

# AGRÓNIC 4500

## INSTALLER MANUAL VERSION 1

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### PRESENTATION

We are very grateful to you for the trust you have shown us when you are interested in or purchase the AGRÓNIC 4500.

*Trust that, for our part, we strive every day to deserve and thus justify the tradition of quality of our products.*

*This Manual will allow you to know the benefits of the equipment as well as its installation and use.*

*However, if you have any questions, let us know and we will gladly assist you.*

## 1. FUNCTIONAL DESCRIPTION

The Agrónic 4500 is designed for the automation of irrigation of medium and large farms (maximum of 400 irrigation sectors in 4 independent heads) with the need to open/close sector and general valves, control of fertilizers and acids (hydroponics and conventional), filters, reading of all kinds of sensors for monitoring, automatic modification of risks and alarms. For farms with pivots (maximum of 4) and hedges.

The farm may have a pressurized **water intake or need drive pumps (electric or motorized pump)**. There may be several irrigation water meters in main pipes and one for each sector.

The heads can be **powered** at 12Vdc (with solar panel and battery, or only battery) or at 220Vac (network or generator set). There is also the option of hybrid solar irrigation, with solar panels and a generator or network, where Agrónic can choose which energy to use to optimize irrigation.

The **valves** can be 12Vdc, 24Vac or latch , and can be close to the head and commanded by microtube or cable, or remote with External Modules; up to 2Km with Agrónic Radio and AgroBee-L, and up to 10Km with Agrónic Monocable .

In the heads there can be **fertilization** with a hydraulic motor injector, electric dosing machines or a venturis system . Fertilization can be by units (time or volume) or follow an EC reference.

Reading of all types of **sensors** (analog, digital and meters), both connected to Agrónic itself, and remotely with External Modules.

The Agrónic 4500 has an internet **connection** , with a mobile phone or Wi-Fi, to connect to the “VEGGA” portal or the “Agrónic App” application and remotely manage the Agrónic.

For remote management it can also be connected to the “Agrónic PC” program for Windows. The connection can be with direct USB to the PC, when it is next to the equipment, by radio modem , for medium distances, or by Internet, with Wi-Fi or mobile telephony.

## 2. BENEFITS

### HEAD

The head contains the necessary elements to prepare the irrigation water and the nutrients towards its hydraulic network. This includes drive pumps, general valves, fertilization and filters.

You can control up to 4 independent heads.

The fertilization configurations, general outlets, filters, pressure regulation, diesel engine and water mixture are independent for each head.

### IRRIGATION

Controls up to 400 sectors governed by 99 irrigation programs.

Each sector can have a volume meter, energy meter, start digital input, flow detector, pressure reference, area it occupies and type of crop.

There are two types of programs, “**subprogram**” and “**linear**” . With the first each program can have up to 20 subprograms with 10 sectors each, the amount of irrigation is per subprogram. With the second each program can have up to 20 sectors that can be grouped to irrigate one after another, the amount of irrigation is per sector.

Slice groups can be created, with up to 20 slices each. The sector group is assigned to the program as if it were a single sector, this significantly increases the number of sectors that a program can activate.

The maximum number of sectors that a program can activate at the same time is 40.

There are three ways to start a program:

- **Time start** : at a certain time choosing the days of the week or every few days to repeat the watering (frequency of days) or marking the date on a calendar.
- **Sequential start** : when another program has finished.

- **Conditional start** : when a condition is activated. You can configure an active schedule, a security time between starts, a security time due to lack of starts and a security irrigation from time to time.

Once the program has started, you have the option to repeat the watering from time to time (activations).

At the time of the start, the amount of irrigation can be modified through the conditions. For example, increase irrigation by % if there is a lot of radiation, lower irrigation by % if there is a lot of moisture in the soil, etc.

You can also modify the through daily curves. With the curve, a certain percentage is marked to increase or decrease irrigation, fertilization or the time between activations depending on the time of day in which the program is activated. If the irrigation is by ETc , the amount of irrigation is determined from the Cloud based on the crop, ETo , effective rainfall and other parameters.

Irrigation units in time, " *hh:mm* ", " *mm:ss* " or " *m3/ha(t)* " (m3 per hectare in time); or in volume, " *m3* " or " *m3/ha* " (m3 per hectare) or " *mm* " (millimeters or sheet of water).

Mass programming from "App/Web/PC" when the irrigation units are " *m3/ha* " or " *mm* " and the crop has been assigned to the sector.

A record is made of the time and volume of irrigation and fertilizers for each sector. You can also record the mean conductivity ( mS ), the acidity (pH), the energy consumed by the sector (kW) and the flow lag.

When the program is active, irrigation can be stopped, permanently or temporarily, by means of a condition. For example, stop when it is very windy, stop when the level of the well is low, stop when the flow of a sector is too high (pipe burst), etc.

All the sectors that a program activates have to be in the same head.

## FERTILIZATION

Each head controls up to 8 fertilizers, 2 acids and 2 phytosanitary treatments, all in independent tanks.

Regulation to maintain a set point of acidity (pH) and electrical conductivity ( mS ).

pre- and post-irrigation values for each subprogram or grouping in a linear program.

Cleaning of the injectors at the end of fertilization.

Units of fertilization in time " *hh:mm* " or " *mm:ss* "; or in volume, " *L* " (liters) or " *L/ha* " (liters/hectare).

Configurable the use or not of the stirrers, with pre-stirring and intermittent or continuous stirring.

Fertilizers can be applied in three different ways:

- **Series** : one fertilizer after another, with a single injector. You can fertilize several programs at the same time if the fertilizer is not repeated.
- **Parallel** : the fertilizers are applied all at the same time , with an injector for each one. In each program the type of fertilization that is going to have is configured, it can be "By EC", "EC input", "Uniform", "Proportional" or "Units".
- **Solar** : It is only used when the head is configured as "Hybrid solar irrigation". Fertilizers are applied all at the same time , with an injector for each one . In each program the type of fertilization that is going to have is configured, it can be "By EC", "EC entry" or "Proportional". They can water and fertilize several programs at the same time using the same fertilizers.

If there are meters in the fertilizers, the lack of pulses or leakage can be detected. Proportional distribution of each meter pulse in the accumulated and historical according to the expected flow of the sectors that fertilize at the same time.

For the 4 heads, the equipment is capable of managing 32 fertilizers, 8 acids and 8 phytosanitary treatments.

## PUMPING

Each head has **6 general** irrigation outlets, or motors. One of the motors can be a motorized pump or generator set. Each sector is assigned to which engines it has associated. The engines are activated along with the sector. There are timings to separate the activation of the motor from that of the sector, both in activation and in shutdown.

You can **regulate the** irrigation pressure by means of a PID control or deliver the pressure reference to the drive so that it makes the regulation.

You can go activating or stopping motors depending on the expected flow you need.

For the 4 heads, the equipment is capable of managing 24 pumps, 4 diesel engines and 4 pressure regulations.

## FILTERS CLEANING

Each head has three groups of filters, with different washing times. The number of filters is not limited.

4

The start of the washing sequence can be by the differential pressure , pressure switch or two pressure sensors, and/or by the time or volume of water circulation.

Configurable whether or not to stop the irrigation and fertilizer sectors while filters are being cleaned.

Failure control by continuous cleaning.

Configurable a general filter output.

The filters of head 1 can be used as common filters for all the heads, that is, cleaning can be associated with the motors of all the heads.

For the 4 heads, the equipment is capable of managing 12 different groups of filters.

## DETERMINING FACTORS

The equipment has a total of 120 fully configurable conditions to perform actions based on the status or values of digital, analog, counter or calculated sensors (based on various sensors and logical or arithmetic operations). The actions are as varied as being able to carry out permanent, temporary or conditional stops applied to a program or to all of them, starting and/or stopping an irrigation process, issuing a warning, adjusting the irrigation or fertilizer units when the irrigation program starts according to an instantaneous value of a sensor or the integrated value from the previous irrigation, stop irrigation at a certain time, etc. In addition, each condition can be configured to generate an anomaly, activate an alarm output, send an SMS message, and send an SMS message to another machine.

As examples, we can highlight the use to end irrigation due to a pipe break, postpone irrigation due to lack of level or excessive wind, modify the volume of each irrigation in relation to the water content in the soil, to the solar radiation received by the plant from the previous watering or due to evapotranspiration, stop watering if a certain amount of rain has fallen since the previous watering, notify the owner for attempted theft, etc.

## FOGGING

Controls up to 8 nebulizations. Misting is used to cool and increase humidity in **greenhouses** by spraying pressurized water into the environment.

The control can be carried out by DPV (vapour pressure deficit), by temperature and/or humidity or by a condition.

## DRAIN SYSTEM

Control up to 20 drains. Drainage is used in **hydroponic crops** to remove salts from the reticular zone. To do this, a part of the irrigation water that enters the buckets has to come out or drain. The drainage is associated with a program, and the % of the irrigation water that has to be drained is configured in the program. To achieve this, you can modify the amount of irrigation, in the same irrigation or the next one, or the time between program starts. The conductivity and acidity of the drainage water can be measured, being registered in each irrigation.

## SOLAR IRRIGATION

One of the irrigation heads can manage a **hybrid power system** , solar panels and electric grid or diesel generator. Depending on the solar radiation, the equipment can decide with which type of energy it is going to irrigate, there is also the option of using both at the same time. You can decide the order in which the programs will water based on available solar power and program priorities. It allows the use of the same fertilizer by several programs that are irrigating at the same time. You can configure a schedule for the exclusive use of solar energy, and if there is irrigation left, it ends it after hours also using energy from the network.

## POINTS

It controls up to 4 pivots with start and stop control, position with GPS, autoreverse , speed control, sectorization and alarms. Irrigation can be by passes or time. It can start a diesel engine. They can also run on solar energy.

## MANUAL

With manual orders, irrigation programs can be started, stopped, put out of service or suspended at certain times; sectors in manual or automatic; out of service or general stop; start or stop filter cleaning; completion of alarms and faults; modify virtual sensors; sensor calibration or direct activation of the outputs.

## READINGS

The equipment keeps the history and event records with the anomalies of the last days.

The history saves, in periods of 10 minutes, the value of all **sensors** , **program** starts and filter cleaning, and if it is irrigating for each **sector** , the accumulated time and volume, pH and EC averages, etc.

In the program history, there is a record of everything that has been done during the last activation of the program, start date and time, amounts of irrigation and fertilizer, modifying factors, excess irrigation and fertilizer, etc.

When reading **anomalies**, you can see the list of events considered important, ordered by date and time.

When reading the log, you can see the list of all the events on the computer ordered by date and time.

## EXTERNAL MODULES

For remote management of valves, reading of sensors and meters, there are the **AgroBee-L** , **Agrónic Radio** and **Agrónic Monocable radio modules** . The AgroBee-L and Agrónic Radio use free bands that do not need legalization for environments of up to 2.5Km. The Agrónic Monocable can reach distances of up to 10 km with a two-wire cable. Up to two links from each of the systems can be connected.

From the AgroBee-L there is a wide variety of modules and sensors that can be read (see AgroBee-L Brochure R-2151). To carry out special controls such as management of irrigation heads, drainage, and others, there are **Expansion Modules** , connected with a two-wire cable to Agrónic, allowing these controls to be carried out at distances of up to 1 km.

There are also **External Modbus Devices** that are equipment not manufactured by Progrés but that can be connected via Modbus to Agrónic to read or write data. For example , read the power consumed by a pump, pass the pressure reference to a drive, etc.

AGRONIC 4500 PERFORMANCE SUMMARY		
HEADS	Number of heads: 1 or 4	
	For each head	
	PUMPING	General motors or valves: 6 Generator set or motor pump: 1 pressure regulation <a href="#">Solar pumping, including sum of solar and grid energy</a>
	FILTERS	Filter groups with different time: 3 Number of filters: unlimited <a href="#">Pressure reference for filter cleaning</a>
	FERTILIZATION	Fertilizers: 8
		Installation Type: series, parallel or <b>solar</b>
		Type of fertilization: <b>by CE, by CE entry</b> , Uniform, Proportional or Units (time or volume)
pH regulation: 1 or 2 ( <b>can be base</b> )		
<b>Phytosanitary treatments: 2</b> <b>Mixture of two irrigation waters</b>		
	Deposit volume control	
IRRIGATION	SECTORS	Number of sectors: 99 or <b>400</b>
		For each sector: Volume and energy counter flow sensor Type of crop and area for mass programming <a href="#">Pressure reference for irrigation</a>
	GROUP SECTORS	Number of groups: 40 Number of sectors per group: 20
	PROGRAMS	Number of programs: 40 or <b>99</b> Number of subprograms or positions: 12 or <b>20</b> Number of sectors in each subprogram: 10 individual or 40 using groups. Maximum sectors per program irrigating at the same time: 40
		Number of conditions: 6 Start times: 6 <b>drainage control</b> <b>Number of drains for all programs: 20</b>
<b>HYBRID SOLAR</b> <b>Number of heads with solar irrigation: 1</b>		
SENSORS	DIGITAL	Number of digital sensors: 80
	ANALOG	Number of analog sensors: 120
	ACCOUNTANTS	Number of counter sensors: 80 Counters with pulse, analog and frequency output Measurement of volume, energy and units Sum of several counters

	LOGICAL	Number of logical sensors: 20 Number of inputs for each sensor: 5 Type of inputs: digital sensor, conditioning, digital output, logic sensor, sector, analog sensor, counter sensor and analog output. Addition, subtraction, average, and and or operations	
CONDITIONING		Number of conditions: 120	
MISTING		Number of sprays: 8 Control by humidity / temperature or DPV	
POINTS		Number of pivots: 4	
EXTERNAL MODULES	AgroBee-L	Number of coordinators: 2 Number of modules for each coordinator: 20 Total number of modules: 40	
	External ModBus	Number of External ModBus devices: 32	
	Agrónic Monocable	Number of EAMs : 2 Number of MAM modules per EAM: 120 Total number of modules: 240	
	Agronic Radio 433	Number of EARs : 2 Number of MAR modules for each EAM: 60 Total number of modules: 120	
	Expansion Module	Number of Expansion Modules: 50	

Legend:

BASIC version	black color	
PLUS version	Color blue	
HYDRO option	Green color	
PIVOTS option	Orange	
SOLAR option	Red color	

The options only with the PLUS version.

### 3. MODELS AND OPTIONS

Team format:

- Box format. With plastic box and transparent door to hang on the wall.
- Embedded format. With metal box to embed in cabinet or desk.
- Front for Agrónic 4000 box format. To update an Agrónic 4000.
- Front for Agrónic 4000 embedding format. To update an Agrónic 4000.
- Front for Agrónic 7000. To update an Agrónic 7000.

Feeding:

- Unique 12 Vdc power supply model .
- External power supply from 220 Vac to 12 Vdc .
- Double voltage option for generator sets. 12 Vdc and 24 Vac outputs .

Valve Type:

- 12 Vdc valves .
- 24 Vac valves .
- Latch valves . Selectable 2 or 3 wires.

Departures:

- Models with 24, 40, 56, 72, 88 and 104 outlets.

Tickets:

- Analog inputs / outputs. Board with 6 inputs and 5 analog outputs (or pulsed).
- 2nd analogue inputs / outputs board. To expand with 6 inputs and 5 outputs.

Communication with the user:

- Cloud option. To connect with “Agrónic App” and “Agrónic Web”. An internet connection is required.
- PC + Cloud option. To connect with “Agrónic App”, “Agrónic Web” and “Agrónic PC”. You may need an internet connection.
- Modem Link. To connect to the internet via mobile phone. It includes the option of sending and receiving SMS messages.
- Wi-Fi link. To connect to the internet through a Wi-Fi network.
- USB link. To connect with "Agrónic PC" with a cable.

#### External Modules:

- AgroBee-L link option.
- Agrónic Monocable Option
- Agrónic Radio Option

#### Agrónic features:

- PLUS version: increases the number of sectors and programs. To activate the following options you must have the PLUS version.
- HYDRO option: allows hydroponic irrigation.
- PIVOTS option: allows the control of pivots.
- SOLAR option: allows the management of a solar power plant.

## 4. TECHNICAL CHARACTERISTICS

If an update is made from Agrónic 4000 or Agrónic 7000 to Agrónic 4500, the technical characteristics of the original equipment are maintained.

<b>overall power supply</b>		Equipment for direct current	
Strain		12Vdc – 24Vdc _	
Energy consumption		Less than 12W	
Fuse	Entrance	Thermal (PTC) 1.1A at 25°C, self-resetting	
<b>power supply outputs</b>		direct/alternating current	
Strain		From 12 to 24 Vdc either Vac (maximum 30V)	
Fuse	“R+” input	Thermal (PTC) 6A at 25°C, self-resetting	
<b>Departures</b>	digital	Number	24, expandable to 40, 56, 72, 88, 104.
		Guy	By relay contact, with 24 Vac potential (external transformer).
		Boundaries	30 Vac / 30 Vdc , 1 Ampere, 50-60 Hz, CAT II (per output)
	Analog/Pulsed (option)	Number	5 or 10
		Guy	4-20 mA (with galvanic isolation)
	All the outputs have double insulation with respect to the network input.		
<b>Tickets</b>	digital	Number	12
		Guy	Optocoupled , they operate at 12 or 24 Vdc either empty
	analog (option)	Number	5 or 10
		Guy	4-20 mA (with galvanic isolation)
		Number	1 or 2
		Guy	0-20 V (with galvanic isolation)
<b>Atmosphere</b>	Temperature	-5°C to 45 °C	
	Humidity	< 85%	
	Altitude	2000 m	
	Pollution	Grade 2	
<b>Weight (kg)</b>	Model wall box	2.0 to 3.0	
	Model Embed	3.0 to 4.5	

<b>Memory backup and clock</b>	
<i>Memory</i>	Maintenance-free, 10 years for parameters and programs in MRAM memory and records in FLASH memory
<i>Clock</i>	48 hours without food

### DECLARATION OF CONFORMITY

It complies with Directive 89/336/CEE for Electromagnetic Compatibility and Low Voltage Directive 73/23/CEE for Product Safety Compliance. Compliance with the following specifications was demonstrated as indicated in the Official Journal of the European Communities



#### Symbols that may appear on the product

protective earth terminal



Danger, risk of electric shock



Ground Terminal



double insulation



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



## 5 . PARAMETERS

### FUNCIONS

1. PROGRAMS
2. MANUAL
3. READINGS
4. **PARAMETERS**
5. FOGGINS
6. PÍVOTS

### PARAMETERS

- |                         |                      |
|-------------------------|----------------------|
| 01. <b>Head</b>         | 10. Pivots           |
| 02. Programs            | 11. Solar irrigation |
| 03. Sectors             | 12. Timer            |
| 04. Sectors groups      | 13. Various          |
| 05. Communications      | 14. Installer        |
| 06. Determining factors |                      |
| 07. Sensors             |                      |
| 08. Fogging             |                      |
| 09. Drain               |                      |

### 5.1. HEAD PARAMETERS

The head contains the necessary elements to prepare the irrigation water and the nutrients towards its hydraulic network. Being independent from each other allows for differentiated and highly flexible operations. Even the filtering can be autonomous per head or common to all of them. In case of having the basic version, the head is not asked.

Select the spindle number to configure

When you enter the configuration of the spindle, you must select the section that you want to parameterize.

### HEAD PARAMETERS

1. **Head 1**
2. Head 2
3. Head 3
4. Head 4

### HEAD PARAMETERS 1

1. Fertilization
2. Generals
3. Filters
4. Pressure regulation
5. Diesel engine
6. Mix of two waters

#### 5.1.1. Header - Fertilization

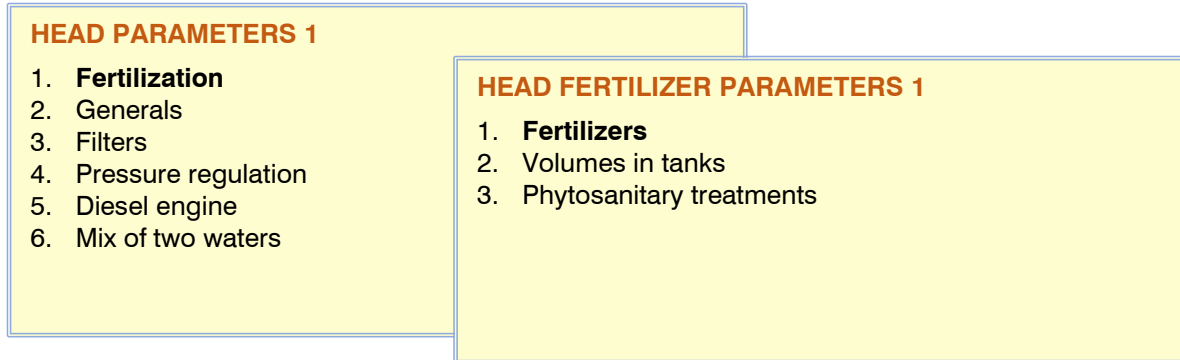
Each head can control:

- 8 fertilizers and 2 acids. The second acid can be a base. Depending on the base unit that is connected, the fertilizer outputs will be fixed or not.
  - o A4500 Base Unit: The outputs are not fixed, it can be any output.
  - o A4000 base unit: the outputs are not fixed, it can be any output.
  - o A7000 base unit: the analog outputs are fixed, but only for head 1, for the others they have to be configured.
- 2 phytosanitary treatments. Two outputs, FT1 and FT2, can be configured to apply phytosanitary treatments (root treatments, chelates, amino acids, etc. ). Treatment is applied by time or volume. After the start of each group of sectors or the subprogram, it waits for the configured time and activates FT1 or FT2. It does not take into account either the pre-watering or the post-watering . To be able to use it, you have to assign it an output in "*Parameters - Spindle - General*" .

- shakers. To remove fertilizer tanks before and during fertilization. There are 8 agitators, one per fertilizer.
- Fertilizer cleaning. When a fertilizer is finished, plain water can be applied for a while to clean the head. Cleaning is done at the end of each fertilizer. There are 8 cleaning outlets, one for fertilizer.

To use the different elements of the spindle, outputs must be assigned in "*Parameters – Spindle – General*".

## 1. Fertilizers



**No. of fertilizers:** number of fertilizers in the header (from 0 to 8).

**Fertilization:** indicates how the fertilization installation is in the header.

- "*Series*" : the fertilizers are applied one after the other. The type of fertilization can only be by units of time or volume. They can fertilize several programs at the same time if the same fertilizer is not repeated.
- "*Parallel*" : the fertilizers are applied all at the same time. In each program the type of fertilization that is going to have is configured, it can be "By EC", "EC input", "Uniform", "Proportional" or "Units".
- "*Solar*" : It is only used when the head is configured as "Hybrid Solar Irrigation". Solar irrigation can be used when the installation has a hybrid energy system: grid or diesel and solar panels together with a drive that admits alternating and continuous current input. In this modality the fertilizers are applied all at the same time. In each program the type of fertilization that is going to have is configured, it can be "By EC", "EC entry" or "Proportional". They can fertilize several programs at the same time using the same fertilizer. In practice, the programs that are fertilizing will coincide in the type and in the setpoint, if they do not coincide they will be waiting to be able to enter. It must be taken into account that in this modality fertilization can be paused, along with irrigation, due to lack of solar energy.

The default units and the volume format are configured in "*Parameters - Installer - Miscellaneous*"

**Minutes without shaking to pre-shake** : pre-shake will be carried out whenever the minutes programmed here have elapsed since the last shake (from 0 to 250').

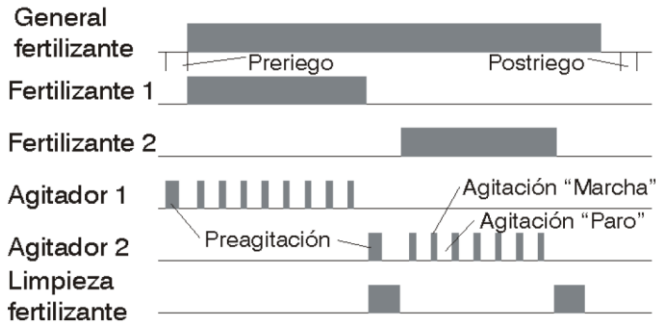
In parallel fertilization, you will ask the following question.

**Pre-agitation in pre-irrigation :**

- "*yes*" : it will start the irrigation and will do the pre-shaking during the pre-irrigation (provided that the fertilizer has stopped for longer than the time marked in the question "Minutes without fertilizing to pre-shake").
- "*no*" : the pre-shake will be carried out before starting the irrigation, provided that the fertilizer has been standing still for longer than the time marked in the question "Minutes without fertilizing to pre-shake".

Serial fertilization will work as shown in the image:

## Agitación / Limpieza fertilizante



For each of the 8 fertilizers it is configured:

**Pre-stirring** : time that the fertilizer will be removed before starting the fertilization (from 0 to 999”). In parallel fertilization, pre-mixing occurs before the program starts or during pre-irrigation as configured. In serial fertilization, pre-mixing is carried out during irrigation before entering each one of the fertilizers. If it has been less than the configured minutes since the previous watering, it does not pre-shake .

Shaking during fertilization can be continuous or with pauses.

**Stirring running:** time that will be stirring before a pause. If continuous stirring is desired, set the stirring pause to 0 and any time here (from 0 to 999”).

**Agitation stop:** time that the agitation will be stopped after a running time. If continuous stirring is desired, set this time to 0 (from 0 to 999”).

**No. sensor counter:** number of sensor counter associated with the fertilizer (from 0 to 80). A 0 has no associated counter.

**Expected flow:** expected maximum injection flow for this fertilizer. The units in which the flow is entered are those configured in "Parameters - Sensors - Counters" or if there is no counter in "000.0 L/h" .

**Text:** identifying text of the fertilizer. Maximum 9 characters.

### pH sensors:

**Regulation:** analog sensor number where the sensor to be used for regulation and the pH Error condition (from 0 to 120) are located. A 0 is not used.

**Security:** analog sensor number containing the sensor to be used for security and the security pH condition (from 0 to 120). A 0 is not used.

### EC sensors:

**Regulation:** analog sensor number containing the sensor to be used for regulation and the CE Error condition (from 0 to 120). A 0 is not used.

**Security:** analog sensor number containing the sensor to be used for security and the CE security condition (from 0 to 120). A 0 is not used.

**Input:** analog sensor number where the sensor that measures the EC of the input water is located. It is used to regulate the inlet EC and the water mixture (from 0 to 120). A 0 is not used.

**Acid 2. Regular acid/base:** Acid 2 can be a base.

- "acid" : an acid is applied. When injecting the pH drops.
- "base" : a base is applied. When injecting the pH rises.

**Acid in pre-irrigation :**

- "yes" : the pH is regulated during pre-irrigation .
- "no" : the pre-irrigation is only with water.

**Acid in post-priming :**

- "yes" : the pH is regulated during and after watering .
- "no" : the post-irrigation is only with water.

**Fertilizer cleaning** : time in seconds to clean the injector (0 to 255”). Common to all fertilizers. Cleaning will be done at the end of each fertilizer. It is recommended that this be done within the irrigation or post-irrigation time .

serial fertilizer cleaning , the general fertilizer output, the auxiliary output of each fertilizer and its cleaning output will open.

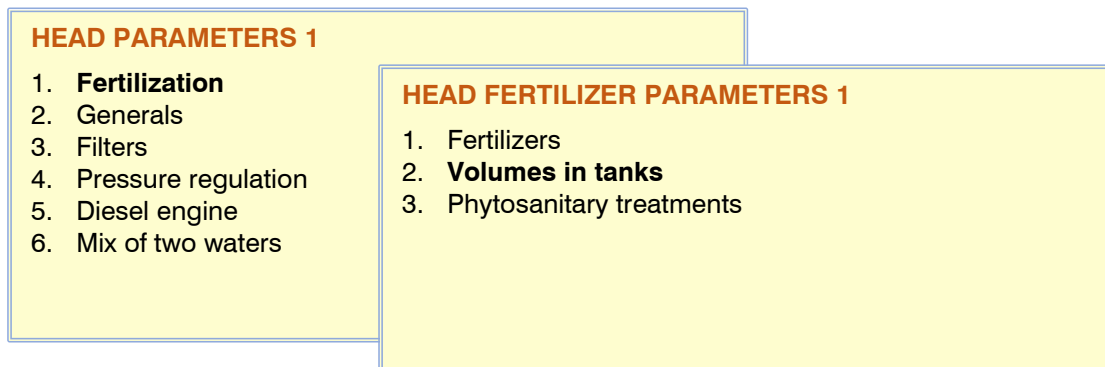
When a fertilizer cleaning is done in parallel, the general fertilizer output, the output of each fertilizer (injector) and the cleaning output of each fertilizer will be opened.

#### Fertilization conditions:

Edit or create the conditions linked to the fertilization of the head, just as can be done in the "*Parameters - Conditions*" section

- EC Error, pH Error, 100% EC, 100% pH, EC Ratio
- Modify EC fertilizer or units

### 2. Volumes in deposits:



**Fertilizer tank:** number of fertilizer to which the measurement of the volume of its tank is going to be configured.

**Shape:** choose the shape of the tank to be able to determine the volume relative to the height of the liquid.

*[cylindrical] [conical] [cubic]*

Cylindrical tank dimensions:

**Diameter :** from 0 to 99.99 m.

Conical tank dimensions:

**Upper diameter :** from 0 to 99.99 m.

**Lower diameter :** from 0 to 99.99 m.

Cubic tank dimensions:

**Side 1 :** from 0 to 99.99 m.

**Side 2 :** from 0 to 99.99 m.

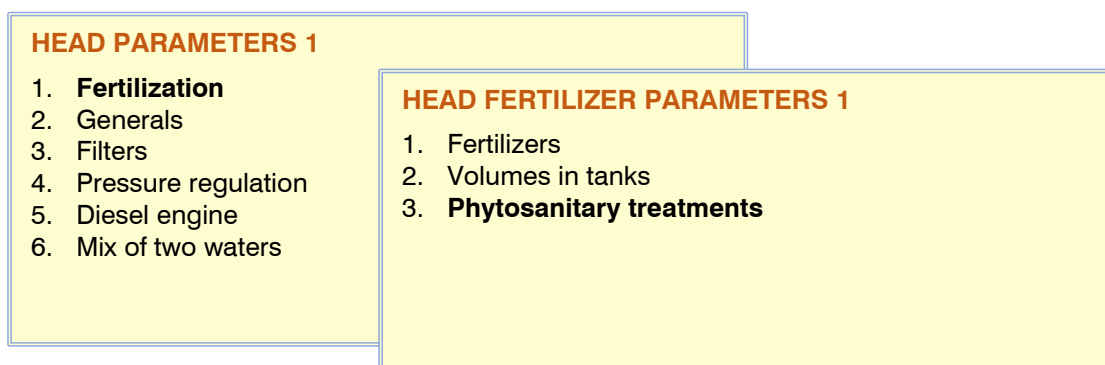
**Maximum liquid height :** height at which the tank capacity is reached (from 0 to 9999 mm).

**Sensor height :** height of the sensor at the bottom of the tank (from 0 to 9999 mm).

**Warning volume :** volume level below which a recording will be made [8.2] (0 to 9999 L). In "*Parameters - Installer - Events*" you can prepare to activate an alarm output, receive a notification or an SMS . [Delay to detection of 60 seconds, differential of 5% of full capacity].

**Sensor number :** analog sensor that will take the measurement (from 0 to 120). Ultrasonic level sensor connected to an AgroBee-L transmitter or module.

### 3. Phytosanitary treatments:



**Units:** determines the units of phytosanitary treatments. It is common for all programs whose sectors are assigned to this head.

- "hh:mm" : hours and minutes.
- "mm:ss" : minutes and seconds.
- "L" : liters. You need to have a counter sensor configured.
- "L/ha" : liters per hectare. You need to have a counter sensor set to the fertilizers and the area of each sector. Adding the total area of the sectors to be irrigated, calculate the liters of fertilizer.

**Volume format:** when the units are by volume, here it is determined in which format they will be entered.

[00000 L] [0000.0 L] [000.00 L] where L is liters.

**TF1 counter:** counter sensor number associated with phytosanitary treatment 1 (from 0 to 80).

**Text TF1:** text identifying treatment 1. Maximum 9 characters.

**TF2 counter:** counter sensor number associated with phytosanitary treatment 2 (from 0 to 80).

**Text TF2:** identification text of treatment 2. Maximum 9 characters.

### 5.1.2. Head – General

In this section, the outputs where the motors or general valves, fertilizers and other elements involved in the management of the head are to be connected are configured.

When an output is not used, it should be left at 0.

"Inputs and outputs coding" section to know how to code the outputs.

#### HEAD PARAMETERS 1

1. Fertilization
2. **Generals**
3. Filters
4. Pressure regulation
5. Diesel engine
6. Mix of two waters

#### GENERAL HEAD PARAMETERS 1

1. Filters
2. Pumps
3. Fertilizers
4. Acids
5. Phytosanitary treatments
6. Alarm
7. Mix of two waters
8. Diesel

#### 1. Filters:

The number of filters is determined and the outputs where they must be connected are assigned.

**General outlet filters:** outlet of the general valve for cleaning the filters. It is activated for the entire duration of the cleaning, including the pause between filters. Leave at 0 if not used.

**Filter Outputs:** when cleaning filters, it is assigned to which output the first and last filter is connected. The filters between the first and the last must be connected to the outputs between the two assigned.

Example: there are 4 filters, the outputs Filter 1: 00010, Filter 4: 00013 are assigned. The filters must be connected to the following outputs: FL1: 10, FL2: 11, FL3: 12 and FL4: 13. The number of outputs between the one assigned to the first filter and the last one determines the number of filters.

#### 2. Engines:

In order to use the motors, they must be assigned an output together with the timings to avoid water hammer.

For each of the 6 main motors or valves:

**Motor output:** output where the motor is connected.

**Start timing:** time delayed for motor activation when starting (from 0 to 250").

**Stop time delay:** time that the motor stop is extended (from 0 to 250").

**The strike to the sectors:** "*Yeah*" if you want the motor to stop at the end of irrigation and the sectors remain open for a few more seconds.

**Analog pressure output:** 4-20 mA (or 0 – 10 V) output that corresponds to 0 to 100% of the drive or to the reference for motors 1 and 2.

The analog output of motor 2 will always follow the same value as motor 1, to perform the "multi-follower" function (not available on the A7000 base).

**Pipe filling time:** time that the activation of the motor is delayed when starting the irrigation (when the motors start for the first time). Useful, for example, for the motors to start in stages in the pipe filling operation. If when starting the motor there are already others that were running, this time will not apply, but rather the "run timing" (from 0 to 999").

**Text:** identifying text of the engine. Maximum 9 characters.

### **3. Fertilizers:**

**General Output:** output of the pump for the injection or the general valve of the fertilizers. It is not activated by phytosanitary treatments.

For each of the 8 fertilizers:

**Fertilizer outlet:** outlet where the fertilizer valve (or injector or Venturi) is connected. If the type of fertilization is by CE regulation, you can also use the "fertilizer analog output". In uniform and with a long modulation cycle this output will be used.

**Agitator output:** output where the agitator is connected. The same output can be repeated in other agitators (if a blower is used, for example. In this case, the start and stop times must be identical).

**Auxiliary output:** auxiliary output that will be active as long as the fertilizer is active (where the output of the fertilizer tank is connected in parallel, or for example the dosing machine in series). It can be repeated with other auxiliaries.

**Cleaning output:** output for fertilizer cleaning. They can be repeated between them.

**Fertilizer analog output:** when the type of fertilization is by EC regulation, uniform or proportional to the expected flow, it can work with a 4-20mA/0-10V output or by fast pulses (short modulation cycle), which corresponds to 0 at 100% injection.

**Text:** identifying text of the fertilizer. Maximum 9 characters.

### **4. Acids:**

Assignment of output of acids. The outlets must be specific for acid. It may vary depending on the base of the team.

**General Outlet:** outlet of the acid injection pump. The same output can be assigned as the "General Fertilizer"

**Acid outlet 1:** outlet where the acid valve is connected, it will open whenever the injection is being regulated.

**Acid outlet 2:** outlet where the acid valve is connected, it will open whenever the injection is being regulated.

**Acid 1 analogue output:** 4-20mA/0-10V or pulsed output that corresponds to 0 to 100% injection.

**Acid 2 analogue output:** 4-20mA/0-10V or pulsed output that corresponds to 0 to 100% injection.

### **5. Phytosanitary treatments:**

**TF1 outlets:** outlet where the phytosanitary treatment 1 valve is connected.

**TF2 outlets:** outlet where the phytosanitary treatment valve 2 is connected.

### **6. Alarm:**

The alarm is activated when an event occurs that has the alarm activation configured or a condition is activated. The list of events is in the "*Readings - Record*" section and its activation is configured in "*Parameters - Installer - Events*". Conditions are configured in "*Parameters - Conditions*".

The alarm is deactivated manually in "*Function – Manual – End shutdowns*".

If the alarm has an output assigned, it is activated continuously or it can intermittently. A light, a siren, etc. can be connected to this output to notify us that an event has occurred that requires our immediate attention. The alarm is common to all 4 heads and is asked in the first one.

**Alarm output:** alarm output.

**Running time:** time that the alarm output will be activated (from 0 to 250"). At 0 the output is not activated.

**Stop time:** time that the alarm output will be stopped (from 0 to 250"). It is used to make the alarm output flash when it is activated. At 0 the output is always active.

## 7. Mixture of two waters:

If the mixture of two waters of different salinity is used, the outputs must be assigned to open and close the regulation valves.

The outputs cannot be in external modules, they have to be in the base.

Valve 1 corresponds to the water with the lowest salinity and valve 2 to the one with the highest salinity.

Valve 2 may not exist, in this case leave the outputs at 0.

**Valve 1 open output:** output where the valve 1 open command is connected.

**Valve 1 close output:** output where the valve 1 close command is connected.

**Valve 2 open output:** output where the valve 2 open command is connected.

**Valve 2 close output:** output where the order to close valve 2 is connected.

## 8. Diesel

The assignment of the outputs is limited to the base or expansion modules.

**Starter output:** Output where the starter is connected

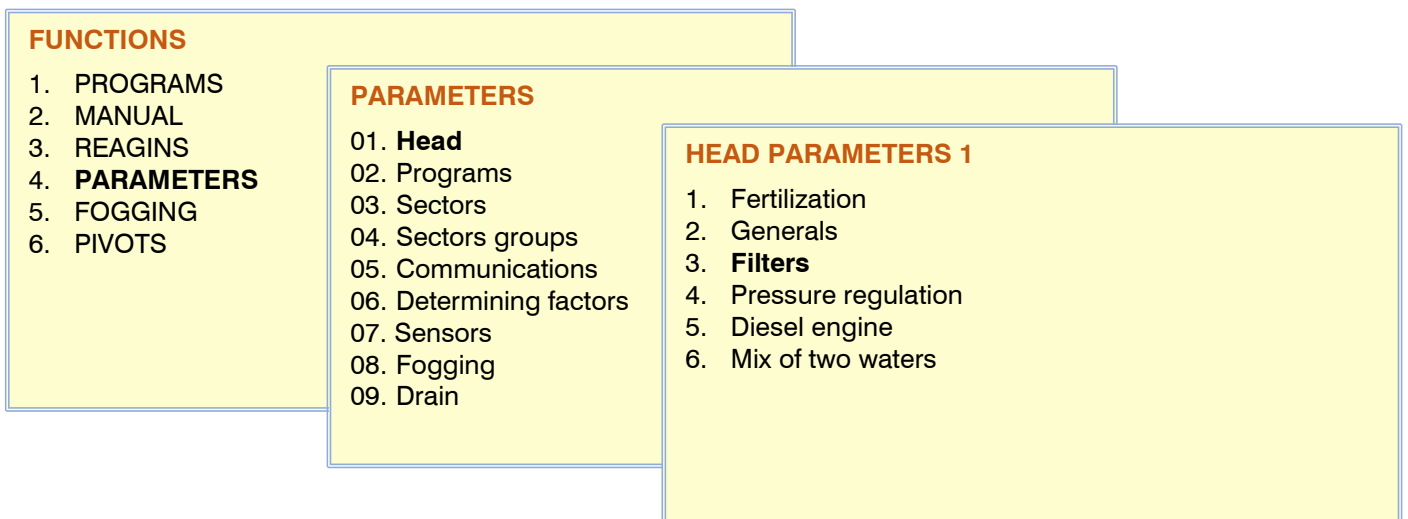
**Stop output:** Output where the stop is connected

**Contact output:** Output where the contact is connected

**Preheating output:** Output where the preheating is connected

### 5.1.3. Head – Filters

The head can control the cleaning of a large number of filters. Filters can be divided into up to 3 filter groups with a cleaning time for each. Cleaning can be started manually or automatically. It starts automatically due to a differential pressure switch, due to the difference between two pressure sensors or due to a time or volume of water having passed through the filters, and it will only be done if the general one assigned to the filters is activated, that is, when there is some program watering. It can be done manually when desired from "Manual – Filters".



#### Head Filters 1

In head 1 you can configure a filter cleaning common to all the heads.

**General filter for all heads:** only asked in head 1.

- "yes" : these filters are common to all irrigation heads. The filters can be associated to the motors of all the heads.
- "no" : these filters only affect spindle 1. The filters can only be associated with the motors of spindle 1.

In "Parameters - Head - General - Filters" the total number of filters in the output assignment is determined.

#### For each head, there are three groups of filters

The total number of filters can be divided into up to three sections with different times for each one.

**Number of filters:** Number of filters to which the same cleaning time will be assigned. Example:

In General Head, outputs have been assigned for filters from R1 to R10 (therefore, there are 10 filters).

*Filter group 1. Number of filters: 7. 120"*

*Filter group 2: Number of filters: 3 60"*

It means that the first group of filters goes from 1 to 7 and 120" are going to be cleaned. The second group goes from filter 8 to 10 and they are going to clean 60".

**Activation time per filter:** time that the water will pass through each filter to perform the cleaning (from 0 to 999"). 18 filters have been configured in "Parameters - Head - General" and we want a time greater than the first three, we would do: filter 01 to 03 a time of 058" and filter 04 to 18 a time of 040".

Do not confuse the filter number with the number of your physical outlet.

If a group is not necessary, the values will be left at 0.

**Initial wait:** it is the time that waits between the activation of the general filters and the cleaning of the first filter (from 0 to 999").

**Pause between filters:** waiting time between the closing of the cleaning of a filter and the activation of the next one (from 0 to 99").

Start of cleaning. Filter cleaning can start automatically for two reasons: because a certain amount of water has passed through the filters or because there is a sensor indicating that they need to be cleaned.

**Units Between Cleanings:** Time or irrigation volume that must pass through the filters for an automatic cleaning to begin. Time in minutes (0 to 9999') and volume in m3 (0 to 9999 m3).

Filter pressure switch. Differential pressure switch between the inlet and outlet of the filters. The pressure switch is connected to a digital input; when activated cleaning is done. The status of the pressure switch is only checked when it is being watered.

**Input number:** digital input where the pressure switch is connected.

**Delay:** delay in the detection of the pressure switch input (from 0 to 999").

Pressure diferencial. Difference between the inlet and outlet pressure of the filters. Activates cleaning when this pressure difference reaches the reference. Pressure is only checked when irrigating. The formats and units of the two sensors must be the same.

**Input sensor number:** analog sensor number connected to the input of the filters. The sensor has to be connected to a base input (0 to 120).

**Output sensor number:** analog sensor number connected to the output of the filters. The sensor has to be connected to a base input (0 to 120).

**Reference:** pressure difference above which cleaning will start. The reference has to be the inlet pressure minus the outlet pressure.

**Delay:** time that the pressure differential must remain above the reference to start cleaning (from 0 to 999").

**number of consecutive cleanings:** if cleaning is started by a pressure switch or by a differential sensor and it is always activated, at most it will do the cleaning configured here, then it goes into fault and will not do any more cleaning until it is manually reset (from 0 to 9). . Continuous cleaning is considered if it takes less than 5 minutes from the end to the beginning. At 0 it never fails. To reset the cleaning, go to "Manual – Filters" or to "Manual – Finish Shutdowns and Breakdowns" .

**Clean:** time when cleaning is done. Auto cleaning is only done if units have passed between cleanings or pressure indicates. You also need the program you are watering to have a motor related to cleaning activated.

- "during irrigation" : it is done at the time indicated by the pressure or the units between cleanings.
- "irrigation start" : it is done before starting a new irrigation program. The cleaning start condition must have occurred in the previous watering.

**Stopping sectors:** if cleaning is during irrigation, you can select whether or not you want to postpone irrigation while it is being done. If the cleaning is done at the beginning of the irrigation, it does not matter because there will never be open sectors.

- "yes" : programs that have sectors related to the engine used by cleaning are postponed. When the cleaning is finished, the programs continue at the point where they were. Used when sectors must be closed during cleaning to maintain pressure. Fertilization also stops when stopping sectors.
- "no" : the programs continue active during cleaning and the irrigation sectors are not closed.

**Fertilizer stop:** if cleaning is during irrigation, you can select whether or not you want to postpone fertilization while it is being done. The sectors continue to irrigate. If the cleaning is done at the beginning of the irrigation, it does not matter because there will never be fertilization. Includes fertilization, acid application and treatments.

- "yes" : the fertilization of programs that have sectors related to the engine used by cleaning is postponed. When the cleaning is finished, the fertilization continues. The irrigation does not stop. It is used when you do not want to lose fertilizer during cleaning.
- "no" : the fertilizer remains active during cleaning.



If the cleaning mode is "during watering" and the program ends with a filter cleaning that has not finished, the cleaning will pause and continue from the same point at the next watering start.

**Relationship with M1, M2, M3, M4, M5, M6:** indicates which main motor/valve drives or opens the water that passes through the filters. Let's see the benefits linked to these assignments:

- Count the time of use of any of the motors assigned here to carry out the cleaning by units of time of use of the filters.
- Count the volume circulating through the filters while using any of the motors assigned here. Once the threshold is exceeded, the filters will be cleaned.
- Start the motors assigned here when the sectors stop when carrying out a filter wash.
- Take into account the pressure switch or the pressure differential when using any of the motors.

If it is spindle 1 and it has been configured to filter for the rest of the spindles, the relationship with the rest of the spindle motors will be entered.

The outputs where the filters are connected are assigned in "Parameters – Head – General" .

#### 5.1.4. Head – Pressure regulation

The head can regulate the irrigation pressure and filter cleaning with an analog output connected to a variator. In irrigation, the desired pressure is set in the sector, in filter cleaning it is set in this section. To indicate that a sector or filter cleaning is going to use pressure regulation, motor 1 will be assigned.

If the analog output is configured for motor 2, it will also regulate by copying the output of motor 1 (follower mode of motor 1).

There is the possibility of configuring a minimum regulation output value, to ensure that it does not drop below that value and to keep the motor at a minimum speed.

The Agrónic can make the regulation by means of a PID control or directly deliver the reference to the drive so that it can make the regulation. All of this is configured in the " Parameters - Installer - Head - Adjustments" section .

**Regulation sensor:** When the Agrónic makes the regulation. Analog sensor number where the pressure sensor to be used for Pressure Regulation is connected (from 0 to 120). A 0 is not used. The sensor format must be in bars and with two integers and one decimal.

**Filter cleaning pressure:** pressure reference that must be maintained when cleaning filters (from 00.0 to 20.0 bars). With a value of zero the pressure assigned to the sectors will be used.

**Manual filter cleaning pressure:** Pressure for manual filter cleaning if there are no active sectors and there is no filter cleaning pressure set (from 0.00 to 20.0 bar) (it is only asked if there is no "filter cleaning pressure" set).

**Pressure of the sectors:** when there is more than one sector irrigating, each one with its configured pressure, you have to choose which one will be used as a reference.

- "Maximum" : the reference will be the maximum of the sectors that are irrigating.
- "Minimum" : the reference will be the minimum of the sectors that are irrigating.

#### 5.1.5. Head – Diesel engine

Agrónic manages the start, stop and fault control of a motor pump or generator set. The engine can be diesel or gasoline and must have an electric starter.

##### Functioning:

The diesel engine is related to engine 1. It starts when a sector that uses engine 1 is opened and stops when the last sector that uses engine 1 is closed.

First the sector opens, after the water hammer time, the output of the contact and preheating of the diesel engine is activated. At the end of the preheating, it activates the start output. If the pressure switch input is activated, the diesel engine has already started and irrigation starts. If after the boot time it has not been activated, it waits 30" and makes another boot attempt. If it fails to start the diesel engine in 4 attempts, it activates the stop output, enters "Fault" and makes a record. At the next watering start, it will try to start the motor again.

If the boot time is 0, it does not perform the above boot process.

At the end of the irrigation, it closes the sectors and the pump performing the water hammer timings and once the "pump end" time has elapsed, it activates the stop.

In the " Query - Heads " you can see the status of the diesel engine.

**Diesel:** the use of the control of a diesel motor pump or a generator set must be confirmed.

pressure switch To detect that the motor is running, a pressure switch is used; Its function is twofold, one to detect start-up when making starting attempts and, once finished, to detect the lack of oil pressure.

**Input:** digital input where the diesel pressure switch is connected. The input must be in the base or in the base expansion module.

**Delay:** delay in the detection of the pressure switch input (from 0 to 99”).

**Preheating:** time that the preheating output (Pr) is activated before starting the diesel engine (from 0 to 99”).

**Start:** time that the start output (Ar) is activated to start the diesel engine (from 0 to 20”).

**Stop:** time that the stop output is activated ( Pa ) to stop the diesel engine (from 0 to 999”).

**Pump input:** time between when the diesel engine is running and when the output of "Motor 1" is activated (from 0 to 999”).

**Pump end:** time between the “Motor 1” output stopping and the diesel engine stopping (from 0 to 999”).

#### GENERAL PARAMETERS

Diesel: y/n  
Pressure switch:  
Entry: 00000009  
delay: 20”

Preheat: 08”  
Boot: 04”  
Stop: 060”

Pump inlet: 085”  
Pump end: 120”

### 5.1.6. Head – Water mix

This control allows the mixing of two waters of different salinity to achieve a certain conductivity. The mixture is done by regulating one or two motorized valves. The desired conductivity reference is set in the program; when the program is started, the water mixture is also activated. No two programs can be active using the mix at the same time.

When the program starts, the valves are placed in the position they were in the last watering. If it is the first time you water, valve 1 (less salinity) opens to 50% and valve 2 (more salinity) opens to 100%.

If you only want to work using a single valve, you must use valve 1 (low CE).

The mixture uses the input EC sensor and is configured in "Parameters - Header - Fertilization" .

**Activate:** the use of the mixture must be confirmed.

**Start delay:** when the water mix starts, the valves are placed in the initial position and wait for the time set here before starting the regulation (from 0 to 999”).

**Margin:** If the EC sensor reading is not above Reference + Margin, or less than Reference – Margin, the valves do not move. It is to avoid continuous movements of the valve (from 0 to 1.0 mS).

**Position by:** to determine the position of the valves there are two systems.

- **“time”** : the total opening time of the valve is indicated and the equipment calculates its position based on how long it has been in motion. This system may have errors in position.
- **“sensor”** : the valves have an analog sensor that indicates their position to the equipment. It is a system without position errors and faster than the previous one.

**Hold position :**

- **“yes”** : it will keep the position of the valves at the end of the irrigation.
- **“no”** : then it will fix the position of the values of the next question.

**Position V1 and V2:** position in which the valves will remain at the end of the regulation, only if it has been configured not to close the valves at the end. From 0 to 100%, at 0% they remain closed.

#### HEAD PARAMETERS 1 WATER MIX

Activate: yes  
Start delay: 012”  
Margin: 0,2 mS  
Position by <time>  
Valve position at the end  
Mantain position: no  
V1 position: 020 %  
V2 position: 060 %

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For each valve:

**Opening time:** it only asks if the position is due to time. The time it takes for the valve to go from fully closed (0%) to fully open (100%). If there is no valve, leave this value at 0. The minimum time to make a correct adjustment is 60" (from 0 to 999").

**Position sensor:** it only asks if the position is by sensor. Analog sensor number where the valve position sensor has been connected (0 to 120). The sensor has to be from 0% (valve closed) to 100% (valve open).

**Minimum movement:** if an order to move the valve does not exceed the % set here, it will not be done (1 to 20%).

**Pause time:** after making a movement, the valve waits for the time set here (from 1 to 99") to make the next one.

**Minimum opening:** when regulating, the valve does not close below this value (from 0 to 99%).

### Conditioning mix:

Edit or create the conditioning factors linked to the head water mixture, just as can be done in the "*Parameters - Conditioning Conditions*" section

- Mistake EC mix
- Add.

To use the water mixture, the HYDRO function must be activated.

### HEAD PARAMETERS 1 WATER MIX

Valve 1, EC low  
 Opening time: 090"  
 Minimum movement: 00 %  
 Pause time: 07"  
 Minimum opening: 00 %

Valve 2, EC high  
 Opening time: 090"  
 Minimum vement: 00 %  
 Pause time: 07"  
 Minimum opening: 00 %

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## 5.2. PROGRAM PARAMETERS

The programs are those that manage the irrigation and fertilization of the crops. They control the opening and closing of sectors, fertilization and conditions.

**Program:** program number to be configured (from 1 to 40 or from 1 to 99 with PLUS version).

**Type of program:** there are two types of programs depending on how the activation of the sectors and fertilization are organized.

- "*Subprograms*" : works like Agrónic 4000. There are 12 or 20 subprograms with 10 sectors or groups of sectors each. Irrigation and fertilization are indicated in each subprogram.
  - o **Alternate:** answering "*yes*" will start the irrigation in the next subprogram than the one it did in the previous activation, with the alternation it is avoided that a subprogram always operates in the same period of time.
- "*Linear*" : works like the Agrónic 7000. There are 12 or 20 sectors or groups of sectors that can be grouped as desired to irrigate together. In each sector, its irrigation units are indicated. Fertilization is unique for all sectors.
  - o **Group each:** sectors of the group will be activated together (from 1 to 20). When the irrigation of a group ends, it starts to activate the next one. If the sectors of a group have different amounts, it will not go to the next one until the last sector of the group has finished. Here it is indicated how many sectors there are per group. With 1 it activates one sector after another, with 2 it activates two at the same time, etc.

**sequential start:**

- "*yes*" : the program will start when another program ends
- "*no*" : the program will start due to time conditions (times/dates) or sensors.

**Watering days:** only asked if it is not sequential.

- "*weekly*" : the program will ask for the days of the week. For example, water on Mondays and Thursdays.
- "*frequency*" : the program will irrigate by frequency of days. For example, water every 3 days.
- "*calendar*" : the program will ask for 5 watering days with day/month format.

**Irrigation Units:** Determines which units the program will use for irrigation.

- "*hh:mm*" : hours and minutes (from 0 to 99:59).
- "*mm:ss*" : minutes and seconds (from 0 to 99'59").
- "*m3*" : cubic meters. As configured in "*Parameters - Installer - Miscellaneous*" the value is entered with the formats [00000 m3], [0000.0 m3], [000.00 m3] (from 0 to 65000 / 6500.0 / 650.00 m3).
- "*m3/ha*" : cubic meters per hectare. You need the area of each sector to be configured. Adding the total area of the sectors to be irrigated in the program determines the m3 of the program (from 0 to 650.00 m3/ha).
- "*m3/ha(t)*" : time per hectare. You need to have configured the expected flow and the area of each sector. The irrigation programming is in "m3/ha" but the irrigation will be done in "hh:mm". Adding the total area and the expected flows of the sectors to be irrigated converts the m3 of the program to irrigation time. (from 0 to 650.00 m3/ha).
- "*mm*" : millimeters or sheet of water (1 mm = 10 m3/ha). You need the area of each sector to be configured. Adding the total area of the sectors to be irrigated in the program determines the m3 of the program (from 0 to 99.00 mm).

When the units are volume (m3, m3/ha or mm) you need to have a counter sensor configured in the sectors. In each subprogram or linear position there must be at least one sector with an assigned counter, otherwise it will not irrigate .

The unit format in "m3/ha" or "mm" gives us the possibility of operating by performing "Mass Programming", as easy as sending an order from "App/Web/PC" of, for example, watering 4.1 mm of application to all the sectors of the same crop to all my programmers or to part of them, with this it is avoided to go to each programmer and in each one of them to each program that contains sectors with the crop to modify one by one the units of irrigation.

**Fertilization Type:** Type of fertilization the program will do if parallel fertilization is used. The type of fertilization is linked to the fertilization system configured in the header.

- "*units*" : it is going to apply a certain amount of each fertilizer continuously. The quantity can be in time or in volume. If it is by volume you need a counter on each fertilizer. Assign this type when fertilization is serial, there is no other possibility.
- "*CE regulation*" : you are going to follow a CE reference by injecting fertilizer. The proportion that must be followed between the 8 fertilizers is configured.
- "*CE entry*" : it will follow a reference of CE by injecting fertilizer. The reference is calculated from the EC value of the inlet water. Two reference points and two inlet water value points are configured, with this two straight lines are made for the calculation of the reference to follow. The proportion that must be followed between the 8 fertilizers is configured.
- "*uniform*" : it will apply a certain amount of each fertilizer, injecting it in small doses throughout the irrigation. The quantity can be in time or in volume. If it is by volume you need a counter on each fertilizer.
- "*proportional L/m3*" : it will apply a proportion between fertilizer and irrigation, x liters of fertilizer for each x m3 of irrigation. fertilizer unitsdeben ser en volumen.
- "*proportional cl /L*" : it will apply a proportion between fertilizer and irrigation, x centiliters of fertilizer for every x liters of irrigation. fertilizer unitsdeben ser en volumen.

**In proportional fertilization, use** : choose the appropriate operation for the injection of fertilizers when using the proportional one.

- "*Counter pulses*" , implies the use of counters in the fertilizer and in the irrigation , at the arrival of each pulse it will discount the corresponding volume in the proportion. Every time the irrigation rate reaches zero it will reload the volumes in proportion.
- "*Predicted flow*" , the regulation by flow takes from the irrigated sectors the expected flow together with the expected flow of each fertilizer, with this it calculates the opening times of the venturis or the speed of the injector with its variator. It is not necessary to have counters, but if there are in irrigation-fertilizer they will be used to generate the accumulated history of the sectors.

**Units:** Determines the fertilizer units for this program.

- "*hh:mm*" : hours and minutes.
- "*mm:ss*" : minutes and seconds.
- "*L*" : liters. You need to have a counter sensor configured.
- "*L/ha*" : liters per hectare. You need to have a counter sensor set to the fertilizers and the area of each sector. Adding the total area of the sectors to be irrigated, calculate the liters of fertilizer.

**What acid does it use:** configures which of the two acids in the head it will use. For a program to use the acid, it must have a reference configured in the programming section.

- "acid 1" : it will regulate using acid 1.
- "acid 2" : will regulate using the acid 2 or base.

**Phytosanitary treatments:** indicates whether the program is going to use the two phytosanitary treatments available to the head.

**F1 treatment:** "if" treatment 1 is going to be used.

**F2 treatment:** "if" treatment 2 is going to be used.

**TF1 delay:** delay between the start of each irrigation group of the program or subprogram and the start of treatment 1 (from 0 to 99'59").

**TF2 delay:** delay between the start of each irrigation group of the program or subprogram and the start of treatment 2 (from 0 to 99'59").

**Start by condition:** if the program starts by condition, the following controls can be configured:

**Safety time between starts:** when the program starts as a condition, it will not be taken into account again until the time configured here has elapsed. It is a security to avoid continuous risks if the sensor breaks down. It only works within the active schedule (from 0 a23:59), at 0 there is no control.

**Safety time due to lack of starts:** when the program starts due to a condition and it takes longer than the time configured here without watering, it will water from time to time. It is a security to avoid running out of water in case of sensor failure. It only works when it is within the active schedule or active day (from 0 a23:59), at 0 there is no control.

**Safety watering every:** How often will the safety watering be done. You have to have set the previous point (from 0 a23:59), to 0 there is no control. To end the security irrigation go to "Manual – Programs – End security irrigation".

**Finish outside of the active schedule:** when leaving the active schedule you can "stop" ending the program, "do not stop" continuing with the programmed watering or "postpone" leaving the irrigation on hold to finish it when you re-enter the active schedule. The program started by "manual" order will not take into account the end by active schedule.

**Priorities:** by means of the operational, group and priority parameters, it is possible to prevent or not that two programs water at the same time or that one postpones the other. The priority is linked to all the heads.

**Operational: Exclusive :**

**Group:** group number to which the program belongs. Two programs from the same group cannot irrigate at the same time, they will do so if they are from a different group and do not share sectors or fertilizers. If it is left at 0, it does not belong to any group and will always irrigate (from 0 to 99).

**Priority:** when a program starts and there is another, from the same group (from 1 to 99), watering, the one with the highest priority waters and the other is postponed. From 1 highest priority to 99 lowest priority. When there is more than one program on hold and one of them can enter, the one that has been delayed the longest will do so.

**Operational: Inclusive :**

\* In Normal Irrigation:

**Group:** group number to which the program belongs. Two programs from different groups can irrigate at the same time, if they are from the same group they can irrigate at the same time if they have the same priority, and they do not share sectors or fertilizers. If it is left at 0, it does not belong to any group and will always irrigate (from 0 to 99).

**Priority:** when a program starts and there is another, from the same group (from 1 to 99), watering, the one with the highest priority waters and the other is postponed. If they are of the same priority, both water. From 1 highest priority to 99 lowest priority.

**Sub priority:** Only operative when "solar irrigation" is active to extend the priority logic.

\* In Solar Irrigation:

**Group:** group number to which the program belongs. Two programs from different groups can irrigate at the same time, if they are from the same group they can irrigate at the same time as long as the priority allows it together with the available energy, and they do not share sectors or fertilizer with different EC/pH value or proportion. If it is left at 0, it does not belong to any group and will always irrigate (from 0 to 99).

**Priority:** when a program starts and there is another, from the same group (from 1 to 99), watering, the one with the highest priority waters and the other is postponed. If they are of the same priority, both water. From 1 highest priority to 99 lowest priority.

**Sub Priority:** When there is enough power, it will let the programs that have more sub priority act, it will also let programs with lower sub priority enter if the ones with higher sub priority do not match the available power. From 1 maximum sub priority to 99 minimum sub priority.

There will be no priority control between programs with different priority operations, priority control is carried out between those of the same operation.

**Irrigation curves:** Using the watering curve, watering and fertilizer can be modified according to the time of day the program starts. The curves are configured in programming.

**Use irrigation curves:** Answering “yes” this program will take the curves into account.

- “yes” : the program will take into account the irrigation curve. The curve is going to be entered in the programming.
- “no” : the program does not take the irrigation curve into account. The curve does not appear in the programming.

The following question only appears if the program has been configured with the units "mm", "m3/ha" or "m3/h(t)", and the irrigation days are by "Frequency":

**Irrigation by ETc :** Y/N, when irrigating by ETc (Evapotranspiration) the objective is to restore the water consumed by the plant. Each irrigation sector is configured with a crop and a parameterization from the Cloud ( ETo , effective rainfall, day of vegetative state on the Kc, correction factor, etc.)

To know the sheet of water evaporated, each sector linked to a crop receives the evapotranspiration value in hourly bands from the cloud. This value is corrected by the calculation of the "effective rain". When starting irrigation, the first sector of a subprogram automatically determines the amount of water from this value.

From the cloud, for each crop, a minimum and maximum irrigation value can be configured, as well as a security irrigation in case of communication failure.

The program has to irrigate by “m3/h”, “mm”. In this case it is necessary to have counter sensors configured in the sectors.

In the case of wanting irrigation by time, there is the possibility of irrigating by "m3/ha(t)", which, based on the mm of ETc received and the expected flows of the sectors, becomes the irrigation value to “ hh:mm ”.

The start of irrigation has to be by frequency of days and use a single start time. Several activations can be configured, in this case the irrigation value will be divided among them. The irrigation curves will not be operational in this condition.

**Determinants:** Up to six determinants that affect the program can be configured. The numbers (out of 120) are entered here . 0 aLeaving 0 there is no condition. By means of the conditioning factors, the program can be started and stopped, irrigation and fertilizer modified, stop due to alarms, etc. Programs with sequential startup cannot have startup conditions.

Edit or create the conditioning factors linked to the program, as can be done in the "*Conditioning Parameters*" section

- Definitive/Temporary/Conditional Stop, Start, Modify Irrigation/Frequency/CE
- Add.

**Text:** identifying text of the program. Maximum 9 characters.

### 5.3. SECTOR PARAMETERS

The sectors are the elements linked to an irrigation valve and other electrical, hydraulic or agronomic accessories, all for optimal management of each element of the distribution network.

**Sector:** Sector number to configure (out of 1 a400).

**Output No.:** digital output where the solenoid valve is connected, it can be in the equipment itself or in modules located at a distance. See the *“Inputs and outputs coding”* section . This output cannot be assigned to any other sector or general.

**Auxiliary:** digital output that can be common with other sectors. It is activated whenever any of the sectors that have it configured is activated.

**No. of spindle:** spindle to which the sector is associated (from 0 to 4). A 0 is not associated with any head and will not fertilize or activate motors. Only in PLUS version.

**Engine 1, 2, 3, 4, 5 and 6:** *“yes”* if the sector needs an engine to be activated to irrigate. The motors are associated with the head. If the sector is not associated to a spindle, the motors are not asked.

**Water hammer timing:** time in seconds of delay between the opening and closing of consecutive sectors and with general ones (from -999” to +999”).

With a positive value , when irrigation starts, it opens immediately and at the end it keeps the valve open for the programmed seconds.

With a negative value , it delays the opening for the programmed seconds and when finished it closes immediately. There may be the exception that the sector is the last in a watering sequence and applies the motor stop timer.

**No. volume meter sensor:** irrigation water meter sensor (of 0 a80). It can be shared by several sectors and the volume is distributed among all those that are open in proportion to the expected flow. If you have configured the auxiliary counter, the counter configured here will not be used. The accumulated total of the counter can be consulted in *“History – Counter Sensor”*.

#### flow sensor

Each sector can have a sensor that indicates if water passes through the sector. With this it is possible to detect if water passes when the sector is closed (leak) or if water does not pass when the sector is open. In these cases a record is made, and if it is irrigating it can be stopped (temporary stop).

In *“Parameters - Installer – Sectors”* the other parameters are configured.

#### **Flow detector type:**

- *“Digital detector”* : digital sensor type probe or pressure switch (pressure detector).
- *“Auxiliary counter”* : counter sensor. It cannot be shared with any other sector. It will be used to discount the irrigation volume and the accumulation in the history of the sector.

If *“Digital Detector”* is selected.

**Digital detector. Input No.:** digital input where the flow detector sensor is connected. The detection delay is configured in *“Parameters - Installer – Sectors”* and is common for all inputs.

If *“Auxiliary counter”* is selected.

**Assistant accountant. Input No.:** digital input where the counter sensor is connected.

**Auxiliary meter format:** the format indicates the parameters necessary for the operation of the meter (pulse value, units, flow, etc. ). In *“Parameters - Installer – Sectors”* 4 different formats can be configured. Here it is configured which of them will be used for the auxiliary counter (from 1 to 4).

#### SECTORS PARAMETERS

Sector: 002

Output: 00000002 Base – R2

Auxiliary: 00000000

Head No.: 1

Pump:

P1: yes P2: yes P3: no P4: no P5: no P6: no

Water hammer timing: -007”

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#### SECTORS PARAMETERS

Sector: 002

Volume meter sensor No.: 01

Flow detector type: <Auxiliary meter>

Input No. Flow detector: 07100206

EAM-1 MAM2 – ED6

Auxiliary meter format: 1

Expected flow: 053,60 m3/h

Energy meter sensor No.: 08

Expected power: 011,56 kW

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**Expected flow:** is the flow consumed by the sector by drippers, sprinklers, etc. It is used to distribute the irrigation and fertilizer volumes in the histories of the sectors that irrigate at the same time and share the same general meter (from 0 to 650.00 m<sup>3</sup>/h).

Let's see an example of the distribution: We have three sectors in irrigation using the same general meter, in two different programs, sector 1 and 3 in program 12 plus sector 8 in program 15.

Expected flow: Sector 1= 014.50 m<sup>3</sup>/h Sector 3= 011.80 m<sup>3</sup>/h Sector 8= 018.00 m<sup>3</sup>/h

A pulse is received from the 1000-liter meter, the liters are accumulated in the historical of the sectors:

Sector 1: 327,313 Sector 3: 266,356 Sector 8: 406,320

In the programs, the volume to be applied is decreased by:

Program 12: -593,669 L Program 15: -406,320 L

If one of the irrigated sectors of the same meter has not been assigned the expected flow, the distribution of the volume will be made in equal parts to all of them.

If the sector has its own counter (auxiliary sector counter), the accumulated volume is directly indicated by this counter.

**No. energy meter sensor:** energy meter sensor that is associated with the sector (out of 0 a80). The amount of energy that passes through the meter is distributed proportionally to the "expected consumption" of the sector. The amount of energy can be consulted in "History – sector".

**Expected power:** corresponds to the power necessary to carry out irrigation at the expected flow and pressure (from 0 to 650.00 kW/h). It is used for solar irrigation.

**Manual start. Input No.:** Each sector can have a switch that manually initiates it. Here you configure the digital input where the switch is connected. The sector remains in "Manual – Digital Run" as long as the switch is activated. The "Manual-Stop/Start" command in the "Manual – Sectors" section is more prevalent than the digital input.

**Pressure reference:** pressure needed to irrigate this sector (from 0 to 25.5 bars ). It is used for head pressure regulation.

**Area of the sector:** area that the sector will irrigate (of 0 a9 99999 m<sup>2</sup>, 1ha=10000 m<sup>2</sup>). The area of the sector is used when irrigating by m<sup>3</sup>/ha or in mm.

**Crop:** type of crop irrigated by the sector. See annex with the crop table.

**coef . corrector:** correction coefficient of the default irrigation value. It is only used if the program where the irrigation sector is configured is by " m<sup>3</sup>/ha " or in " mm ". The program watering amount is multiplied by this coefficient (of 0.00 a2.55). If it is left at 1.00 the value is not modified. If a program has more than one sector configured, the coefficient of the first is used.

**Text:** identifying text of the sector. Maximum 9 characters.

#### SECTOR PARAMETERS

Sector: 002

Manual start Input No.: 07100202

EAM-1 MAM2 – ED2

Pressure reference: 02,8 bar

Sector area: 024000 m<sup>2</sup>

Crop: 30301

Coeff. corrector: 1.10

Text: PT22A

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## 5.4. SECTOR GROUPS PARAMETERS

Sector groups are used to designate a group of up to 20 sectors with a single number. It makes it easier to assign more sectors to the programs. The group is assigned in the same place where the sector to be activated is entered in the program, but instead of entering the sector number (from 0 to 400) the group number plus 500 (from 501 to 540) is entered.

**Group:** group number to configure (out of 1 a40).

**Text:** identifying text of the group of sectors. Maximum 9 characters.

**Sectors:** number of sectors that make up the group (from 1 to 20).



## 5.5. COMMUNICATIONS PARAMETERS

For this section, consult the manual “Agrónic 4500 Comunicaciones” (R-2407) .

## 5.6. CONDITIONING PARAMETERS

Conditioning factors are controls that act on irrigation programs and records based on the value of the sensors.

A condition is assigned a type of operation (stop, start, modify, warning, etc.), an origin (digital sensor, analogue, meter, flow, etc.), some references to enter the operation, the type of registration and if you send SMS.

**Determinant:** number of determinants to configure (out of 1 a120).

**Type:** operative condition

- *"Not configured"* : the condition is not used.
- *"Definitive stop"* : for irrigation or only fertilization or only pH of the associated programs until it is manually reset.
- *"Temporary stop"* : in the associated programs for irrigation or only fertilization or only pH of the active subprogram or group in progress, continued with the next one until the condition ends, if there is a sequential program it will also activate it.
- *"Conditional stop"* : for the associated programs while the condition is active.
- *"Start"* : when the condition is activated, it starts the associated programs.
- *"Start / Stop"* : when the condition is activated, the associated programs are started and when it is deactivated they stop.
- *"Notice"* : when the condition is activated or deactivated, it makes a record.
- *"Modify watering"* : when you start a program it allows you to modify the amount of watering.
- *"Modify fert."* : when you start a program, you can modify the EC reference, if you fertilize by EC, or the fertilizer units.
- *"Modify freq."* : when you start a program and have several activations, it allows you to modify the time to enter the next activation.

**Origin:** type of sensor or output associated with the determining factor.

- *"Digital sensor"* : associated with a digital sensor.
- *"Analog sensor"* : associated with an analog sensor.
- *"Logic sensor"* : associated with a logical sensor. These sensors can act as a digital sensor and as an analog sensor depending on the configuration.
- *"SC flow"* : associated with a counter sensor. Use the instantaneous flow reading.
- *"SC accumulated"* : associated with a counter sensor. Use the cumulative.
- *"Flow error"* : associated with a counter sensor (high and low flow errors, not receiving pulses when watering, receiving pulses when not watering).
- *"CE error"* : associated with the analogue CE sensor that is used to regulate the CE.
- *"pH error"* : associated with the analogue pH sensor used to regulate the pH.
- *"CE at 100%"* : associated with the fertilizer injection output.
- *"100% pH"* : associated with the output of acid injection.
- *"CE security"* : associated with the difference between the analog sensors of CE for regulation and security.
- *"safety pH"* : associated with the difference between the regulation and safety analog pH sensors.
- *"Prop . CE"* : associated with the actual injected volume of fertilizers to detect that the proportion is not met.
- *"Mix EC error"* : associated with the EC analog sensor used for mixing two waters.
- *"Drainage error"* : associated with drainage (drained volume / applied irrigation ratio).
- *"CE drain error"* : associated with the EC analog sensor used in the drain.
- *"Drain pH error"* : associated with the analog pH sensor used in the drain.
- *"Communication"* : associated with the communication status with the AgroBee-L, Radio, Monocable modules or with the PC-Cloud.
- *"Schedule"* : associated with a schedule and days of the week.
- *"Deposit F."* : associated with one or more fertilizers from a head to determine a drop in level.

Depending on the origin of the condition, the associated sensor is asked. There are cases in which it is not asked because it is associated with an output, or because the sensor is already defined by default.

**No. digital sensor:** number of associated digital sensor (out of 1 a80).

**No. analog sensor:** analog sensor 1 ano. (out of 120).

FOR. CONDITIONING
Determinant: 000
Type: Definitive stop
Origin: digital sensor
Digital Sensor No.: 00

**No. counter sensor:** counter sensor 1 ano. (of 80).

**Logical Sensor No.:** Logical sensor number (out of 1 a20).

List of TYPES of conditions and ORIGIN that can be used:

<b>Origin</b>	<b>Guy</b>	Unemployment definitive	Unemployment temporary	Unemployment cond .	Start	start / stop	Warning	modify irrigation	modify EC	modify freq .
digital sensor		■	■	■	■	■	■	■	■	■
analog sensor		■	■	■	■	■	■	■	■	■
logic sensor		■	■	■	■	■	■	■	■	■
counter sensor. Flow		■	■		■	■				
counter sensor. Accumulated		■	■		■		■	■	■	■
flow error		■	■				■			
CE error		■	■				■			
pH Error		■	■				■			
100% EC		■	■				■			
100% pH		■	■				■			
CE safety		■	■				■			
pH safety		■	■				■			
Proportion. EC		■	■				■			
Mistake EC mix		■	■				■			
Drain Error		■	■				■			
CE Error Drain		■	■				■			
Drain pH Error		■	■				■			
Communication		■	■	■						
Schedule			■	■						
Deposit f.		■	■				■			

#### Common parameters for all.

**SMS to tel. A:** when the condition is activated, it sends an SMS to phone A.

**SMS to tel. B:** when the condition is activated, it sends an SMS to phone B.

**SMS to tel. C:** when the condition is activated, it sends an SMS to phone C with the selected text ( 0 a6).

**Activate alarm:** "yes" when the condition is activated activates the alarm output. The alarm is deactivated manually in "Function – Manual – End Shutdowns and Malfunctions".

**It is an anomaly:** "yes" when the determining factor is activated it is registered as a new anomaly.

#### **To all programs:**

- "yes" : the condition is associated with all the programs of the spindle indicated below. It is not assigned to the types "start" or "start/stop" nor to nebulizations.
- "no" : the determining factor is associated with the desired programs within "Parameters – Programs".

**Affects the heads:** the condition can only affect the programs that are associated with one or several specific heads, if it is not associated with any then it affects all of them. Those of "origin" related to CE/pH only allow assigning a head.

**Head 1:** "yes" the condition affects the programs or elements that are linked to this head.

**Head 2:** "yes" the condition affects the programs or elements that are linked to this head.

**Head 3:** "yes" the condition affects the programs or elements that are linked to this head.

**Head 4:** "yes" the condition affects the programs or elements that are linked to this head.

It is not asked in the drainage conditions since they are associated from "*Parameters - Drainage*"

**On error:** what to do in the event of an error in the sensor associated with the condition.

- "*Does not change*" : the conditioner maintains the state.
- "*Not active*" : the condition becomes deactivated.
- "*Active*" : the determining factor becomes activated.

**Text:** identifying text of the determining factor. Maximum 9 characters.

### 5.6.1. Definitive Unemployment – Temporary Unemployment

#### Definitive Stop.

Stops associated programs until manually reset.

To reset it, go to “Manual – End shutdowns and faults” or “Manual – Programs” or “Manual – Determinants” . When it is reset, it is also asked if you want to continue with the programs that have been stopped from the point where they were.

It can only be activated if there is an associated program watering.

A certain number of temporary stops can be made before making a definitive stop.

#### Temporary Stop.

When the temporary stop enters, it will end the irrigation or only the fertilization or only the pH regulation of the subprogram in progress or active group to continue with the next one.

It can only be activated if there is an associated program watering.

CONDITIONING PARAMETERS			
Type: <b>Permanent Stop / Temporary Stop</b>			
Origin: <b>digital sensor logic sensor</b> No. digital sensor: 01 Detection delay: 0030"	Source: <b>Analog Sensor logic sensor</b> No. analog sensor: 01 Detection delay: 0030" Start Delay: 0000" Reference: 01.8 Bar When exceeding: no	Origin: <b>accumulated SC</b> No. counter sensor: 01 Previous hours: 006 Reference: 00120 L	Origin: <b>SC caudal</b> No. counter sensor: 01 Detection delay: 0030" Start Delay: 0030" Reference: 000.00 m3/h When exceeding: no
Origin: <b>Flow Error</b> No. counter sensor: 01 Detection delay: 0030" Start Delay: 0030" subprog change : yes High margin: 015% Low margin: 019% No Pulse Delay: 006'	Origin: <b>CE Error pH Error</b> Detection delay: 0030" High: 01.0 mS /pH Low: 00.5 mS / pH	Origin: <b>100% CE 100% pH</b> Detection delay: 0030"	Origin: <b>CE safety pH safety</b> Detection delay: 0030" Differential: +01.0 mS / pH
Origin: <b>EC proportion</b> Detection delay: 0030" Margin: 10%	Origin: <b>Error EC mix</b> Detection delay: 0030" High: 01.0mS Low: 00.5mS	Origin: <b>Drain Error</b> Detection delay: 0030" High margin: 015% Low Margin: 0.20%	Origin: <b>Error EC drain Drain pH error</b> Detection delay: 0030" High: 01.0 mS /pH Low: 00.5 mS / pH
Origin: <b>Communication</b> Equipment: AgroBee / PC Module: 01 / User: 1	Origin: <b>Schedule</b> Hours: 12:00 – 15:00 Days: LMMJV--	Origin: <b>Deposit F.</b> % of max level: 08% Fert .: F1- - - -F8 Detection delay: 0120"	

**Detection delay:** time that the condition must remain in order to activate or deactivate the conditioning factor (of0 a 9999").

#### Origin: digital sensor and logical sensor.

The condition is activated when the digital sensor is activated for a while. If it is a logic sensor, it must have a digital output (operation: and/ or ).

#### Origin: analog sensor, counter sensor, flow rate and logic sensor.

If it is a logic sensor, it must have an analog output (operation: addition/subtraction/average).

**Delay at start:** when you start a program during this time, the condition is not calculated (of0 a 9999"). In the case of sequential programs, it only applies to the start of the first program.

**Reference:** sensor value from which the conditioning is activated or deactivated.

**When overcoming:**

- “yes” : the condition is activated if the sensor value is higher than the reference (value > reference).
- “no” : the condition is activated if the sensor value is lower than the reference (value < reference).

Origin: counter sensor, accumulated.

**Previous hours:** for the calculation of the determining factor, the accumulated hours of the last hours are used.

Here you set the number of hours ago to take into account (from 0 to 250 hours).

**Reference:** volume from which the determining factor is activated (from 0 to 65535 L).

Origin: flow error.

**Delay at start:** when you start a program during this time, the condition is not calculated (of0 a 9999”).

**subprog change . or group:**

- “yes” : the timing of the delay at the beginning is done every time the program affected by the determining factor changes its subprogram or group.
- “no” : the timing of the start delay is only done when the watering starts on the counter.

**High margin:** the condition is activated when the instantaneous flow is higher than the expected flow by this % (from 0 to 100%, at 0 there is no high margin control).

**Low margin:** the condition is activated when the instantaneous flow is lower than the expected flow in this % (from 0 to 100%, at 0 there is no low margin control).

**Delay without pulse:** time in minutes that must elapse without receiving pulses from the counter to activate the condition (of0 a 255’, at 0 there is no counter error control).

Origin: EC error, pH error.

**High:** margin of error for the high alarm. This value is added to the reference; if the regulation sensor reading is higher than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no high alarm control).

**Low:** margin of error for the low alarm. This value is subtracted from the reference; if the regulation sensor reading is lower than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no low alarm control).

The EC error only works when fertilization is by EC regulation.

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: 100% EC, 100% pH.

The condition is activated when fertilizer, or acid, is being injected at 100% for a while.

100% EC only works when fertilization is by EC regulation.

It is configured to a head and will act whenever fertilization or pH regulation is carried out.

Origin: CE safety, pH safety.

**Differential:** when the difference between the regulation sensor and the safety sensor is greater than this value, the conditioning is activated (from 0 to 05.0).

It is configured to a head and will act whenever fertilization or pH regulation is carried out.

Origin: EC proportion.

**Margin:** the condition is activated when the actual volume of any of the fertilizers applied suffers a deviation greater than the margin in % (from 0 to 100%) of the proportion. Useful for detecting clogged filters or damaged valves. It will be necessary to have meters in each of the fertilizers. A “detection delay” of several minutes is recommended to ensure good control.

It is configured to a head and will act whenever EC fertilization is carried out.

Origin: Error EC mix.

It uses the input EC sensor and the reference of the water mixture.

**High:** margin of error for the high alarm. This value is added to the reference; if the regulation sensor reading is higher than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no high alarm control).

**Low:** margin of error for the low alarm. This value is subtracted from the reference of the water mixture; if the regulation sensor reading is lower than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no low alarm control).

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: drainage error.

For the drainage error, the relationship between the irrigated volume and the drained volume is measured. There must be an irrigation meter and a drainage meter.

**High:** margin of error for the high alarm. If the drainage is higher than this value, the condition is activated (from 0 to 50%, at 0 there is no high alarm control).

**Low:** margin of error for the low alarm. If the drainage is lower than this value, the condition is activated (from 0 to 50%, at 0 there is no low alarm control).

The drainage conditions are assigned in "Parameters - Drainage"

Origin: EC drainage error, pH drainage error.

**High:** margin of error for the high alarm. If the drain sensor reading is higher than this value, the condition is activated (from 0 to 15.0, to 0 there is no high alarm control).

**Low:** margin of error for the low alarm. If the reading of the drain sensor is lower than this value, the condition is activated (from 0 to 15.0, to 0 there is no low alarm control).

The drainage conditions are assigned in "Parameters - Drainage"

Origin: Communication.

Use the communication status with the AgroBee-L, Radio, Monocable or with the PC-Cloud.

**Equipment:**

- **"AgroBee-L"** : when the Agrónic does not have communication with the AgroBee-L, the condition is activated. The condition only affects the programs that have sectors with outputs assigned to the AgroBee-L.
- **"AM120"** : when the Agrónic does not have communication with the Agronic Monocable 120 activates the conditioner. The condition only affects the programs that have sectors with outputs assigned to the Monocable .
- **"AR433"** : when the Agrónic does not have communication with the Agronic Radio 433, the condition is activated. The condition only affects the programs that have sectors with outputs assigned to the Radio.
- **"PC-Cloud"** : when Agrónic does not have communication with the PC/WEB/APP, the condition is activated.

**EAR / EAM/ Coord** : when the equipment is Agronic Monocable 120, Agronic Radio 433, or AgroBee-L enter the number of EAR, EAM or Coordinator (1 or 2).

**Module:** when the equipment is AM120, AR433 or AgroBee-L, the module number is entered. The condition is activated when there is no communication with any of the modules (leaving it at 0) or with the module configured here (from 1 to 120, from 1 to 60, from 1 to 20).

**User:** when the equipment is the PC, enter the user number. The conditioning is activated when there is no communication with any of the users (leaving 0) or with the user configured here (from 1 to 3).

Origin: Hours.

A stoppage of the affected program will occur when the determinant enters within the time slot and on a selected day.

**Schedule:** two schedules in hours and minutes, the time slot between the two schedules allows the performance of the determining factor. The values 00:00 to 00:00 or also 00:00 to 23:59 condition all the hours of the day.

**Days of the week** : the coincidence of the day of the week plus the coincidence of the time will give way to the activation of the condition.

Origin: Fertilizer Deposit.

The affected program will stop when the level of a deposit drops below the selected percentage (%).

**% of the maximum level:** margin of the maximum level of the capacity below which the conditioning will be activated.

Common to all.

**What for:** where does unemployment affect. If the condition is assigned to a nebulization, this parameter is not used.

- **"irrigation"** : for irrigation, fertilizer and pH.
- **"fert ."** : for fertilization and continuous with the regulation of acid and irrigation. Not for TF1 and TF2 treatments used for phytosanitary treatments.
- **"pH"** : for acid regulation and continuous with fertilization and watering.

**Temporary attempts** : only if the determining factor is a Definitive Stop. Number of Temporary Stops that will be done before a Definitive Stop is produced (from 0 to 9), at 0 it goes directly to definitive. If the condition is assigned to a nebulization, this parameter is not used. Once the Definitive Shutdown has occurred, it will not irrigate, fertilize or apply acid again until the user manually resets it in *"Manual – Finish shutdowns"* or *"Manual – Program"* or *"Manual – Conditioning"* . If desired, you can modify the number of temporary attempts that have been counted from *"Manual - Determinants"* .

## 5.6.2. Conditional unemployment

For the associated programs while the condition is active, when it becomes inactive it continues with the program at the point where it was.

CONDITIONING PARAMETERS			
Type: <b>Conditional Stop</b>			
Origin: <b>digital sensor logic sensor</b> No. digital sensor: 01 Detection delay: 0030"	Source: <b>Analog Sensor logic sensor</b> No. analog sensor: 01 Detection delay: 0030" Reference: 01.8 bar Differential: 00.3 bar When exceeding: no	Origin: <b>Communication</b> Equipment: AgroBee / PC Module: 1 / User: 1	Origin: <b>Schedule</b> Hours: 12:00 – 15:00 Days: LMMJVSD

**Detection delay:** time that the condition must remain in order to activate or deactivate the conditioning factor (of 0 a 9999").

Origin: digital sensor and logical sensor.

The condition is activated when the digital sensor is activated for a while. If it is a logic sensor, it must have a digital output.

Origin: analog sensor and logic sensor.

If it is a logical sensor, it must have the analog output.

**Reference:** sensor value from which the conditioning is activated or deactivated.

**Differential:** margin between activation and deactivation of the determining factor.

**When overcoming:**

- **"yes"** : If (value > reference) active determining factor.  
If (value < reference - differential) determinant not active.
- **"not"** : If (value < reference) active conditioning.  
If (value > reference + differential) determinant not active.

Origin: Communication.

Use the communication status with the AgroBee-L, Radio, Monocable or with the PC-Cloud.

**Equipment:**

- **"AgroBee-L"** : when the Agrónic does not have communication with the AgroBee-L, the condition is activated. The condition only affects the programs that have sectors with outputs assigned to the AgroBee-L.
- **"AM120"** : when the Agrónic does not have communication with the Agronic Monocable 120 activates the conditioner. The condition only affects the programs that have sectors with outputs assigned to the Monocable .
- **"AR433"** : when the Agrónic does not have communication with the Agronic Radio 433, the condition is activated. The condition only affects the programs that have sectors with outputs assigned to the Radio.
- **"PC-Cloud"** : when Agrónic does not have communication with the PC/WEB/APP, the condition is activated.

**EAR / EAM/ Coord** : when the equipment is Agronic Monocable 120, Agronic Radio 433, or AgroBee-L enter the number of EAR, EAM or Coordinator (1 or 2).

**Module:** when the equipment is AM120, AR433 or AgroBee-L, the module number is entered. The condition is activated when there is no communication with any of the modules (leaving it at 0) or with the module configured here (from 1 to 20, from 1 to 60, from 1 to 120).

**User:** when the equipment is the PC, enter the user number. The conditioning is activated when there is no communication with any of the users (leaving 0) or with the user configured here (from 1 to 3).

Origin: Hours.

A stoppage of the affected program will occur when the determinant enters within the time slot and on a selected day.

**Schedule:** two schedules in hours and minutes, the time slot between the two schedules allows the performance of the determining factor. The values 00:00 to 00:00 or also 00:00 to 23:59 condition all the hours of the day.

**Days of the week** : the coincidence of the day of the week plus the coincidence of the time will give way to the activation of the condition.

### 5.6.3. Start – Start / Stop

#### Start.

Starts the associated programs when the condition is activated. It is not possible to select “to all programs”, it must be assigned to the desired programs.

#### Start / Stop.

It starts the associated programs when the condition is activated and stops them when the irrigation units are deactivated or finished.

The condition can limit its action if the program is not found in the active schedule, the active period, the days of the week, the frequency of days or the calendar.

CONDITIONING PARAMETERS			
Type: Home			
Origin: <b>digital sensor logic sensor</b> No. digital sensor: 01 Detection delay: 0030”	Source: <b>Analog Sensor logic sensor</b> No. analog sensor: 01 Detection delay: 0030” integrate: no Reference: 01.8 bar Differential: 00.3 bar When exceeding: no	Origin: <b>accumulated SC</b> No. counter sensor: 01 Previous hours: 006 Reference: 00120 L	Origin: <b>SC caudal</b> No. counter sensor: 01 Detection delay: 0030” Reference: 000.00 m3/h Differential: 000.00 m3/h When exceeding: no

**Detection delay:** time that the condition must remain in order to activate or deactivate the conditioning factor (of 0 a 9999”).

#### Origin: digital sensor and logical sensor.

The condition is activated when the digital sensor is activated for a while. If it is a logic sensor, it must have a digital output (operation: and/ or ).

#### Origin: analog sensor, logic and counter sensor, flow.

**Integration:** in the case of analog sensors, you can work with immediate reading (“no”) or sensor integration (“yes”). When you work by integration it is very important to associate the condition to a single program. Outside of the active schedule of the program, the integration value is at 0. Within the schedule, it integrates until irrigation starts and the integration value is set to 0 to integrate again.

**Detection delay:** time that the condition must remain in order to activate or deactivate the conditioning factor (of 0 a 9999”). In case of start by integration, the delay does not apply.

**Reference:** sensor value from which the conditioning is activated or deactivated.

**Differential:** margin between activation and deactivation of the determining factor.

#### **When overcoming:**

- **"yes"** : If (value > reference) active determining factor.  
If (value < reference - differential) determinant not active.
- **"not"** : If (value < reference) active conditioning.  
If (value > reference + differential) determinant not active.

#### Origin: counter sensor, accumulated.

**Previous hours:** for the calculation of the determining factor, the accumulated hours of the last hours are used. Here you set the number of hours ago to take into account (from 0 to 250 hours).

**Reference:** volume from which the determining factor is activated (from 0 to 65535 L).

## 5.6.4. Warning

CONDITIONING PARAMETERS			
Type: Notice			
Origin: <b>digital sensor logic sensor</b> No. digital sensor: 01 Detection delay: 0030"	Source: <b>Analog Sensor logic sensor</b> No. analog sensor: 01 Detection delay: 0030" Previous hours: 002 Reference: 01.8 Bar Differential: 00.5 Bar When exceeding: no	Origin: <b>accumulated SC</b> No. counter sensor: 01 Previous hours: 006 Reference: 00120 L	Origin: <b>SC caudal</b> No. counter sensor: 01 Detection delay: 0030" Reference: 000.00 m3/h Differential: 000.00 m3/h When exceeding: no
Origin: <b>Flow Error</b> No. counter sensor: 01 Detection delay: 0030" Start Delay: 0060" subprog change : yes High margin: 015% Low margin: 019% No Pulse Delay: 006' Ref . for leakage: 000.00 m3/h Leakage Delay: 000'	Origin: <b>CE Error pH Error</b> Detection delay: 0030" High: 01.0 mS /pH Low: 00.5 mS / pH	Origin: <b>100% CE 100% pH</b> Detection delay: 0030"	Origin: <b>CE safety pH safety</b> Detection delay: 0030" Differential: +01.0 mS / pH
		Origin: <b>Prop . EC</b> Detection delay: 0030" Margin: 10%	Origin: <b>Error EC mix</b> Detection delay: 0030" High: 01.0mS Low: 00.5mS
	Origin: <b>Drain Error</b> Detection delay: 0030" High margin: 015% Low Margin: 0.20%	Origin: <b>Error EC drain Drain pH error</b> Detection delay: 0030" High: 01.0 mS /pH Low: 00.5 mS / pH	Origin: <b>Deposit F.</b> % of max level: 08% Fert .: F1- - - -F8 Detection delay: 0120"

The Notice does not act on programs, it only makes a record when it is activated and one when it is deactivated. This record can be used to send an SMS, but it only sends SMS when the alert is activated, not when it is deactivated. With the warnings you can configure anti-theft , anti-frost , warn of pipe breaks, errors in meters, etc.

**Detection delay:** time that the condition must remain in order to activate or deactivate the conditioning factor (of 0 a 9999").

Origin: digital sensor and logical sensor.

The condition is activated when the digital sensor is activated for a while. If it is a logic sensor, it must have a digital output (operation: and/ or).

Origin: analog sensor, counter sensor, flow rate and logic sensor.

If it is a logic sensor, it must have an analog output (operation: addition/subtraction/average).

**Previous hours:** how many hours will integrate the condition (of 0 a250). If it is left at 0 it does not integrate, it uses the last reading of the sensor. The integration value is incremented every 10 minutes. For the analog sensor only. When integration is done, the detection delay is not applied.

**Detection delay:** time that the condition must remain in order to activate or deactivate the conditioning factor (of 0 a 9999").

**Reference:** sensor value from which the conditioning is activated or deactivated.

**Differential:** margin between activation and deactivation of the determining factor.

**When overcoming:**

- **"yes"** : If (value > reference) active determining factor.  
If (value < reference - differential) determinant not active.
- **"not"** : If (value < reference) active conditioning.  
If (value > reference + differential) determinant not active.

Origin: counter sensor, accumulated.

**Previous hours:** for the calculation of the determining factor, the accumulated hours of the last hours are used. Here you set the number of hours ago to take into account (from 0 to 250 hours).



**Reference:** volume from which the determining factor is activated (from 0 to 65535 L).

Origin: flow error.

**High margin:** the condition is activated when the instantaneous flow is higher than the expected flow by this % (from 0 to 100%, at 0 there is no high margin control).

**Low margin:** the condition is activated when the instantaneous flow is lower than the expected flow in this % (from 0 to 100%, at 0 there is no low margin control).

**Delay at start:** when you start a program during this time, the condition is not calculated (of0 a 9999”).

**subprog change . or group:**

- “yes” : the timing of the start delay is done every time the program changes subprogram or grouping
- “no” : the start delay timing is only done when the program starts.

**Margin detection delay:** time that the high margin or low margin condition must remain in order to activate or deactivate the condition (in0 a 9999”).

**Delay without pulse:** time in minutes that must elapse without receiving pulses from the counter to activate the condition (of0 a 255’, at 0 there is no counter error control).

**Reference for leakage:** if there is no irrigation order that makes use of the meter, the leakage control will be carried out, giving the warning when the leakage flow reference is exceeded.

**Leak delay:** minutes that the leak flow must remain for the warning to be given (from 0 to 255).

Origin: EC error, pH error.

This condition has to be assigned to a program for it to act.

**High:** margin of error for the high alarm. This value is added to the reference. If the regulation sensor reading is higher than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no high alarm control).

**Low:** margin of error for the low alarm. This value is subtracted from the reference. If the regulation sensor reading is lower than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no low alarm control).

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: 100% EC, 100% pH.

This condition has to be assigned to a program for it to act.

The condition is activated when fertilizer, or acid, is being injected at 100% for a while.

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: CE safety, pH safety.

This condition has to be assigned to a program for it to act.

**Differential:** when the difference between the regulation sensor and the safety sensor is greater than this value, the conditioning is activated (from 0 to 05.0).

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: Prop . EC.

This condition has to be assigned to a program for it to act.

**Margin:** the condition is activated when the actual volume of any of the fertilizers applied suffers a deviation greater than the margin in % (from 0 to 100%) of the proportion. Useful for detecting clogged filters or damaged valves. It will be necessary to have meters in each of the fertilizers. A “detection delay” of several minutes is recommended to ensure good control.

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: Error EC mix.

This condition has to be assigned to a program for it to act.

It uses the input EC sensor and the reference of the water mixture.

**High:** margin of error for the high alarm. This value is added to the reference. If the regulation sensor reading is higher than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no high alarm control).

**Low:** margin of error for the low alarm. This value is subtracted from the reference of the water mixture. If the regulation sensor reading is lower than this value, the conditioning is activated (from 0 to 05.0, to 0 there is no low alarm control).

When configuring the determinant, it is indicated to which spindle it is linked. It cannot be assigned to multiple heads at the same time.

Origin: drainage error.

For the drainage error, the relationship between the irrigated volume and the drained volume is measured. There must be an irrigation meter and a drainage meter.

**High:** margin of error for the high alarm. If the drainage is higher than this value, the condition is activated (from 0 to 50%, at 0 there is no high alarm control).

**Low:** margin of error for the low alarm. If the drainage is lower than this value, the condition is activated (from 0 to 50%, at 0 there is no low alarm control).

The drainage conditions are assigned in "Parameters - Drainage".

Origin: EC drainage error, pH drainage error.

**High:** margin of error for the high alarm. If the drain sensor reading is higher than this value, the condition is activated (from 0 to 15.0, to 0 there is no high alarm control).

**Low:** margin of error for the low alarm. If the reading of the drain sensor is lower than this value, the condition is activated (from 0 to 15.0, to 0 there is no low alarm control).

The drainage conditions are assigned in "Parameters - Drainage" .

Origin: Fertilizer Deposit.

A warning will be produced when the level of a deposit falls below the percentage (%) selected.

**% of the maximum level:** margin of the maximum level of the capacity below which the conditioning will be activated.

**5.6.5. Modify irrigation – Modify CE / Fertilizer units – Modify frequency**

Modify irrigation.

Increases or decreases the irrigation units depending on the value of the determining factor.  
The modification is made at the time the program is started.

Modifies CE / Fertilizer Units.

Yeah the fertilization is by EC: increase either decreases the reference of EC in function of the worth of the conditioning.

If the fertilization is uniform: increase or decrease the fertilizer units depending on the value of the conditioner.  
The modification is made at the time the program is started.

Modify frequency.

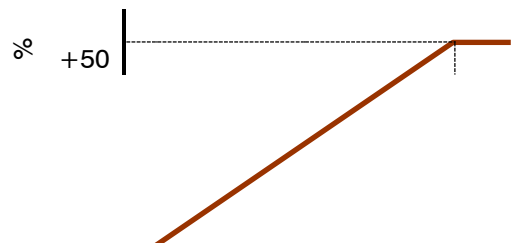
If the program has several activations, the time between starts is increased or decreased depending on the value of the condition.

The modification is made for each activation, according to the value integrated in the previous hours or the instant the time for the next activation is modified.

CONDITIONING PARAMETERS			
Type: <b>Modify irrigation / Modify CE / Modify frequency</b>			
Origin: <b>digital sensor logic sensor</b> No. digital sensor: 02 % to modify: +025 %	Source: <b>Analog Sensor logic sensor</b> No. analog sensor: 01 Previous hours: 048 Point 1: Reference: 3500 W/m2 % to modify: -010 % Point 2: Reference: 9000 W/m2 % to modify: +050%	Origin: <b>accumulated SC</b> No. counter sensor: 01 Previous hours: 048 Point 1: Reference: 001 L % to modify: +000 % Point 2: Reference: 024L % to modify: - 080 %	

Origin: digital sensor and logical sensor.

**% to modify:** if the condition is activated at the time of starting the program, it modifies the irrigation or fertilizer by the % indicated here (of -100 a+100%). If it is a logic sensor, it must have a digital output (operation: and/ or ).



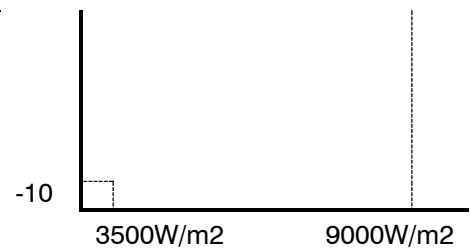
Origin: analog sensor and logic sensor.

If it is a logic sensor, it must have an analog output (operation: addition/subtraction/average).

**Hours prior:** how many hours prior to the start of the program will the determining factor be included (out of 0 a250). If it is left at 0 it does not integrate, it uses the last reading of the sensor. The integration value is incremented every 10 minutes.

**Reference:** initial and final values of the integration line.

**% to modify:** initial and final values of the irrigation or fertilizer modification line (of -100 a+100%).



Origin: counter sensor, accumulated.

The accumulated from a counter sensor can be the rain that has fallen at a certain time, the drainage of a tray, etc.

**Previous hours:** for the calculation of the determining factor, the accumulated hours of the last hours are used.

Here you set the number of hours ago to take into account (from 0 to 250 hours).

**Reference:** initial and final values of the integration line. Values are in liters.

**% to modify:** initial and final values of the irrigation or fertilizer modification line (of -100 a+100%).

**5.7. SENSOR PARAMETERS**

There are four types of sensors:

- **Digital:** on/off sensors connected to digital inputs. There can be a total of 80.
- **Analog:** current (4-20 mA) or voltage (0-20 V) sensors connected to analog inputs. Sensors connected to external modules. There may be a total of 120.
- **Meters:** sensors for the measurement of volume (water, fertilizer, rain, etc ) or quantities (electrical energy). They can be connected to digital, analog, ModBus , virtual or calculated inputs. There may be a total of 80. The counters of each sector are not included.
- **Logic:** sensors whose value is obtained by applying mathematical or logical operations to the value of other sensors or conditions. There can be a total of 20.

**SENSOR PARAMETERS**

1. Digital
2. Analog
3. Meters
4. Logical

**5.7.1. Digital sensors**

A digital sensor acts by opening and closing a contact. Example: pressure switches, thermostats, pond levels, open door detector, etc.

**Sensor:** digital sensor number to configure (out of 1 a80).

**Input No.:** digital input where the sensor is connected. See the “ *Inputs and outputs coding* ” section or press the “F6” key with the text “I/O” to access a form where it will guide you step by step to easily encode the value.

**State, normally open:**

- “*yes*” : the sensor marks '1' when there is continuity between DC and the corresponding input.
- “*no*” : the sensor marks '1' when there is no continuity between DC and the corresponding input.

**Record:** answering “*yes*” will record the status of the sensor in the history. It is logged every time the sensor status changes. This history is only displayed on Agrónic PC or Agrónic Web.

**Text:** sensor identification text. Maximum 9 characters.

**DIGITAL SENSOR PARAMETERS**

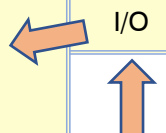
Sensor: 01  
 Input No.: 03100602 AgroBeeL-1 M6 – ED2  
 Status, normally open: yes  
 Registry: no  
 Text: Pre. Min.

**Input / output CODING**

Device type: <AgroBee-L>  
 Device No.: <1>  
 Module: 006  
 Input: 002

<Sen S

I/O



## 5.7.2. Analog sensors

An analog sensor works by delivering a current or a voltage proportional to what it measures. Example: temperature, radiation, pressure, wind, humidity, etc.

### SENSORS.

**Sensor:** Analog sensor number to configure (out of 1 a120).

**Input No.:** analog input where the sensor is connected. See the “*Inputs and outputs coding*” section or press the “F6” key with the text “I/O” to access the pop-up form. If the sensor is connected to an AgroBee-L it is necessary to configure the module before the sensor.

**Format:** Format number used by the sensor (out of 1 a31). Pressing the “F6” key with the text “List” shows a pop-up form for your selection. There are internal sensors or from AgroBee-L that the format is set automatically.

**Tare:** Value to be added or subtracted from the sensor reading.

**Text:** sensor identification text. Maximum 9 characters.

### FORMATS.

The format indicates the units of the sensor and the relationship between the voltage read by the input and the reading values of the sensor.

**Format:** Format number to configure (out of 1 a31).

**# of Integers:** How many integers is the sensor reading (out of 1 a5).

**No. of decimal places:** how many decimal places does the sensor reading have ( 1 a4).

**Sign:**

- “*yes*” : the sensor reading may be negative.
- “*no*” : the sensor reading is always positive.

**Units :** Descriptive text of the units. Choose the “Type” and the index within each family or access the pop-up form by pressing the “F6” key with the text “UNIT.” Table of “UNITS - types:

Generic:	01	- No text	Mass	01	<b>g</b>	- gram
	02	%		02	<b>kg</b>	- kilogram
	03	<b>u</b>		03	<b>mg</b>	- milligram
Temperature	01	°C		04	<b>mol</b>	- amount of substance
	02	°F	Density	01	<b>kg/m3</b>	
	03	°C		02	<b>ppm</b>	- parts per million
Humidity	01	%RH		03	<b>mg /L</b>	
Velocity	01	<b>m/s</b>	Force	01	<b>N</b>	- Newton
	02	<b>km/h</b>	Area	01	<b>m2</b>	- square meter
	03	<b>rps</b>		02	<b>a</b>	- area (1a=100m2)
	04	<b>rpm</b>		02	<b>ha</b>	- hectare (1ha=10000m2)
Length	01	<b>m</b>	Angle	01	°	- sexagesimal degree
	02	<b>km</b>		02	<b>rad</b>	- degree radian
	03	<b>mm</b>	Pressure	01	<b>bar</b>	- bars
Volume	01	<b>m3</b>		02	<b>cbar</b>	- centibars
	02	<b>L</b>		03	<b>mbar</b>	- millibars
	03	<b>mL</b>		04	<b>Pa</b>	- pascals
	04	<b>l/m2</b>		05	<b>kPa</b>	- kilopascals
	05	<b>mm</b>		06	<b>mH2O</b>	- Water column
Flow / Flow	01	<b>m3/h</b>		07	<b>mmHg</b>	- Column of Mercury
	02	<b>m3/s</b>	Light	01	<b>W/m2</b>	- solar radiation
	03	<b>L/h</b>		02	<b>Lux</b>	- brightness
	04	<b>L/s</b>		03	<b>J/cm2</b>	- solar energy
	05	<b>GPM</b>		04	<b>Wh /m2</b>	- solar energy

### ANALOG SEN. PARAMETERS

1. Sensors
2. Formats

### ANALOG SEN. PARAMETERS

Formato: 01

Number of integers: 2      Number of decimals: 1

Symbol: no

Units: <pressure> - 01

Calibration point 1: 0800 mV - 00,0 bar

Calibration point 2: 4000 mV - 16,0 bar

Calibration point 3: 0000 mV - 00,0 bar

Calibration point 4: 0000 mV - 00,0 bar

<For      For>                      Pag>                      UNITS

05 <b>NDVI</b> -	Conductivity 01dS _
06 <b>PRI</b>	02mS _
07 <b>UVI</b> - <i>ultraviolet index</i>	03 <b>uS</b>
Frequency 01Hz _	04 <b>mS/cm</b>
Power 01W _	05 <b>S/m</b>
02 <b>kW</b>	06 <b>VIC</b>
03mW _	Acidity 01 <b>pH</b>
04 <b>VA</b>	Radiofrequency_ 01 <b>dB</b> - <i>gain/variation</i>
05 <b>W/h</b>	02 <b>dB/m</b> - <i>power/sensitivity</i>
06 <b>kWh</b>	Nutrients 01 <b>meq /L</b> - <i>concentration</i>
Voltage 01V _	Evaporation 01mm /d
02mV _	02mm _
current 01A _	User 01___
02mA _	02___
resistor 01 <b>ohm</b>	.....
Cont. Water 01 %	15 ___
02 <b>m3/m3</b>	
03 <b>V.W.C.</b>	

Within the type "User" you can create up to 15 units at will.

**Calibration points .**

There are up to four calibration points, which allows you to configure sensors that are not linear. If they are not used, they can be left at 0.

**Actual Value:** Analog input reading in millivolts. If it is by current, it must be converted taking into account that there is a resistance of 200 ohms, 4 mA = 800 mV , 20 mA = 4000 mV .

**Logical value:** logical value that corresponds to the previous real value. It goes in the units and format that has been previously defined.

List of default formats (changeable); the others until 31 are without values.

FORMATS – Default configuration											
No.	units	Description	Sign integers Decimals	P1 Real (mV)	P1 Logical	P2 Real (mV)	P2 Logical	P3 Real (mV)	P3 Logical	P4 Real (mV)	P4 Logical
1	°C	Temperature	+/- 3.1	800	-30.0	4000	+ 60.0	0	0	0	0
2	W/m2	Radiation	4.0	800	0	4000	2000	0	0	0	0
3	cbars	soil moisture	3.1	800	0	2326	40.2	3422	85.5	4000	120.0
4	%HR	RH	3.0	800	0	4000	100	0	0	0	0
5	km/h	Speed	3.0	800	0	4000	160	0	0	0	0
6	%	Percentage	3.0	800	0	4000	100	0	0	0	0
7	or	units	4.0	0	0	5000	5000	0	0	0	0
8	mm	Distance	3.0	800	0	4000	100	0	0	0	0
9	L	Volume	4.0	800	0	4000	1000	0	0	0	0
10	L/m2	Precipitation	2.1	800	0	4000	20.0	0	0	0	0
elevation	m3/h	Flow	3.1	800	0	4000	200.0	0	0	0	0
12	bar	Pressure	2.1	800	0	4000	16.0	0	0	0	0
13	mS	Conductivity	2.1	800	0	4000	20.0	0	0	0	0
14	pH	Acidity	2.1	800	0	4000	14.0	0	0	0	0
fifteen	mm/d	Evaporation	1,2	800	0	4000	5.00	0	0	0	0
16	th	Address	3.0	800	0	4000	360	0	0	0	0
17	rpm	revolutions	4.0	800	0	4000	5000	0	0	0	0
18	mm	Displacement	+/-1.1	800	-2.5	4000	+2.5	0	0	0	0
19	V	Voltage	2.1	800	0	4000	50.0	0	0	0	0

twenty	%	C. water in soil	3.0	800	0	4000	fifty	0	0	0	0
twenty-one	mA	Current	2.2	0	0	4000	20.00	0	0	0	0

### 5.7.3. Meter sensors

A meter sensor receives information about the volume and flow of water that passes through the pipe, in the case of the rain gauges of the rain that has fallen or a volume drained and from the energy meters the power consumed in a period and the one that is being consumed.

Meter sensors can be connected to a digital input (digital meter), to a digital frequency (frequency meter and rain gauge), to an analog input (analog meter) or read from another electronic device via RS485 and ModBus protocol .

**Sensor:** counter sensor number to configure (out of 1 a80).

**Text:** sensor identification text. Maximum 9 characters.

**What it measures:** counter sensors can measure volumes of liquids or quantities of energy.

- *"volume"* : cubic meters, liters, centilitres, liters per square meter, etc. Measure volume and flow.
- *"power"* : kilowatts. Measure power consumption and energy flow.
- *"units"*: units. For other concepts.

**Guy:**

- *"digital"* : the counter closes a contact, producing a pulse, every time a known volume of water passes through. Counting the time between two pulses calculates the flow rate. It has to be connected to a digital input of Agrónic or external modules.
- *"analog"* : the meter has a 4-20 mA analog output that indicates the flow that is passing through the pipe at any moment. It has to be connected to an analog input of Agrónic or external modules.
- *"frequency"* : the meter has a windlass that delivers a train of pulses (frequency) proportional to the flow that is passing. It has to be connected to a digital input that is suitable for reading frequencies. En una base de A4500 puede conectarse de la D1 a la D9 y/o D12. En una base de A4000 puede conectarse de la D1 a la D7.
- *"rain gauge"* : the rain gauge has a teaspoon that fills with rain or drainage, when it is full it automatically empties generating a pulse. Each pulse is equivalent to a quantity of water per m2. It has to be connected to a digital input that is suitable for this type of pulse.
- *"Summation"* : summation of several counters. It must be taken into account that the accumulated and the flow do not exceed the maximum allowed.

volume counter:

**Flow in:**

- *"0000 m3/h"* : cubic meters per hour. Maximum flow 9999 m3/h.
- *"000.0 m3/h"* : cubic meters per hour. Maximum flow 999.9 m3/h.
- *"00.00 m3/h"* : cubic meters per hour. Maximum flow 99.99 m3/h.
- *"0000 L/h"* : liters per hour. Maximum flow 9999 L/h.
- *"000.0 L/h"* : liters per hour. Maximum flow 999.9 L/h.
- *"00.00 L/h"* : liters per hour. Maximum flow 99.99 L/h
- *"0000 m3/s"* : cubic meters per second. Maximum flow 9999 m3/s.
- *"000.0 m3/s"* : cubic meters per second. Maximum flow 999.9 m3/s.
- *"00.00 m3/s"* : cubic meters per second. Maximum flow 99.99 m3/s.
- *"0000 L/s"* : liters per second. Maximum flow 9999 L/s.
- *"000.0 L/s"* : liters per second. Maximum flow 999.9 L/s.
- *"00.00 L/s"* : liters per second. Maximum flow 99.99 L/s.

The rain gauge does not have flow, instead it shows the intensity of rain that is accumulated in the last 60 minutes. It is displayed in the format "000.00 L/m2 or 000.00 mm".

**Accumulated in:** units in which the accumulated volume is displayed in the history. The units are: *"m3", "L", "cl"* .

Energy meter:

**Energy in:**

- "0000 kW" : Power. Maximum maximum power 9999 kW.
- "000.0 kW" : Power. maximum power 999.9 kW.
- "00.00 kW" : Power. maximum power 99.99 kW.

**Power consumption in:** cannot be configured, they are always "kW" .

#### Unit counter:

**Units in:** cannot be set, it is always "0000 U/h" . Maximum value 9999 U/h.

**Accumulated in:** cannot be configured, they are always: "U"

#### Digital counter sensor.

**Input:** digital input where the counter is connected.

**Pulse value:** volume or power measured by each pulse (of 0 a 90000,00 litros / de 0 a 90000,00 W).

**Maximum time between pulses:** if after receiving a pulse more than this time passes, the instantaneous flow or energy flow goes to 0 (from 0 a 999").

#### Analog counter sensor.

**Input:** analog input where the counter is connected.

**Real value:** value read by the analog input. It is always in millivolts. For 4-20 mA sensors: 4mA=800mV and 20mA=4000mV.

**Logical value:** value displayed on the screen when the real value entered before is read at the analog input.

With the two calibration points, the relationship between mA and the flow or energy flow is established.

Frequency counter sensor. These counters are always volume or energy.

**Input:** digital input where the counter is connected.

**Cycles per liter:** frequency that the counter emits for each unit of volume or energy that it passes. Of 0 a 1500,000 pulses per liter/watt (maximum instantaneous frequency per second 500 Hz).

En una base de A4500 puede conectarse de la D1 a la D9 y/o D12. En una base de A4000 puede conectarse de la D1 a la D7.

#### Rain gauge counter sensor.

**Input:** digital input where the rain gauge is connected.

**Pulse value:** amount of rain corresponding to each filling of the teaspoon (of 0 a 99.99 liters/m<sup>2</sup> or mm).

#### Sum counter sensor.

**First sensor:** number of the first sensor in the sum (from 0 to 80).

**Last sensor:** number of the last sensor in the sum (from 0 to 80).

The sum will be of all the counter sensors that are between the first and the last. All the sensors that are part of the summation have to measure the same thing (volume or energy) and have the same flow or energy flow format.

For the assignment of the inputs, see the section " *Inputs and outputs coding* ".

### 5.7.4. Logic sensors

The value of the logical sensors is obtained by applying mathematical (addition, subtraction, mean) or logical (and, or) operations to the value of elements such as sensors, sectors, conditioning factors, outputs, etc. The result or output can be a digital on/off value or an analog value. Its status can be applied to a condition or to another logical sensor. If the result is a digital value, it can be assigned to an Agrónic output.

Up to five inputs and one operation can be configured on each logic sensor.

**Sensor:** logical sensor number to configure (out of 1 a 20).

#### **Operation:**

- "sum" : sums the values of the elements. The inputs have to be analog values and all have the same format and units. The output is an analog value.
- "subtract" : subtract from the first element the rest of the elements. The inputs have to be analog values and all have the same format and units. The output is an analog value.
- "mean" : average of the values of the elements. The inputs have to be analog values and all have the same format and units. The output is an analog value.
- "and" : logical operation. The inputs have to be digital values. The output is a digital value.
- "or" : logical operation. The inputs have to be digital values. The output is a digital value.

For each element. Each sensor can have five inputs. The five inputs must have the same type of output (digital value or analog value) and also the analog ones must have the same format. For each input the following must be configured:

<b>Element type:</b>	(for "operation" <u>and/ or</u> )	(for "operation" <u>add/subtract/mean</u> )
- "Digital sensor" :	active/not active ( on /off)	----
- "Conditioning" :	active/not active ( on /off)	----
- "Digital Output":	active/not active ( on /off)	-----
- "Logic Sensor":	active/not active ( on /off)	----
- "Sector " :	active/not active ( on /off)	----
- "Analog Sensor ":	higher/lower – reference – differential	Reading value
- "Flow Counter Sensor ":	higher/lower – reference – differential	Reading value
- "Logic Sensor-Value ":	higher/lower – reference – differential	Value of the result
- "Analog Output ":	higher/lower – reference – differential	Result value

In the and/ or operation, by means of the **Condition** question "active/not active" it is marked when the state of the element is considered valid to fulfill the condition.

**Element number:** number of the element. Depending on the type of input, the number will correspond to the digital sensor, the analog sensor, the counter sensor, the logical sensor, the determining factor or the sector. The entry limit varies by type.

**Output:** in the event that the result of the operation is a digital value ( on / off) you can activate an output. Here you configure which output should activate. The output cannot be assigned to any sector or general.

**To register:** "yes" a record of the sensor value is going to be made in the history. If the result is a digital value, each status change is recorded; if the result is an analog value, the average, maximum value, and minimum value of the 10 minutes are recorded every 10 minutes.

**Text:** sensor identification text. Maximum 9 characters.

## 5.8. NEBULIZATION PARAMETERS

Misting is used to cool and increase humidity in greenhouses by applying pressurized water. The control can be carried out by DPV (vapour pressure deficit), by temperature and/or humidity or by a condition.

Up to 8 different mists can be created. In each one, up to a maximum of 8 outputs are configured that will be activated sequentially during the time indicated. When it ends there is a pause time before starting the cycle again. The pause time can be automatically modified based on the value of the sensors. See the " *Nebulization* " section of the User Manual.

Nebulization can be started in two ways:

- Automatic : when, within an active schedule, it is indicated by a start condition or it is not within the temperature, humidity or DPV ranges that have been indicated.
- Manual : in the "Manual – Nebulization" section , set to "Manual: running". To start manually, it is not necessary to have conditioners or sensors configured.

Misting needs the HYDRO version.

**Nebulization:** number of nebulization to be configured (out of 1 a8).

**Temperature sensor:** temperature sensor number. From 0 to 120, to 0 there is no refresh control.

**Humidity sensor:** humidity sensor number. From 0 to 120, to 0 there is no humidification control.

**Control by DPV:** if we want control by "Vapor Pressure Deficit" and the two sensors, temperature and humidity, have been configured, the DPV will be calculated in units of "00.0 kPa".

### Departures

**R1 to R8:** there can be up to 8 outputs for each nebulization, each one with its activation time. Enter the output number to activate. They are activated sequentially. See the output coding in the " *Input and output coding* " section.

**General:** general output that will be activated whenever nebulizing.



**Determinants:** up to four determinants that affect nebulization can be configured. Here the numbers of 120 are entered. 0 aLeaving 0 there is no condition. The conditions that can be assigned to a nebulization are "Definitive Stop", "Conditional Stop", "Start" and "Start/stop". For a condition to affect a nebulization it has to be assigned here; Conditions that are marked for all programs do not affect nebulizations. The condition of "Definitive Stop" does not take into account the temporary attempts that have been assigned.

Edit or create the conditions linked to nebulization, just as can be done in the "*Parameters - Conditions*" section

- Definitive/Conditional Stop, Start, Start/Stop.
- Add.

**Text:** identifying text. Maximum 9 characters.

## 5.9. DRAIN PARAMETERS

Drainage in hydroponic crops is necessary to remove salts from the reticular zone, for this purpose the Agrónic 4500 has up to 20 drainage controls, including the measurement of the drained volume, conductivity, acidity and level in the tray.

Each drain is linked to an irrigation program and a sector in which the drainage tray with the associated sensors is located. That sector will be the first in the irrigation order, once its irrigation is finished, the same adjustments will be applied in the sectors that come after it to achieve the drainage objective. Outside the "active hours" the drainage control is not carried out.

The control indicates what % of the irrigation water volume you want to drain. To achieve the desired drainage volume, it can be done in two ways: modifying the amount of watering in the program or modifying the time between program starts.

The drain control needs the HYDRO option.

**Drain:** Drain number to configure (out of 1 a20).

### Compensation type:

- "*Same irrigation*" : attempts are made to comply with the drainage in the same irrigation. Increases or decreases the amount of watering of the program sectors.
- "*Next watering*" : attempts to comply with the drainage in the next watering. Depending on the drainage that has occurred in the previous irrigation, the amount of the next irrigation increases or decreases.
- "*Activations*" : an attempt is made to comply with the drainage by modifying the time between activations, without modifying the amount of irrigation. It is only possible if the program works with activation frequency.

**Associated irrigation program:** corresponds to the program (1 to 99) where the objective drainage will be entered, the first sector that will irrigate must include the sector of the next question.

**Sector associated with drainage:** sector number where the drainage control is carried out (de 1 a 400), where the measurement sensors are located. Assign it in the first position of the program sectors.

### Measurement level :

- "*Low*": the irrigation flow applied to the crop sample where the drainage is measured will be in liters "000.0 l/h". The counter or meter of the volume drained will be in milliliters "000.0 ml".
- "*High*": The irrigation flow applied to the crop sample where the drainage is measured will be in cubic meters "000.0 m3/h". The counter or meter of the drained volume will be in liters "000.0 l"

**Flow applied to the sector:** corresponds to the volume applied by the drippers in the area of the sector where the drained water is measured. The measure can be carried out in all the cultivation of the sector or in a part. The units will be based on the configured measurement level: "Low" up to 999.9 l/h and "High" up to 999.9 m3/h.

**Pulse value:** to measure the volume drained, a rain gauge or similar is usually used. Here you enter the value of each pulse. The units will be based on the configured measurement level: "Low" up to 999.9 ml and "High" up to 999.9 liters.

**Meter digital sensor input:** digital input where the sensor is connected.

**Drain EC sensor:** analog sensor number used to measure the EC in the drain (from 0 to 120).

**Drain pH sensor:** number of the analog sensor used to measure the pH in the drainage (from 0 to 120).

**Emptying output:** when the irrigation starts, it will activate for 2 minutes to empty the container where the sensors are located. If not used leave the value to 0.

**Correction / error values:** 00% / 00%, percentage of correction that will be applied in irrigation or time between irrigations for an error value in drainage.

To calculate a new drainage correction factor, a time greater than the minimum and less than the maximum must have elapsed since the start of the previous irrigation, otherwise the previous correction factor will be maintained.

**Minimum time between starts:** hh:mm

**Maximum time between starts:** hh:mm

**End of drainage:** once the irrigation is finished, the minutes entered here will be counted to consider the drainage finished, at this point the drainage, EC and pH values are recorded. If the program performs a new activation before the end of this time, it will be considered as a drain end.

#### **Drainage conditions:**

Edit or create the conditioning factors linked to the drainage control, as can be done in section “ 5.6. Conditioning Parameters”

- Drainage error, CE drainage error, pH drainage error.
- Add.

\* To take into account when compensating in the "same irrigation":

- In a program with linear operation and grouping of more than one sector, the same units must be programmed in all of them
- Do not chain a program at the end of another, since it will not compensate the drain in the programs following the first one.
- Do not use after-treatment , since it cannot be applied. At least in the first group.
- If the risks are carried out by time, the format of minutes / seconds is the most appropriate to make the corrections, the format of hours / minutes implies jumps from minute to minute, too much to make an adjusted compensation.
- The first irrigation after a total deletion or a start-up of the equipment will not apply the drainage, due to not having previous references.
- Avoid stopping the irrigation (Stop, Conditional Stop, etc.) of the sector that contains the tray since it can affect the correct calculation of the drainage compensation.

It may be useful to carry out the first or even the second watering of the day outside the "active hours" of the program so that it does not compensate for drainage, all this to be able to correctly fill the crop bags.

## **5.10. PIVOT PARAMETERS**

Consult the manual “Man A4500 – Centers” (R-2406).

## **5.11. HYBRID SOLAR IRRIGATION PARAMETERS**

Solar irrigation is used when the facility has a hybrid power system: grid or diesel power and solar panels together with a drive that accepts AC and DC input.

With solar irrigation activated, Agrónic selects where it has to use the energy through the motors:

- M1: activates when the power is from the network or diesel.
- M2: activates when the energy is solar.
- M1 and M2: they are activated when there is a sum of energies.

The sectors and filters that use the hybrid system must have the two motors assigned in addition to the "expected consumption" value. The Agrónic, depending on the parameters it has configured, will decide whether to activate M1 (network or diesel) or M2 (solar) or both at the same time.

In solar irrigation, the “Solar” fertilization mode must be selected in “ *Function – Parameters – Head – Fertilization*”. Fertilization is limited to operating in "CE regulation" or "proportional", in addition the programs that can irrigate at the same time must have the same fertilization formulation. The pre and post-priego is not used .

In the "Solar" fertilization modality, it is not possible to operate in "mixed water" or with treatments.

There is the possibility of using conventional fertilization, but then you will not be able to take advantage of the functionality of solar irrigation, since you will only be able to water one program at a time.

**Activated:**

- “*yes*” : the facility has a hybrid energy system.
- “*no*” : the facility has a unique energy system. Normal use of Agrónic.

**Hours:** within the hours configured here, only solar energy will be used. Outside these hours, both types of energy can be used. If it is left at 0 all day, both types of energy will be used.

**Radiation Sensor:** Used to detect available power (0 to 120). It is recommended to connect the sensor at the base of the equipment to have a new reading from the sensor every second.

**Safety radiation sensor:** if the main radiation sensor fails, the safety sensor is used to determine the available energy (from 0 to 120). If there is no radiation sensor available, then the available energy from the Grid or Diesel will be used until the fault is solved.

**Temperature sensor:** it is used to compensate the effect of temperature on the performance of solar panels (from 0 to 120). The sensor is usually located in the infrastructure of the panel.

**Temperature coefficient > 25°C:** -0.00%/ °C , the standard value corresponds to -0.44%/ °C , when the temperature exceeds 25 degrees the radiation value will decrease in relation to the increase above 25 due to the coefficient. For example, the radiation sensor measures 800 W/m<sup>2</sup>, the temperature on the panel is 42 °C , so  $42 - 25 \text{ °C} \times 0.44 = 7.48\%$  of 800 = 740 W/m<sup>2</sup>.

**Sensor Integration Seconds:** The control integrates the radiation sensor readings in the seconds indicated here (0 to 99”). With them we relax the peaks that may exist at certain times due to the effect of the clouds. With 20 seconds, for example, we will have the average of the last 20 readings.

**Add Solar Energy plus Grid/Diesel:** outside of solar hours the energy sources can feed the system at the same time.

- “*yes*” : the energy sources can act at the same time. It is necessary to have a drive that fulfills the sum function of two power sources.
- “*no*” : the energy sources cannot act at the same time. One or the other is chosen based on consumption and giving priority to solar.

**Power available from Grid or Diesel:** power available to carry out the irrigation when we are operating outside the solar time window (from 0 to 9999 kW/h).

**Digital operating solar sensor:** digital sensor through which the drive sends its status to Agrónic (from 0 to 80). It is timed for 60”.

**Analog energy sensor:** 000, a reading of the energy generated by the drive is taken.

**Assign to head:** we indicate to the control which head will operate with hybrid solar irrigation.

**Escalation time:** when new programs enter, as the available energy increases, it will be timed so that several do not do so at the same time. We may be interested in a staggered filling of pipes, for this, this time will be timed multiplied by each sector that has entered to delay the entry of the next program (from 0 to 999”).

**Table of Energy generated versus Solar Radiation:** we have 6 points to be able to calculate the energy generated (kW) by the photovoltaic system in relation to the Solar Energy that is received once compensated for the temperature. The hysteresis is used to modulate the output of irrigation sectors. Solar irrigation will start working from the first point. Enter values from smallest to largest. Example:

Point	Solar Radiation	Energy generated	Hysteresis
1	0200 W/m <sup>2</sup>	0050 kW	05 kW
2	0300 W/m <sup>2</sup>	0075 kW	08 kW
3	0500 W/m <sup>2</sup>	0160 kW	11 kW/
4	0700 W/m <sup>2</sup>	0210 kW	21 kW
5	0900 W/m <sup>2</sup>	0240 kW	25 kW
6	1050 W/m <sup>2</sup>	0270 kW	28 kW

\*The value of "solar energy generated" is recorded.

**Finish point one with grid power:** y/n, if solar energy falls below the first point within solar time, the active sectors will be closed by means of Grid or Diesel energy (engine 1), provided that engine 2 (the solar) has "stop timing" with an assigned value and the timing of "Stop to the sectors" in "no".

**HYBRID SOLAR IRRIGATION PARAMETERS**

Activate: yes

Schedule: 00:00 – 00:00

Radiation sensor: 000

Safety radiation sensor: 000

Temperature sensor: 000

Temperature coefficient: -0,44 %/°C

Integration seconds: 00”

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**Table of Flow vs. Pressure in pumping:** For the chosen head, six points are asked to generate a pressure curve (delivery height) and its flow limit (Q). Useful to limit the entry of sectors in irrigation when the irrigation pressure cannot exceed a requested flow. Enter values from smallest to largest. Example table:

Pressure point	Flow
1 03.0 Bar	320.0 m3/h
2 03.5 Bar	310.0 m3/h
3 04.5 Bar	270.0 m3/h
4 05.5 Bar	230.0 m3/h
5 06.5 Bar	180.0 m3/h
6 07.5 Bar	150.0 m3/h

To comply with this control, it will be necessary to configure the working pressure and the expected flow in each sector in the "Parameters - Sectors" section and if the maximum or minimum value is used in the "Parameters - Head - Pressure regulation" section .

**Use filter pressure: s/n** , Use the filter pressure to control the flow limit, it will be taken into account when cleaning the filters.

**Expected filter consumption:** corresponds to the energy needed to clean at the expected flow rate and pressure. The units will be in 000.00 kWh.

#### Solar irrigation control operation

Within the standard operation, schedules, pulsations, priorities, conditions, among others, are taken into account in the irrigation programming. Now we add the control of the energy demanded by the sectors that want to irrigate and the energy supplied by the solar infrastructure, Agrónic analyzes all these elements so that the programs enter in such a way that they optimize the available power, both in solar and non-solar supply.

While we are in solar hours, the irrigation programs will enter in such a way that the available power is not exceeded by activating Motor 2 (solar system inverter), outside of these hours it will act in the same way, but activating M1 (Grid or Diesel) when not there is enough power.

## 5.12. CLOCK PARAMETERS

Configuration of clock and calendar parameters. If you want to change the time you have to go to "Manual – Clock"

**Time zone:** ± hh , select the time zone in which the equipment is installed.

#### **Summer schedule:**

- "yes" : it will automatically change from winter time to summer time and vice versa when the change date arrives. If the changeover dates are left at 00/00, the EU standard will be applied, starting on the last Sunday of March and ending on the last Sunday of October.
  - o Start: dd /mm
  - o End: dd /mm

**Solar calendar:** the sunrise and sunset times of the 1st of each month are entered. In this link you can obtain the information <https://meteogram.es/sol/>. This calendar can be used to modify the active schedules of the programs, nebulizations and solar irrigation.

Example of a farm in Zaragoza (Spain):

Day month	Departure time	sunset time
01/01	00:00	00:00
02/01	00:00	00:00
03/01	00:00	00:00
04/01	00:00	00:00
01/05	00:00	00:00
06/01	00:00	00:00
07/01	00:00	00:00
08/01	00:00	00:00
09/01	00:00	00:00
10/01	00:00	00:00

Day month	Departure time	sunset time
01/01	08:30	17:43
02/01	08:15	18:19
03/01	07:37	18:53
04/01	07:45	20:28
01/05	06:59	21:01
06/01	06:31	21:31
07/01	06:33	21:41
08/01	06:58	21:21
09/01	07:29	20:37
10/01	08:00	7:45 p.m.

11/01	00:00	00:00
12/01	00:00	00:00

11/01	07:35	17:58
12/01	08:11	17:34

The rest of the days of each month the sunrise and sunset times are automatically recalculated.

#### Use solar calendar in the active hours of:

Programs: **yes/no**

Nebulization: **yes/no**

Solar irrigation: **yes/no**

With "no" it will be asked in " hh:mm a hh:mm " format, direct value of hours and minutes.

With "yes" it will be asked in the format " $\pm$  h:mm a  $\pm$  h:mm ", here the active time will enter the sunrise time plus or minus the hourly value and the same for sunset. For example, if we want a program to go into active time 2 hours after sunrise and end 1 hour before sunset, we would enter +2:00 to -1:00.

**Weekend active schedule:** When entering values in this schedule, it will be used to replace Saturdays and Sundays in all the programs that have their scheduled active schedule. Useful when there is a different electricity rate on the weekend. If the programs use the solar calendar, this schedule will not be asked.

**Adjust history time:** When we consult the histories we can positively or negatively move the view of the record of all the elements of the History in format as watering day. If in "adjust time" we have -2 hours then we will see the values in the history from 10:00 p.m. the day before to 9:59 p.m. today.

### 5.13. MISCELLANEOUS PARAMETERS

#### Screen.

##### Auto power off:

- "yes" : the screen turns off after 5'not touching any key.
- "no" : the screen is always on.

**Illumination level:** illumination level of the screen (out of 0 a5).

#### Keyboard.

**Sound level:** duration of the sound when a key is pressed (out of 0 a5).

#### PIN security.

Like mobile phones, the Agrónic can be protected with a PIN code so that it cannot be used in the event of theft. If the Agrónic is without power for more than 10 minutes, when it powers up again it will ask for the PIN code. If the correct code is not entered three times, Agrónic is blocked, asking for the deactivation code (PUK). To get it you have to contact PROGRÉS. Although Agrónic is blocked, the programs continue to run normally and if there is a connection to PC-Nube it will work normally.

If, once entered, you want to change the PIN code, you must first enter the current PIN, otherwise it will not let you change it.

**PIN code:** security code (from 0 to 9999, to 0 the PIN protection is not to be used).

**Default query screen :** When starting the equipment or exiting the "*Functions*" section due to lack of activity, it will show the query screen chosen here, it can be any of the query menu.

#### VARIOUS PARAMETERS

##### Screen:

Automatic stop: yes

Lighting level: 5

##### Keyboard:

Sound level: 2

##### PIN security:

PIN code: 0000

Consultation screen by default: < Fertilization >

### 5.14. INSTALLER PARAMETERS

In this section there are the less usual parameters to change once the equipment has been installed.

The entrance to this section is protected with an access code that, if needed, must be requested from Progrés.

#### INSTALLER PARAMETERS

- |                      |                        |
|----------------------|------------------------|
| 01. Erased           | 10. Activation options |
| 02. Events           | 11. Hardware           |
| 03. Head-Regulations | 12. Update software    |
| 04. Sectors          | 13. Exchange ModBus    |
| 05. Communication    |                        |
| 06. Various          |                        |
| 07. Access codes     |                        |
| 08. Backup copy      |                        |
| 09. Language         |                        |

#### 5.14.1. Erased

It allows deleting different parameters of the equipment.

The sections for **deletion of the registry, total and RAM memory** must not be used unless indicated by the technical staff of Progrés.

The “all clear” operation may take a few seconds

01. From Programs [ *all, item, RAM\** ]
02. From Sectors [ *all, element, RAM* ]
03. Of Determinants [ *all, element* ]
04. Digital Sensor [ *all, element* ]
05. Analog Sensor [ *all, element* ]
06. Sensor Counter [ *all, element* ]
07. Sensor Logic [ *all, element* ]
08. From Pivot [ *all, element* ]
09. Of Engines [ *all, element* ]
10. Drain [ *all, element* ]
11. Register
12. Total
13. RAM memory

- \* *all: delete query and job data parameters, from all elements*  
*element: delete query and job data parameters, only from the indicated element*  
*RAM: clears query and job data, from all elements*

#### 5.14.2. events

For each of the events recorded by Agrónic, the type and subtype are configured with the actions that will be carried out when they occur.

The actions of the events that are produced by the “conditioning factors”, of type 6.1 to 6.12, are configured in each one of the determining factors, section “*Parameters – Conditioning factors*” .

The complete list of events can be seen in the “*Readings – Record*” section of the user manual.

events.

**Event type:** Type of event to be configured (out of 1 a15).

**Event subtype:** Subtype (specific event) to be configured (from 1 to ...)

**It is anomaly:**

- “*yes*” : the event is registered as an anomaly. When it occurs, it is indicated in the general inquiry. It is shown in the anomalies section and in the action record. It is for events that you want to see quickly when they occur.
- “*no*” : the event is registered as actuation. It is shown in the action record section. It is for events that are not important to see when they occur.

**Activate alarm:** “yes” activates the alarm output when the event occurs. The alarm is deactivated manually in “*Function – Manual – End shutdowns and faults*” .

The next section only asks if the GPRS modem is installed.

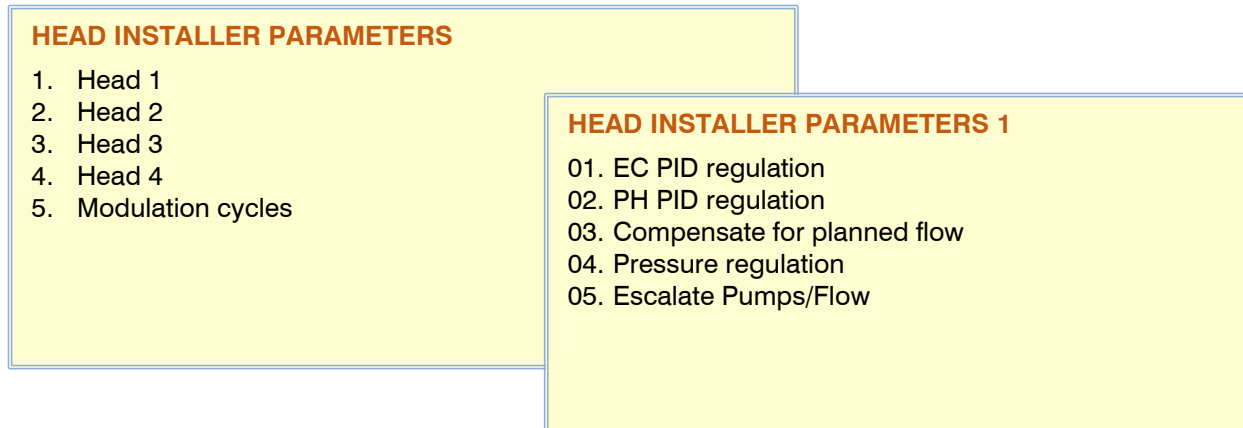
**SMS to tel. A:** when the event occurs, it sends an SMS to phone A.

**SMS to tel. B:** when the event occurs, nante sends an SMS to phone B.

**SMS to tel. C:** when the event occurs, it sends an SMS to phone C with the selected text ( 0 a6).

### 5.14.3. Head – Regulations

Configuration for each head of the CE, pH and pressure regulations. The head is chosen first and then what is going to be configured.



#### EC and pH regulation/Uniform

**Kp** : proportional gain. The fertilizer injection increases the greater the difference between the sensor reading and the reference. At 0 it does not work (from 0 to 10).

**Ki**: integral gain. The injection increases the greater the error accumulated over time. At 0 it does not work (from 0 to 10).

**Kd** : derivative gain. The injection increases the lower the rate at which the EC changes. At 0 it does not work (from 0 to 10).

**Initial delay**: when starting the regulation, the injection is at the same value as the last watering for the time set here; after this time the PID calculates the injection (from 0 to 30”).

**Calculation time**: how often the injection is calculated (from 1 to 9”). This value is important for integral and derivative calculation. Normally it is the time it takes to circulate the water from the point where the fertilizer is injected until it reaches the EC or pH sensor.

#### Compensate for expected flow.

It is possible to make an increase in the injection of EC and pH to that calculated by the "PID" in relation to the expected flow of the sectors in irrigation. Two flow points are requested for an increase of (%) the percentage of injection, from 0 to 50%.

#### Pressure regulation.

The Agrónic can perform the regulation by means of a PID control or directly deliver the reference to the drive so that it can make the regulation

**Who makes the regulation:** it is configured if Agrónic is going to make the regulation or if the reference is delivered to the drive so that it can do it.

- **“Agrónic”** : Agrónic performs the regulation, the analog output will vary as indicated by the PID.
- **“Inverter”** : the inverter performs the regulation, the analog output indicates the reference.

Parameters in the case of “ **Agrónic** ”.

**Kp** : proportional gain. The % output increases the greater the difference between the sensor reading and the reference. At 0 it does not work (from 0 to 10).

**Ki**: integral gain. The % output increases the greater the error accumulated over time. At 0 it does not work (from 0 to 10).

**Kd** : derivative gain. The % output increases the slower the rate at which the pressure changes. At 0 it does not work (from 0 to 10).

**Calculation time:** how often the output is calculated (from 1 to 9"). This value is important for integral and derivative calculation.

**Initial delay:** when starting the pressure regulation, it is at the value of "minimum operating regulation" for the time configured here; after this time the PID calculates the injection (from 0 to 255").

**Minimum operating regulation:** minimum % of pressure regulation from which it will never drop, even if the PID is below it. Useful for the operation of the variator-pump.

Parameters in the case of " **Inverter** ".

**Maximum pressure value** , 00.0 Bar, for scaling the analog output to 100%. The rest of the variables linked to the analog outputs can be found in the " *Parameters – Installer - Hardware* " section.

### Motors / Flow scaling.

When we are interested in the motors entering or leaving automatically in relation to the expected flow demanded by the sectors that are active at each irrigation moment, then we will enter the variables in the following table. Because the scaling flow values (due to the behavior characteristics of the pumps or motors) can vary depending on the pressure range in which they are working, there is the possibility of configuring up to 3 scaling tables, one for each different range of working pressure of the sectors.

**Operate motors in flow scaling:** Answering with "no" this operation will not be taken into account. With "yes" we have 6 scaling points per table, the first goes from 0 m<sup>3</sup>/h to a first flow value for an assignment of motors to enter this first scale, the second point will go from the flow of the first point to the one entered in the second, for another assignment. The "water hammer" timings will be fulfilled at the beginning or end of each one of them. The "pressure regulation" or the diesel engine (generating set) can also operate on the M1 together with the flow scaling, in this case it must be assigned at each of the points.

#### HEAD INST. PARAMETERS 1 ESCALATE PUMPS/FLOW

Operate pumps in flow escalation: yes

Table 1. Pressure of 0.0 to 3.0 bar

Assig.Flow to Pumps	1	2	3	4	5	6
P1 de 0 to 023,00 m <sup>3</sup> /h	y	n	n	n	n	n
P2 to 058.00 m <sup>3</sup> /h	y	n	y	n	n	n
P3 to 073.00 m <sup>3</sup> /h	y	y	n	n	n	n
P4 to 108.00 m <sup>3</sup> /h	y	y	y	n	n	n
P5 to 000.00 m <sup>3</sup> /h	n	n	n	n	n	n
P6 to 000.00 m <sup>3</sup> /h	n	n	n	n	n	n

Table1 Table2 Table3

The M2 motor also has a pressure regulation output, to perform the "multi-follower" function. In this case, the regulation analog output of M2 will follow exactly the same value as that of M1.

Important: The sectors that will operate with the scaling engines must be assigned the same engines in the table. If there is a sector that, for example, irrigates by natural pressure, then we will assign a motor/general not provided for in the table

There is the possibility of delaying the entry of the motors in the initial pipe fill (when they are started for the first time). To do this, configure the "Pipe filling time" in " *Parameters - Head - General* ".

**Pressure:** The pressure range in which each scaling table will apply is indicated. Table 1 goes from 0.0 bar to the indicated pressure. Table 2, from the pressure of table 1 to the indicated value. Table 3, from the pressure of table 2 up to the indicated value.

### modulation cycles

**Short modulation cycle:** It is the time in which the injection pulsations are repeated, in the fast outputs (from 1.5 to 5.0"). Example: if the time is 2" and the injection is 50%, the injection valve will be 1" open and 1" closed. In the case that the output is type 4 – 20 mA or 0 – 10 V, this time is not used.

It will be used in regulation of EC, of pH, in uniform fertilization if fast pulses are required or in proportional fertilization in the mode of injection proportional to the flow.

**Long modulation cycle:** indicates how often the fertilizer injection is repeated, it is only used for uniform fertilization (from 01" to 99"). The normal exits of the base will be used.

The modulation cycle times are common to the 4 spindles.



#### 5.14.4. Sectors

In this section, the flow detectors that can be carried by the sectors are configured, they can be digital (all/nothing) or flow (counter). The parameters of these detectors are common to all the equipment sectors, for the counters there can be up to 4 different formats. The sector goes into error due to the flow detector in two cases: 1. the sector is closed and water passes; 2. The sector is open and no water passes. In the case of the meter flow detector, it can enter an error due to flow out of range.

It is also configured if the sector is going to be used as fertilizer. These parameters are configured for each sector.

The flow detector in the sector can be by Digital Detector or by an auxiliary Meter.

**Stop program:** when the open sector error occurs and no water passes or, in the case of the auxiliary meter, if it is in error due to flow out of range, the program can be stopped.

- "si" : for the program corresponding to the sector in error.
- "no" : not for the program, it only does the registration.

When stopping the program (temporary stop) it will continue with the next subprogram, the next position of a linear or a possible sequential.

##### Digital flow detector.

It can be a probe-type sensor or a pressure switch. The digital contact is open when no water passes and closed when water passes.

**Detection delay:** when the sector changes from open to closed, this time is waited before checking that no water is passing through. When the sector changes from closed to open, this time is waited before checking that water passes. The delays caused by communications should be taken into account if there are modules or by the filling of pipes (from 0 to 99'59").

##### Flow detector by meter (auxiliary meter).

In each sector there can be a counter. All the counters assigned to the sectors have to be the same within four possibilities.

It is considered that water passes through the sector when pulses are received from the meter, and that no water passes if they are not received. There is also a flow and leakage error control if there is no irrigation order.

**Counter format number :** you can have from 1 to 4 different counter formats to assign to the different sectors. Each format includes the following variables.

**Pulse value:** volume measured by each pulse (of 0 a0000.00 liters).

**Maximum time between pulses:** if after receiving a pulse more than this time passes, the instantaneous flow goes to 0 (from0 a 999").

**Flow in:**

- "0000 m3/h" : cubic meters per hour. Maximum flow 9999 m3/h.
- "000.0 m3/h" : cubic meters per hour. Maximum flow 999.9 m3/h.
- "00.00 m3/h" : cubic meters per hour. Maximum flow 99.99 m3/h.
- "0000 L/h" : liters per hour. Maximum flow 9999 L/h.

**Accumulated in:** units in which the accumulated volume is stored in the history. The units are: "m3", "L", "cl" .

**High margin:** the flow error is activated when the instantaneous flow is higher than the predicted flow by this % (from 0 to 100%, to 0 there is no high margin control).

**Low margin:** the flow error is activated when the instantaneous flow is lower than the predicted flow by this % (from 0 to 100%, to 0 there is no low margin control).

For this control it is necessary to have assigned a "projected flow" to the sector.

**Margin detection delay:** delay that must be met to record the flow rate error and stop the program (from 0 to 99'59"). When the sector does not have an irrigation order, this timing will be used for once it has elapsed, it will be checked if a first pulse from the counter arrives, then it will make a record indicating the leak; in the "History - Sector" it will show the escaped units.

### Fertilizer sector.

When a sector is configured as fertilizer, what it does is activate the sector only when the fertilizer assigned to it is activated. It is configured for each sector. They can only be the first 4 fertilizers.

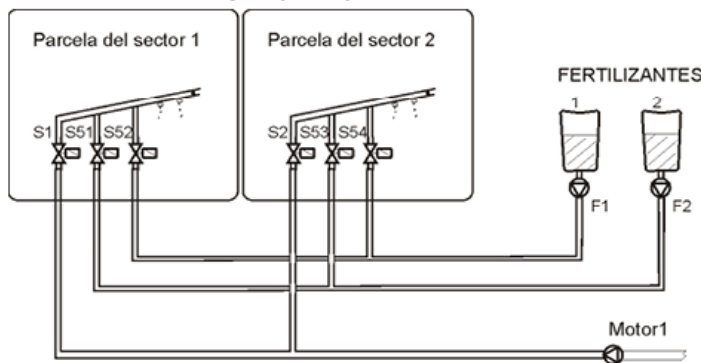
**Sector:** sector number to which the fertilizer will be assigned. From 0 to 400.

**Assigned fertilizers:**

**F1:** yes/no    **F2:** yes/no    **F3:** yes/no    **F4:** yes/no

When another independent network is distributed in the irrigation network for one or more fertilizers, then we can use this utility to open the fertilizer valve in one or more sectors while in others only another fertilizer is irrigated or applied.

**Veamos un ejemplo tipo de este sistema:**



### 5.14.5. Communication \_

Consult the manuals "A4500 – Communications" and "A4500 – External Modules"

### 5.14.6. Several

#### Programs.

**When watering by volume, ask for time:** answering "yes" when watering by volume will ask for a maximum watering time. This time is given for security in the event that it does not receive pulses from the counter, o se quiera marcar un tiempo máximo de riego por un determinado volumen.

**Irrigation volume format:** when the irrigation units are by volume in "m3" here it is determined in which format they will be entered: [00000 m3] [0000.0 m3] [000.00 m3].

**Fertilizer volume format:** when the fertilization units are by volume, here it is determined in which format they will be entered: [00000 L] [0000.0 L] [000.00 L] where L are liters.

**Default fertilizer units:** determines the default fertilizer units. In each program it can be modified in "Parameters – Programs" .

- "hh:mm " : hours and minutes.
- "mm:ss " : minutes and seconds.
- "L " : liters. You need to have a counter sensor configured.
- "L/ha" : liters per hectare. You need to have a counter sensor set to the fertilizers and the area of each sector. Adding the total area of the sectors to be irrigated, calculate the liters of fertilizer.

Changing this parameter will automatically change the fertilizer units of all empty programs (that do not have any sectors configured).

**Pre and post-watering by subprogram or sector:**

- "yes" : if the program is of the "subprogram" type, the pre- and post-watering is asked for each subprogram, if it is of the "linear" type, the pre- and post-watering is asked for each group of linear positions. Default value.
- "no" : the pre-watering and post-watering is asked for the entire program, it will be a unique value, but it will be applied in each subprogram or group of the linear. With this option, the T/V key will not be displayed in Function – Programs, since all the subprograms must have the same irrigation units.

In hybrid solar irrigation it does not allow to operate with pre and post-watering .

**Average EC and pH reading:** the reading of the regulation sensors that it shows in consultation is the average of the last readings. Here you configure the number of readings used to make the average (from 1 to 10). It is used to make the reading more stable in the query, it is not used for control. A reading is taken every second.

**Integrated Radiation Format:** in Wh /m2 or in J/cm2, in the conditions of initiation, warning or modification of "irrigation/fertilizer/time between activations" for an integrated radiation value, it will be treated in one unit or the other.

Record limit.

**Maximum records per hour :** 500 (default). To avoid excessive amounts of the same record, a general limit can be set and thus avoid collapsing communications with repetitive events. It can occur due to a programming error, communication errors in modules, sensors, etc. Once the maximum allowed has been reached, it will stop making new event records until there is a change of day or a manual order is given. When the limit is reached, a record will be made indicating the situation. If the value is left at "0", it will not perform any type of event recording.

#### 5.14.7. Access codes

**SMS code:** code that an order sent by SMS must include in order to be accepted. If it is left at 0 it is not necessary to enter any code.

**PAR code:** code to enter Parameters. If it is left at 0 it will not ask for any access code.

**FUN Code:** code to enter Functions. If it is left at 0 it will not ask for any access code.

#### INSTALLER CODES

SMS code: 0000

PAR code: 0000

FUNCode: 0000

#### 5.14.8. Backup

When you have all the parameters and programs of the equipment configured, you can save a backup copy within the equipment itself. This copy can be retrieved whenever you want. This allows that in the event that the parameters are modified by mistake, or it is desired to return to a previous configuration, it can be done in a single step.

It is very important to make regular backup copies to save data and protect it from possible errors.

This action may take a few seconds.

#### INSTALLER BACKUP COPY

Save copy: no

Recover copy: yes

Last copy: 01/07/22 10:38

#### 5.14.9. Language

Selection of the language of the Agrónic texts.

Available in Spanish, English, French, Italian and Portuguese.

#### 5.14.10. Activation of options

There are some Agrónic functionalities that, in order to be used, must first be activated by means of an activation code provided by Progrés.

If, when it is activated, an incorrect code is entered, the option is deactivated.

**PC-Cloud Code:** activation of communication with the Agrónic PC program, includes communication with the Cloud (Agrónic Web - Agrónic App).

**Cloud Code:** activation of communication with the Agrónic Web/App application.

**Plus Code:** activation of the option to increase the number of heads, sectors and programs, sector grouping, ETo irrigation, pressure regulation, logic sensors, hybrid solar irrigation and connection to equipment via ModBus.

The following options depend on the previous activation of the PLUS version.

**Hydro Code:** includes fertilization by CE regulation, two phytosanitary treatments (TF1-TF2), drainage control, water mixing, nebulization management.

**Pivots Code**, control of up to 4 Pivots.

**Solar Code**, control of Solar Irrigation

**Climate Code** (in preparation)

**Monocable code** : activating this option allows linking with the Agrónic Monocable 120 modules.

**Radio Code** : Activating this option allows you to link with the Agrónic Radio 433 modules.

The activated options can be seen in “Query – Agrónic”.

#### OPTION ACTIVATION

Cloud+PC code:	00000000	Activated
Cloud code:	00000000	
PLUS code:	00000000	Activated
HYDRO code:	00000000	
PIVOTS code:	00000000	Activated
SOLAR code:	00000000	
CLIMA code:	00000000	
Monocable code:	00000000	Activated
Radio code:	00000000	

### 5.14.11. Hardware

The Agrónic hardware is divided into two parts:

- micro plate. It is where the screen and keyboard are connected and where the equipment control software is located.
- Motherboard. It is where the inputs and outputs connect. From this motherboard we have the A4500 own motherboard by default plus the possibility of using the motherboard models of an A4000 or A7000 in existing installations.

**Motherboard type:** select which motherboard you have connected.

- “A4500” : base of the Agrónic 4500.
- “A4000” : base of the Agrónic 4000.
- “A7000” : base of the Agrónic 7000.

**Type:** select the type of motherboard outputs. Only for the A4500 and A4000.

- “Relay base” : outputs for 12Vdc or 24Vac valves.
- “Base latch 3h” : outputs for 3-wire latch solenoids.
- “Base latch 2h” : outputs for 2-wire latch solenoids.

#### A4500/A4000 motherboard.

The expansion of analog outputs does not require any configuration, just install the boards There are a total of 10 analog outputs (5 on each board).

For each of the analog outputs, it is configured which output value corresponds to 1% and which value to 100%. Values are given in mA since the output is 0 to 20 mA.

**1% output:** value from 0 to 20.0 mA that corresponds to 1%.

**100% output:** value from 0 to 20.0 mA that corresponds to 100%.

#### A7000 motherboard.

The expansion of analog outputs does not require any configuration, just install the board. There are a total of 12 0-10V analog outputs.

For each of the analog outputs, it is configured which output value corresponds to 1% and which value to 100%. The values are given in “V” since the output is from 0 to 10.0V.

**Output at 1%:** value from 0 to 10.0 V that corresponds to 1%.

**100% output:** value from 0 to 10.0 V that corresponds to 100%.

#### 5.14.12. Update software

To update the internal software of Agrónic via USB. You need a PC with the Agrónics update application provided by Progrés and a USB to miniUSB cable .

#### 5.14.13. ModBus exchange inputs / outputs

Consult the manual “A4500 – External Modules” (R-2418)

## 6. INPUT AND OUTPUT CODING

The entrances and exits are coded with 8 numbers to facilitate their location. The most significant indicates the device: Base, AgroBee-L, virtual, etc. The following identifies when there is more than one device. The next three numbers indicate which external module or device they are on. The last two indicate the input or output number.

### DIGITAL OUTPUTS

00 0 000 00				description
00:Base	0	00	001 – 120	Base A4500: maximum 104 outputs Base A4000: maximum 96 outputs Base A7000: maximum 120 outputs
03: AgroBee-L	1 – 2	001 – 020	01 – 09	AgroBee-L 1 and 2
06: ModBus	0	001 – 032	01 – 15	Interchange table, outputs 32 teams, 15 maximum values
07: To Single Wire	1 – 2	001 – 120	01 – 08	Agrónic Monocable 120. EAM1 and EAM2
10: To Radio 433	1 – 2	001 – 060	01 – 16	Agrónic Radio 433. EAR1 and EAR2
11: Expansion Modules	0	001 - 015	01 - 99	Expansion modules connected to the A4500 base

Examples: 03100102: output 2 of module 1 of AgroBee-L 1.  
07200101: output 1 of MAM 10 of Agrónic Monocable 2  
00000012: base output 12

### DIGITAL TICKETS

00 0 000 00				description
00:Base	0	000	01 – 32	Base A4500: maximum 12 inputs Base A4000: maximum 12 inputs Base A7000: maximum 32 inputs
		001	01 02	Base A4500: voltage at the inputs Base A4500: voltage at the outputs
02:Virtual	0	000	01	Unique code to indicate that the sensor is virtual
03: AgroBee-L	1 – 2	001 – 020	01 – 09	AgroBee-L 1 and 2
06: ModBus	0	001 – 032	01 – 15	Exchange table, entries 32 teams, 15 maximum values
07: To Single Wire	1 – 2	001 – 120	01 – 10	Agrónic Monocable 120. EAM1 and EAM2 Inputs 1 and 2 cannot be used as counters
10: To Radio 433	1 – 2	001 – 060	01 – 16	Agrónic Radio 433. EAR1 and EAR2
11: Expansion Modules	0	001 - 015	01 - 12	Expansion modules connected to the A4500 base

Examples: 00000102: digital input that indicates if there is voltage at the outputs  
03200201: digital input 1 of module 2 of the AgroBee-L 2

## ANALOG INPUTS

00 0 000 00				description
00:Base	0	000	01 – 16	Base A4500: maximum 12 inputs Base A4000: maximum 12 inputs Base A7000: maximum 16 inputs
	0	001	01 02	Equipment supply voltage GPRS/WIFI RSSI level
02:Virtual	0	000	01	Unique code to indicate that the sensor is virtual
03: AgroBee-L	1 – 2	001 – 020	01 – 16	AgroBee-L 1 and 2 01 to 13: depends on the AgroBee-L model 14: Battery voltage, 15: Panel voltage, 16: Radio signal level
05: This. Davis	0	000	01 - 33	Davis weather station. Need Gateway Davis Pro
06: ModBus	0	001 – 032	01 – 15	Exchange table, entries 32 teams, 15 maximum values
07: To Single Wire	1 – 2	001 – 120	01 – 02	Agrónic Monocable 120. EAM1 and EAM2
10: To Radio 433	1 – 2	001 – 060	01 – 02	Agrónic Radio 433. EAR1 and EAR2
11: Expansion Modules	0	001 - 015	01 - 16	Expansion modules connected to the A4500 base

Examples: 00000002: analog input 2 of the base  
03101201: analog input 1 of module 12 of the AgroBee-L 1

## ANALOG / PULSED OUTPUTS

00 0 000 00				description
00:Base	0	000	01 – 12	Base A4500: maximum 10 (0 - 20 mA) A4000 Base: maximum 10 (0 - 20 mA) Base A7000: maximum 12 (0 - 10V)
06: ModBus	1	001 – 032	01 – 15	Interchange table, outputs 32 teams, 15 maximum values
11: Expansion Modules	0	001 – 015	01 – 10	Expansion modules connected to the A4500 base

Examples: 00000002: analog output 1 of the base  
06100102: analog output 2 of modbus device 1

## 7. PROGRAMMING AND CONSULTATION

The part of programming, manual actions and consultations is explained in the “A4500 – User” manual (R-2405).

**FUNCTIONS**

1. PROGRAMS
2. MANUAL
3. READINGS
4. PARAMETERS
5. FOGGING
6. PIVOTS

**8. PRACTICAL EXAMPLES****9. TROUBLESHOOTING****10. AGRONIC 4500 MANUALS**

Apart from this manual, the Agrónic 4500 has other manuals and didactic videos that can be consulted on the Progrés website.

**ASSEMBLY AND CONNECTION MANUAL.** (R-2403)

Intended for the person who physically installs the Agrónic on the farm or in the electrical panel. The dimensions and how the wiring of the different connection options must be done are indicated.

**INSTALLER'S MANUAL.** (R-2404)

Aimed at the installer who configures the Agrónic irrigation system. There is an explanation of all the parameters related to irrigation: general, sectors, programs, fertilization, etc. The explanations of programming, manual and consultation are in the user manual.

**USER'S MANUAL.** (R-2405)

Aimed at the end user of Agrónic. There are simple explanations on the most common usage of programming, manual actions, and queries. Parameters are not explained in this manual.

**COMMUNICATIONS MANUAL.** (R-2407)

Intended for the installer that configures communications with the Progrés cloud for "Agrónic Web" and "Agrónic App" or with the Windows program "Agrónic PC". There is an explanation of the different communication systems.

**EXTERNAL MODULES MANUAL.** (R-2418)

Intended for the installer who configures the communications and inputs/outputs of the external modules "AgroBee-L", "Agrónic Monocable 120", "Agrónic Radio 433", "External Modbus Devices" and "Expansion Modules".

**VIDEO TUTORIALS**

YouTube channel you can find educational videos that explain, step by step, the most frequent queries we receive. We recommend that you consult them when you have any questions or problems, you may find the solution there.

OTHER MANUALS

Manual A4500 PIVOTS. (R-2406) . Intended for the installer and the end user who uses the equipment to control pivots.



# 1 1. SUMMARY

Legend:

BASIC version	black color	
PLUS version	Color blue	
HYDRO option	Green color	
PIVOTS option	Orange	
SOLAR option	Red color	

The options only with the PLUS version.

**In Italics** : novelty in relation to A4000-A7000

\* : link to the chapter.

## PROGRAMS Settings for each

Basic versión: 40 **Versión Plus: 99**  
 Type subprogram  
 12 subprograms in basic version  
 20 subprograms in plus version  
*Alternate* or no  
 Linear Type  
 12 positions in basic version  
 20 positions in plus version  
 Positions grouped each n  
 Start:  
 Sequential  
 Days of irrigation:  
 weekly  
 Frequency  
 Calendar  
 Units of irrigation:  
 Hours – minutes  
 Minutes – seconds  
 Cubic meters (m3)  
*m3 per hectare*  
*m3 per hectare of time (h:m)*  
*Milimeters (mm)*  
 Tipe of fertilization:  
 Units of time an volume  
 Uniform in time or volume  
 Proportional in L/m3  
 Meter pulses or predicted flow  
 Porportional in cl/L  
 Meter pulses or predicted flow  
 EC regulation  
 Input EC regulation  
 Acid 1 or 2  
 Group or priority  
 Irrigation curves  
 Irrigation units  
 Fertilizer units  
 Time between activations  
*Irrigation by ETc (evapotanspiration)*  
 m3 per hectare  
 Milimeters (mm)  
 m3 por hectare to time (h:m)

## PROGRAMS – Starts conditions

6 Start times  
 Start type  
 Secuential of program  
 Weekdays  
 Frequency of days  
*Calendar*  
 Nº of activations  
 Active schedule  
 Active period  
 Manual factor  
 Drain  
 Mix reference

## PROGRAMS – Type Subprogram

For every subprogram:  
 De 1 a 10 sectors o *groups*  
 (maximum 40 sectors)  
 Units of irrigation  
 Security time  
 Pre y Postirrigation  
 Fertilizers 1 to 8  
 Reference of EC  
 Reference of pH  
*Treatment 1*  
*Treatment 2*

## PROGRAMS – Lineal type

For each position:  
 One sector or group  
 Units of irrigaiaon  
 Security of time  
 Pre y Postirrigation  
 Fertilizers 1 a 8  
 Reference of EC  
 Reference of pH  
*Treatment 1*  
*Treatment 2*

## HYBRID SOLAR IRRIGATION

Use of solar energy  
 Use of grid or diesel power  
 Use in "Add of energies" mode  
 Generated Energy vs Solar Radiation  
 Pressure Limit vs Flow  
 Solar time

**SECTORS**

Basic version: 99 **Plus version: 400**

Output

Auxiliary output

*Nº de head*

Assign to pumps/generals

Time for "water hammer"

Assign to general pump

Flow sensor:

Digital

*Private meter*

Expected flow

*Assign to energy meter*

*Predicted power*

*Digital input for manual start*

*Pressure reference*

Sector area

Crop

Correction coefficient

Descriptive text

**GROUP OF SECTORS**

Nº of groups: 40

Sectors by group: 20

Descriptive text

Numbered from 501 to 540

**DETERMINING FACTORS**

From 1 to 120

Type:

Definitive stop

Temporary stop

Conditional stop

Program start

Start / Stop program

Warning

Irrigation modification

Fertilizer modification

Frequency modification

Origin:

Digital sensor

Analogic sensor

*Logic sensor*

Meter-flow sensor

Meter- accumulated sensor

Flow error

*EC error*

*PH error*

*100% EC*

*100% PH*

*Safety EC*

*Safety PH*

*EC proportion*

*Mix EC error*

*Drain error*

*Drain EC error*

*Drain PH error*

Communication

*Schedule*

*Fertilizer tank*

SMS to phone A-B-C

Activate alarm

Anomaly yes/no

To all programs

*Affects heads 1-2-3-4*

Stop watering/fertilizer/pH

Descriptive text

**SENSORS**

Digitals, from 1 to 80

Register, yes/no

Descriptive text

Analogics, from 1 to 120

Formats: 31

Units: multiple

Tare

Descriptive text

Meters, from 1 to 80

Measure:

Volum

*Energy*

*Units*

Descriptive text

Logics, from 1 to 20

Operation:

Add

Substraction

Average

And (yes)

Or (or)

Elements:

Digital sensor

Determinant factor

Digital output

Logic sensor

Sector

Analogic sensor

Meter sensor

Logic sensor

Analogic output

Register, yes/no

Descriptive text

**CLOCK – SCHEDULES**

*Time zone*

Summer schedule

*Solar calendar, use in:*

Programs / Fogging / Solar irrigation

*Weekend active hours*

*Time setting in history*

**FOGGINS**

From 1 to 8 foggings  
 Regulation by °C and/or %HR  
 Regulation by DPV  
 From 1 to 8 foggings valves  
*Time setting in history*

**DRAINS**

From 1 to 20 independent drains  
 Types of compensation:  
 In the same watering  
 At the next watering  
 Changing the time between activations

**PIVOTS**

From 1 to 4 pivots  
 8 different irrigation áreas  
 16 outside áreas, gun/forward  
 GPS / GNSS position  
 Irrigation by passes or time  
 Limitations for two active schedules  
 One fertilizer  
 Speed control  
 Precipitation and weather calculation  
 Alignment, slip and pressure control  
 Return dry or we with postponement  
 Operate with diesel engine or solar irrigation  
 Modify rainfall by sensors  
 Multiple manual actions

**HEAD**

Basic version: 1 Plus version: 4  
 Fertilization  
 Generals  
 Filters  
 Pressure regulation  
 Diesel pump  
 Mix of two waters

**GENERALS**

of Filters  
 of pumps  
 Water hammer  
 of fertilizers  
 of Acids  
 of Treatments  
 of Alarm  
 of mix of two waters  
 de Diesel engine

**FERTILIZATION**

Nº de fertilizers: 8  
 Application format:  
 Serial  
 Paralel:  
 EC inyection  
 Input EC  
 Uniform  
 Proportional  
 Units  
 Solar:  
 EC inyection  
 EC input  
 Proportional  
 Mixers  
 Fertilizers cleanings  
 PH regulation: 2  
 Phytosanitary treatments: 2  
 Units:  
 Hours - minutes  
 Minutes - seconds  
 Liters  
 Liters per hectare  
*Volume control in tanks*

**FILTERS**

Basic version: 1 Plus version: 4  
 Filters per head or common to all  
 1 to 3 beat groups per ensemble  
 Cleaning by:  
 Watering time  
 Irrigation volume  
 Differential pressure switch  
*Pressure diferencial*  
 Stoppage of sectors  
 Fertilizer strike  
 Control of continuous cleaning  
 Clean during watering or at startup

**FIELDS MODULES**

1 or 2 groups of 20 AgroBee-L modules  
 1 or 2 groups of 120 Monocable modules  
 1 or 2 groups of 60 Radio modules  
 1 to 32 elements with ModBus communication

