19 Ah: VBat max = 3.6 V; VBat min = 2.2 V.
- VSol: Voltage level delivered by the solar panel.

## Estimated battery life

*Battery life with standard communication rate mode 5: 60 seconds*

Type	2SD2ED IP68
Lithium Battery 19000 mAh	> 5 years

Battery life is approximate since there are several factors that can affect consumption. Frequent reading of digital sensors (when counters are configured) shortens the duration. Likewise, if a priority mode rate is set, the battery life will decrease.

**Battery replacement** place the battery in its location having previously turned the module OFF. Respect the polarity.

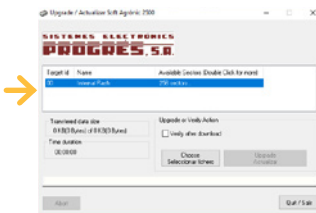
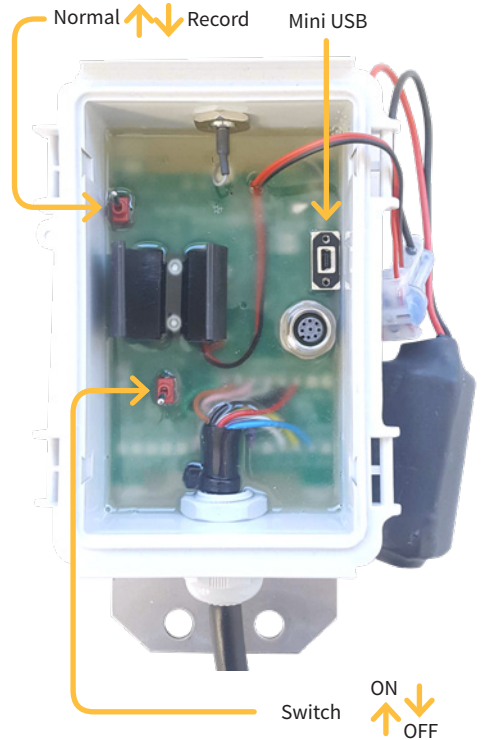
### TURNING OFF THE CONTROLLER

If a module does not find the Agronic with which it communicates, said module will follow its own course, and will send data every certain time, according to the established timing. However, in order to avoid possible collisions and/or interferences, the module will slightly offset the pre-established communication time. The consumption of an AgroBee-L module is practically unchanged due to the fact that it is not connected to any Agronic.

## Updating the AgroBee-L module software

Whenever there is a new software version for an AgroBee-L module, the user can update it. To do this, you must perform the following steps:

- Have a computer with an Internet connection and a USB to miniUSB cable.
- Download the program “AgronicUpg” + “drivers” + update file (dfu) by typing this address [bit.ly/actualizaragronic](http://bit.ly/actualizaragronic) into the computer’s browser.
- Select and download the AgroBee-L folder.
- Go to the module and turn it off using the switch.
- Place the other switch inside the module in the recording position (by default, it is in the ‘Normal’ position).
- Connect the USB to the computer and the miniUSB to the module.
- Start up the module using the ON/OFF switch.
- On the computer, run the program “AgronicUpg”. If you do not see the “Internal Flash” line on the screen as seen in the image, you must install the drivers. If you already have the drivers installed, skip to the next step.



- To install the drivers, go to the files you have downloaded and select the folder that corresponds to your Windows version. Run the file “dpinst\_” and follow the steps. If you use Windows XP, call Progrés to help you with the installation.
- Press the “Choose file” button and select the file “xxx.dfu”. Once loaded, press the “Update” button and wait for the process to finish.
- Once the process is finished, the module is updated.
- To finish, turn off the module, disconnect the miniUSB cable, and place the second switch in the ‘Normal’ position.
- Finally, the module can be started up again.

**Sistemes Electrònics Progrés, S.A.**

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