

AGROTAX

PRECISION AGRICULTURE

PLANTER MONITOR



INSTALLATION AND OPERATOR MANUAL



*AGROTAX™ AG3000. Planter Monitor.
Use and Installation Guide. Version 2.0
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1. Monitor Features

The AG3000 monitor has the following functions:

- Simultaneous monitoring of up to 72 crop and fertilization rows.
- Two-fold presentation of sowing density by row data:
 - Graphics Mode.
 - Table Mode (numeric information in seed/meter).
- Rotation monitoring of up to 7 shafts (optional).
- Minimum level monitoring of up to 2 hoppers (optional).
- On-screen numeric display (OSD) of various parameters during sowing:
 - Sower speed (in Km/h).
 - Mean sowing density of all rows, expressed in:
 - Seeds per meter (S/m), or
 - Seeds per hectare (S/ha).
 - Partial worked time.
 - Full-time work.
 - Partial hectares worked.
 - Total hectares worked.
 - Shaft r.p.m value (optional).
 - Distance traveled (estimated in meters).
 - Yield Prediction (Number of Ha. covered in an hour with constant current working speed).
 - Battery voltage.
- Working record of 9 plots, with the following information displayed on screen for each batch:
 - Hectares worked (in fractions of hectares).
 - Working time (in fractions of hours).
 - Mean yield (mean hectares covered per working hour).
 - Mean sowing density (in seeds per hectare or meter).
- On-screen display (OSD) of dirt level of each seed sensor.
- On-screen display, sound alarm indicators of the following failures:
 - Sowing Density Failure in crop rows.
 - Seed/fertilizer Failure.
 - RPM Failure.
 - Shaft Rotation Failure.
 - Hopper with low seed level.
 - Short-circuit in a seed sensor.
 - Above Maximum working speed.
- User-controlled options:
 - Screen light intensity.
 - Screen contrast.
 - Volume of sound alarms.

- connection (optional) for printing the following data:
 - Value Setting (working-width, rows, constant speed, seeds/m, tolerance ratio).
 - Detailed account of total work performed (time, hectares).
 - Detailed account of work performed in the selected batch (time, hectares, real yield, mean density).
- User-friendly installation functions:
 - Automatic detection and enabling of sensors.
 - Sensor testing to verify correct installation.

2. Seed Monitoring System Design

In *Figure 1* a design of a basic seed monitoring system is shown.

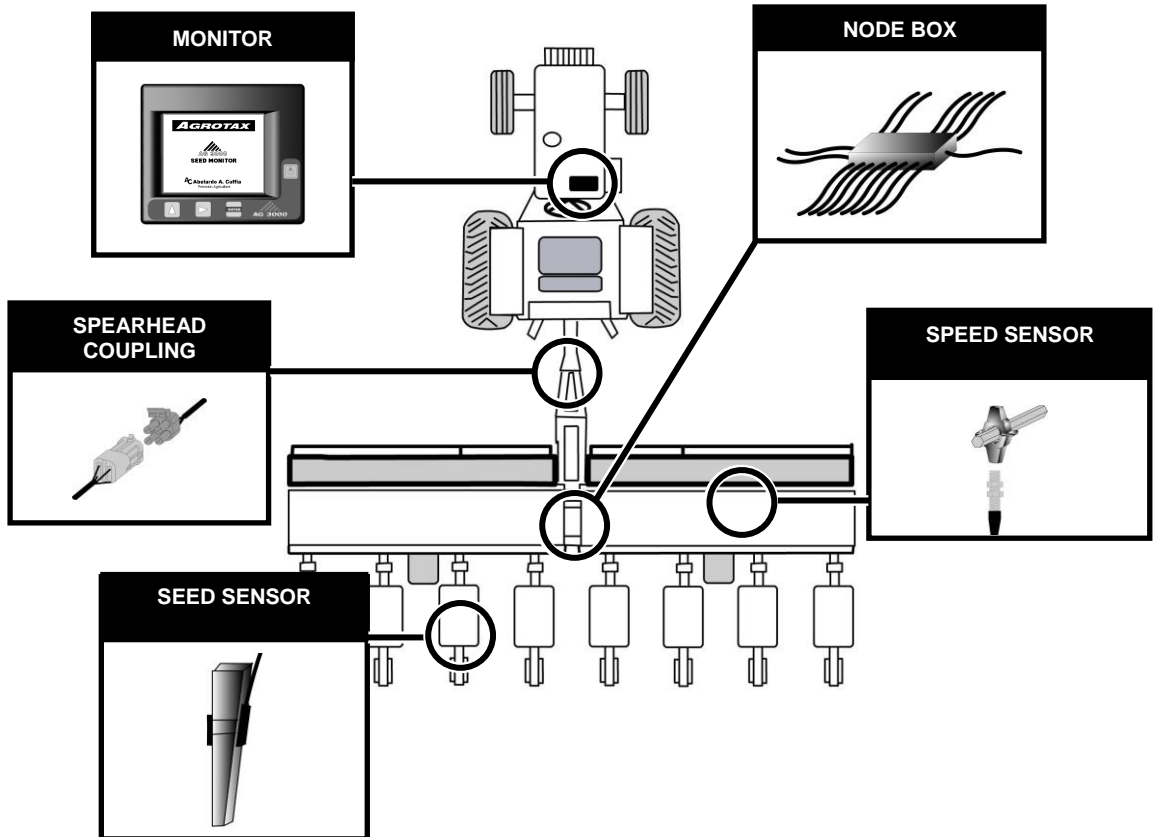


Figure 1. A Basic Monitoring System

The *monitor*, installed inside the tractor cab, provides the user with all the sowing data, with sound and visual alerts in case of failures. The *seed or fertilizer sensors* are installed in the downspouts, and the *speed sensors*, installed in a sowing shaft, are connected to one or more *node boxes*, which are mounted on the sower. These node boxes connect to the monitor through a wiring with its connector located on the sower's spearhead coupling.

Other accessories of the monitoring system are the rotating shaft and r.p.m sensors, the seed or fertilizer hopper level sensors and the *Mobile Pro Plus*[®] printer, among others.

3. Front and Back View of the Monitor

Below are the front and back views of the monitor (*Figure 2* and *Figure 3*).

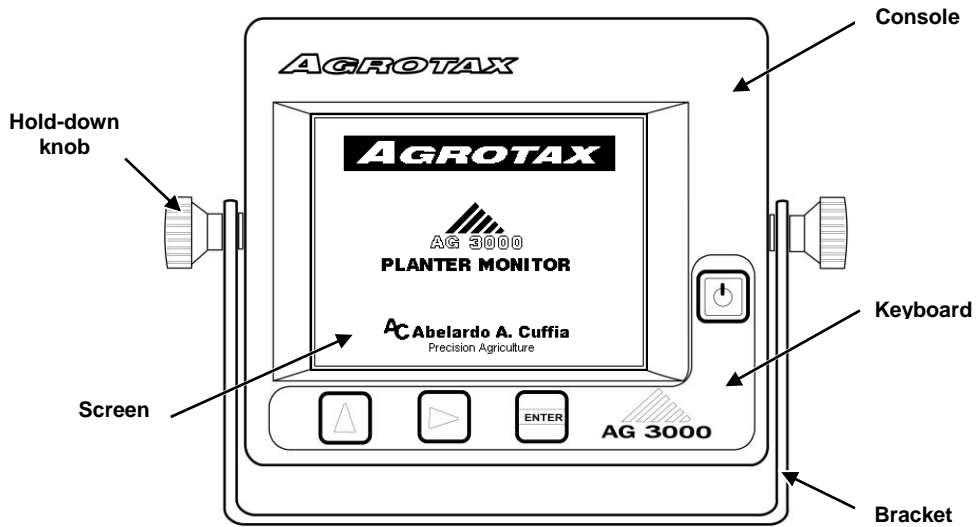


Figure 2. Front View of the Monitor

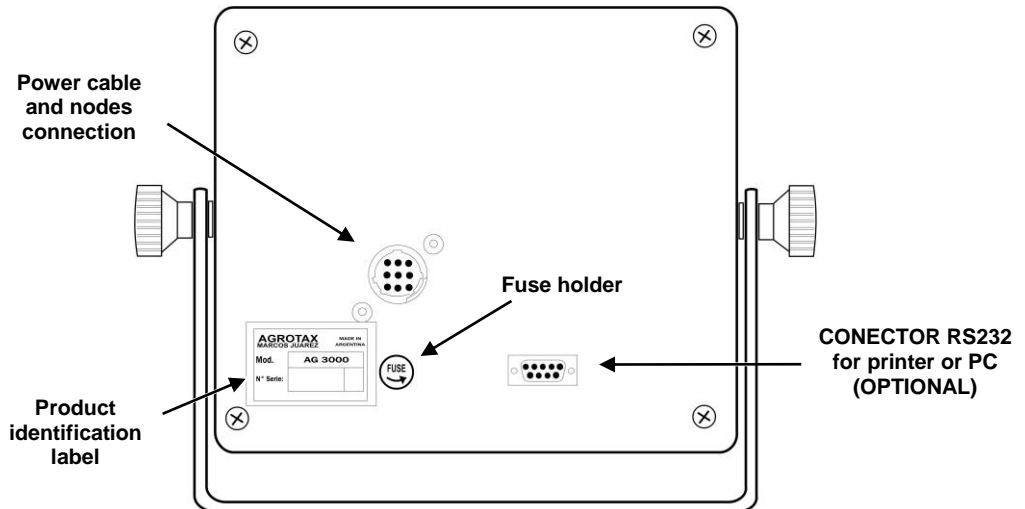


Figure 3. Back View of the Monitor



On the monitor's back panel there is a fuse holder with a 1.5 A (amps) fuse. Never replace a fuse by another with a higher value. If the fuse burns out, check the wiring that connects the monitor to the node boxes installed inside the sower, making sure that the cable cover is not damaged and has not caused a short-circuit.

4. Monitor Keyboard

The monitor has four keys, shown in *Figure 4*.

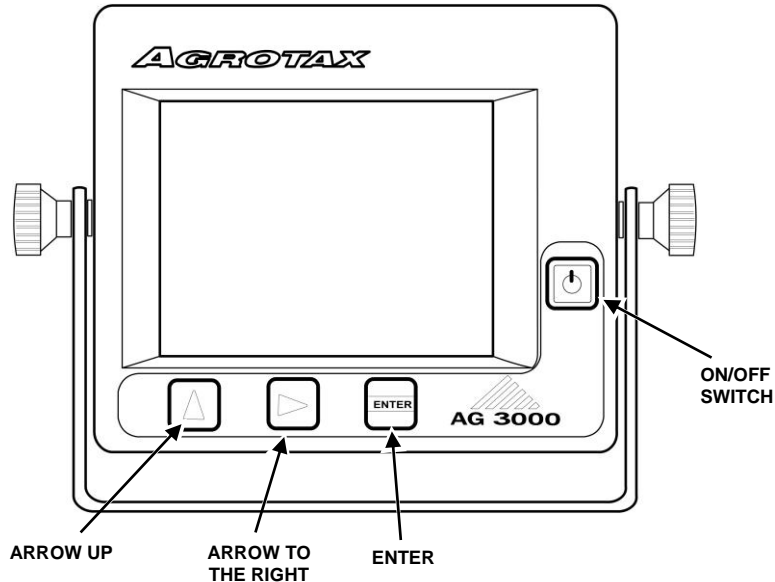








Figure 4. Monitor Keyboard

4.1. Key Functions

Each key has more than one function, depending on what is displayed on the monitor and how long the key is pressed.

Once you are within the menu, keys  and  are used to scroll along the screen by selecting (highlighting) the different options, while key  is used to access the selected option.

When a value is to be entered, for example, seeds/meter or tolerance, the number to be modified is selected by pressing key  while its value is changed by clicking  and then key  must be clicked to enter that value.

This manual provides a detailed explanation on which key should be used in each case depending on what is displayed on the monitor screen at that moment.


4.2. Simply press or hold down a key

The monitor is connected to a buzzer that beeps every time a key is pressed.

Whenever indicated in this manual that you should simply “click” or “press on” a key, you must press the key and release it immediately. The monitor in this case will beep only once and perform a specific action.

If the key is held down for two seconds, until a “double beep” is heard, the monitor will perform a different action.



5. Monitor ON/OFF Switch

To switch the monitor on or off, press on key .



Do not start the tractor's engine while the monitor is still switched on. If the monitor is on, first, switch it off and then start the engine. After the engine has been started you can switch on the monitor. Likewise, the monitor should be turned off before the tractor's engine is stopped.



The monitor powers off when pressing  only when you are in the main working screen. Therefore, if you have accessed the MAIN MENU or any other menu or screen, first you must go back to the main working screen and then press  to switch off the monitor.

6. Main Working Screen

When the monitor is switched on, an introduction will appear on the screen while the monitor performs an internal check-up. After this, the main working screen will appear on display, as shown on *Figure 5*.

Initially, the monitor will also perform a check-up of all connected nodes and will show at the bottom of the screen, the node count result. In addition, during this initial stage, the monitor's version number will be displayed at the bottom of the screen, while the maximum speed reached during previous sowing work will be shown in the speed box at the top of the screen.

Finally, the bars representing the seed/fertilizer downspouts and the remaining data will appear.

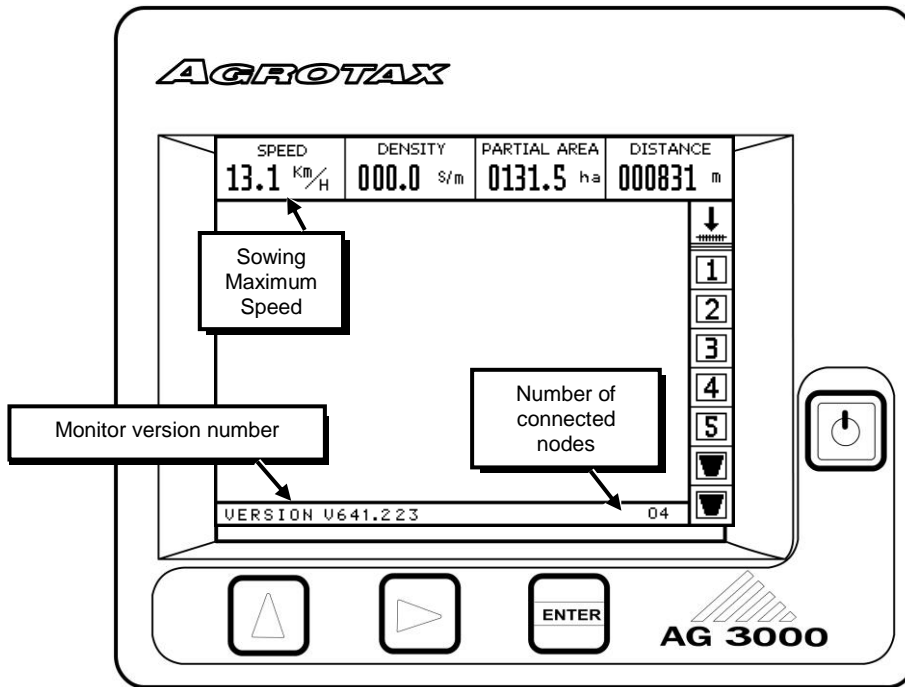


Figure 5. Monitor Startup Information

Figure 6 displays the monitor's main menu. Different areas containing specific data have been highlighted. Such areas will be further described as follows.

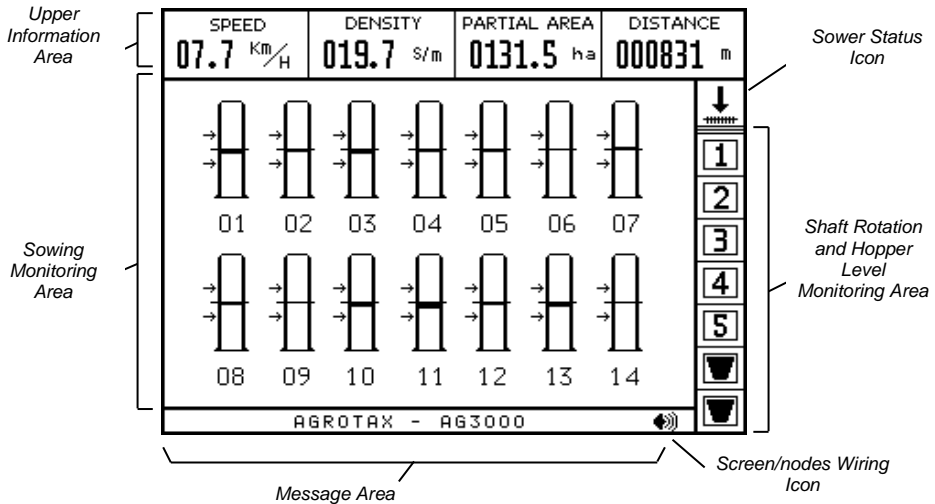


Figure 6. Main work screen. Different areas.

6.1. Sower Status Indicator

The upper right side of the screen displays a meter which provides information indicating the sower's status. There are only two possible statuses in accordance to whether the seeds are shedding down the sowing tubes or not.



MACHINE UP, when there are no seeds falling down the sowing tubes.






MACHINE SOWING, when the seeds are actually falling down the sowing tubes.

6.2. Shaft Rotation and Hopper Level Monitoring Area

At the right side of the screen, different displays can be seen: shaft rotation monitor and hopper seed/fertilizer levels check. When one of the shafts stops rotating or when a hopper displays low seed level, the monitor will indicate the problem through a warning on the screen, the indicator icon will start blinking and a sound alarm will set off.

This is an optional monitoring system, that is, the monitor may not have the aforementioned sensors installed. The shaft and hopper icons will be shown in black indicating that the proper sensors are installed and working.

Figure 7 is an example of the display when two shafts and their rotation are being monitored, represented by  and , as well as two hoppers, represented by .

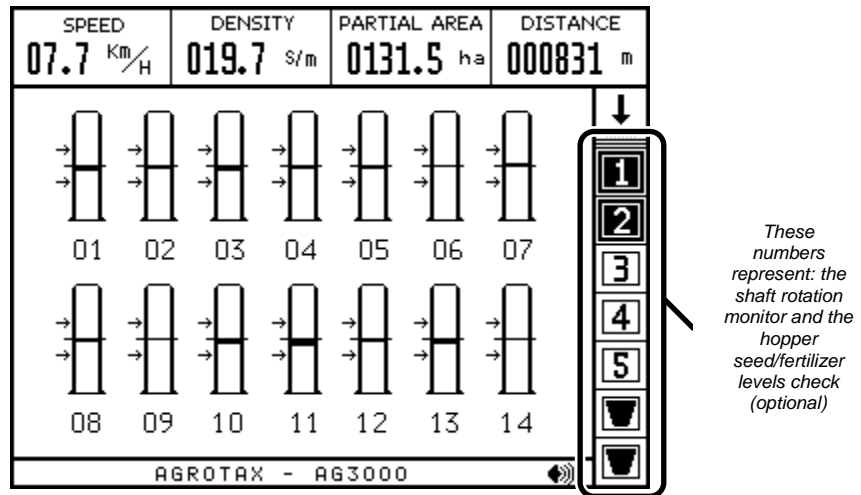


Figure 7. Shaft Rotation and Hopper Level Monitoring Area

6.3. Upper Information Area

At the top of the working main screen, the monitor displays numeric information of the sowing activities in real time. Such information is sorted out in four tables as seen in *Figure 8*.

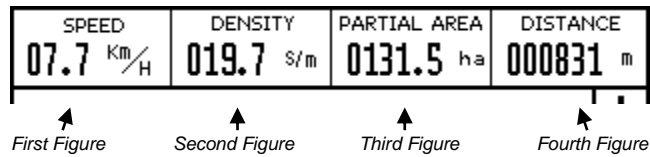


Figure 8. Graph of the upper information area

Each table displays information sorted out as follows:

<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">SPEED 07.7 km/H</td> </tr> </table>	SPEED 07.7 km/H	The first figure always displays the sower's forward speed in km/h.	
SPEED 07.7 km/H			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">DENSITY 375238 S/ha</td> </tr> <tr> <td style="text-align: center; padding: 2px;">DENSITY 019.7 S/m</td> </tr> </table>	DENSITY 375238 S/ha	DENSITY 019.7 S/m	The second figure is related to information concerning average sowing row density; that is, the approximate amount of seeds that fall into each tube. Such information can be displayed in different figures: seeds per meter (S/m) or seeds per hectare [S/ha].
DENSITY 375238 S/ha			
DENSITY 019.7 S/m			
<p>The third figure displays time related information and worked hectares data. This information, either total or partial, can be deleted by the user at any time:</p>			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">PARTIAL AREA 0131.5 ha</td> </tr> </table>	PARTIAL AREA 0131.5 ha	Partial worked hectares (expressed in hectares with decimals).	
PARTIAL AREA 0131.5 ha			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">PARTIAL TIME 0008.5 H</td> </tr> </table>	PARTIAL TIME 0008.5 H	Partial worked time (in hours and tenth of hours).	
PARTIAL TIME 0008.5 H			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">TOTAL AREA 0513,1 ha</td> </tr> </table>	TOTAL AREA 0513,1 ha	Total worked hectares (expressed in hectares with decimals).	
TOTAL AREA 0513,1 ha			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">TOTAL TIME 0035.8 H</td> </tr> </table>	TOTAL TIME 0035.8 H	Total worked time (in hours and decimals).	
TOTAL TIME 0035.8 H			
<p>Finally, the fourth figure shows the remaining information as follows:</p>			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">RPM 2073</td> </tr> </table>	RPM 2073	The RPM spinning speed of a shaft which has been wired with an RPM sensor (this is optional).	
RPM 2073			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">DISTANCE 000831 m</td> </tr> </table>	DISTANCE 000831 m	Distance traveled by the sower displayed in meters. This value can be deleted at any time.	
DISTANCE 000831 m			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">ESTIMATED 005.6 ha/H</td> </tr> </table>	ESTIMATED 005.6 ha/H	Planned yield, that is, the amount of hectares that could be sowed with a permanent sowing speed.	
ESTIMATED 005.6 ha/H			
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; padding: 2px;">BATTERY 13.7 V</td> </tr> </table>	BATTERY 13.7 V	Tractor battery voltage.	
BATTERY 13.7 V			

To change the information displayed by any of the figures, follow these steps:

1. Within the main screen, **activate the upper information area** pressing key . By doing so one of the figures will be shown as selected (it will be in black). Hold down key until the aimed figure is selected.
2. Press until the desired information is displayed at the aimed figure.

In order to change (reset) the information displayed by a specific figure, follow these steps:







1. Select the aimed figure containing the information you wish to modify, as explained above.
2. Hold down key  during two seconds (until you hear two “beep sounds”). Then a message will be displayed requesting a confirmation to delete the data, as shown in *Figure 9*. By pressing  the selected information will be deleted; while if you press  the information will not be deleted.



Figure 9. Confirmation request for data deletion

6.4. Sowing Monitoring Area

In the part of the screen which is devoted to the sowing monitoring information, there will be displayed information of the sowing density for each sowing row. Such information can be displayed in two possible ways: In a graph or in a table, shown as follows.

The viewing mode changes alternatively by pressing . That is, by pressing , numeric information of the sowing tubes' individual density will be displayed, sorted out in a table. By pressing  one more time, the same information will be displayed in a graph.

6.4.1. Sowing density graphic view

With this option, the screen displays information sorted by sowing row by means of a bar with its specific number. *Figure 10* shows an example of the graphic view when the bars representing 14 sowing rows are displayed. These are numbered 1 to 14.

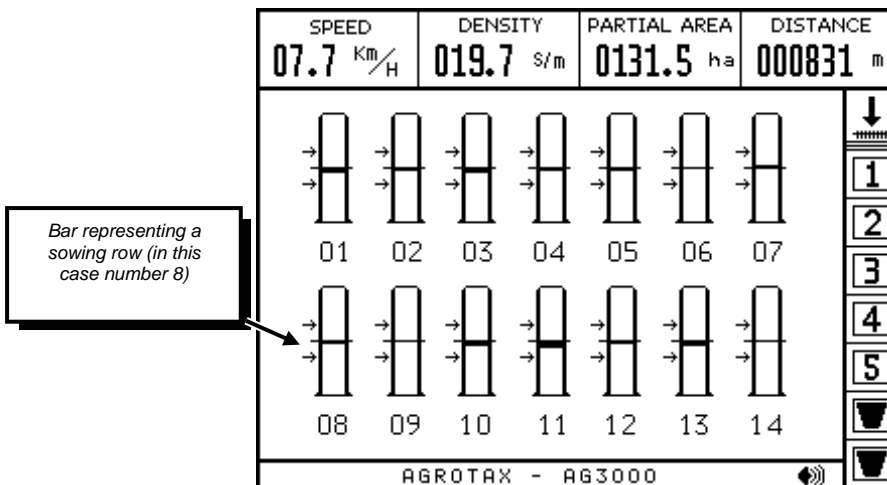


Figure 10. Sowing density graphic view

Each bar displays a line in its central position and two arrows, situated above and below it. The central line represents the nominal working sowing density, that is, the *Seeds per meter* that are set in the MAIN MENU, and the two arrows represent the tolerance in the seeds per meter value which is also set in the MAIN MENU. See also “11.1 Sowing Density Setting (seeds per meter and tolerance)” page 29.

If the screen determines that the seeds per meter value which is being planted in a particular row coincides with the seeds per meter set value in the MAIN MENU, that row will be displayed as an empty bar. On the other hand, if the seeds per meter density which is being planted in a row is higher than the set value, the screen will display such value by means of a colored tube from the middle up. The degree to which the tube is colored depends on the difference between the true value and the set value for that tube. Likewise, if the seeds per meter value which are being planted in a row is lower than the set value, the screen will display a colored bar from the middle down with a difference proportionate to the true and set values.

For example, if the monitor is set in the MAIN MENU to a sowing density of 20 seeds per meter with a tolerance of around 20% in regards to that density value, then the middle line will display a density value of 20 seeds per meter while the upper arrow displays a value of 20 seeds per meter (S/m) plus a 20%; that is, 24 seeds per meter and the lower arrow displays 16 seeds per meter (20 S/m -20%). In this case, an empty bar representing the sowing row will be displayed when the seeds per meter value equals 20 (set value). It will be colored from the middle up if the row density increases above 20 S/m and down if the density value reaches below 20 S/m. Bearing in mind the same values used in the previous examples, it is correct to say that in the following figure, bar 1 represents a sensor with a density of about 20 S/m; number 2, 22 S/m; number 3, 24 S/m, number 4 18 S/m and number 5, 16 S/m. In *Figure 11* some examples are displayed.

The fertilizing sensors would also be displayed here if installed.

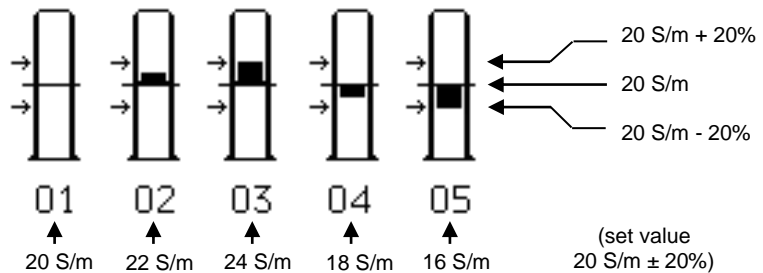


Figure 11. Example of a sowing density display

6.4.2. Visualizing bars in more than one screen (graphic mode)

For best sowing row bar graphic visualization, the screen will display on screen up to a maximum of 36 bars, simultaneously. If the sower has more than 36 rows, the screen will divide the graphic information into two separate screens.

In the case of a 44 row sower, the first 22 rows will be displayed in the first screen and the remaining 22 in the next screen. It is possible to shift from one screen to the other by pressing.

6.4.3. Sowing density table view

On this mode, the screen displays the sowing density for each of the rows sorted in a table. In each square of the table, the sowing row number will be displayed followed by the sowing density value in seeds per meter. *Figure 12* shows an example of this.

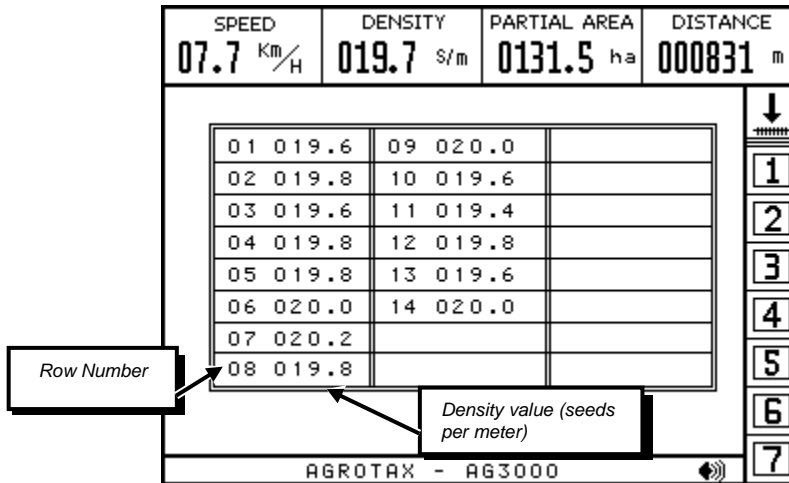



Figure 12. Sowing density in a table display

6.4.4. Visualizing individual densities in more than one screen (table mode)

In table mode, it is only possible to visualize simultaneously sowing density information for up to 24 sensors, on screen. In the case of a sower with more sowing rows, density information for the remaining rows will be displayed in other tables. So as to access all sowing density information, it is possible to shift from one table to the next by pressing.

6.5. Message Area

The screen will display messages in its lower part. Generally the messages are related to failures spotted in the sowing and will appear together with a sound alarm. The blinking icon  situated on the right indicates that the monitor is linked with one or more nodes installed in the sower.

7. Monitoring crop failures

7.1. Crop density failures

Crop density failures occur when the value of the seeds per meter that fall into a specific sowing body is out of the range set by the user. This range is established by setting the nominal values “SEEDS/m” and “TOLERANCE” in the “MAIN MENU”. See also “11.1. Density setting (seed per meter and tolerance)”, on page 29.

For example, if the seeds per meter set value to sow in each tube is 20 and the tolerance set is 30% in regards to such value, when the density in one of the tubes is above 29 S/m (20 + 30 %) or below 14 S/m (20 – 30%) there will be a sowing density failure in that tube.

The screen will indicate such density failure by means of a visual/sound alarm; a message reading “CROP DENSITY FAILURE,” in the lower part of the screen will appear and the bar representing the sowing tube in which the failure has occurred will start blinking indicating the tube number which is failing. *Figure 13* shows an example in which a density failure has occurred in row 6.

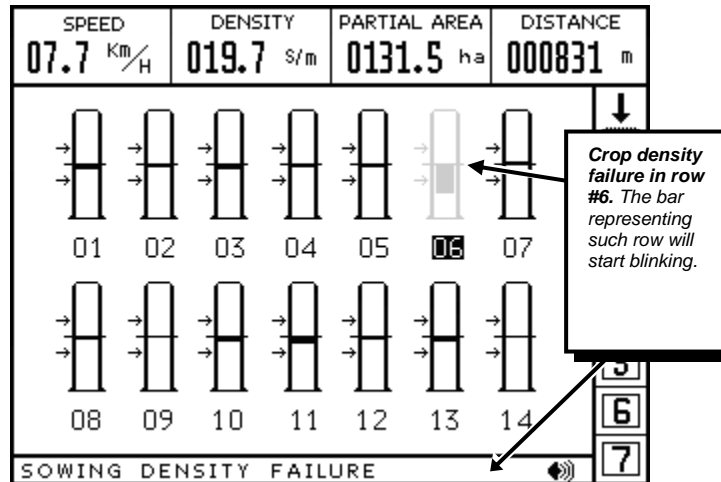


Figure 13. Amount of seeds failure

7.1.1. Shutting down sowing density failure alarms.

It is possible to set the screen mode so that it does not display sowing density failures. This option can be used in the case of fine grain plow sowing, in which case it is not possible to determine the exact number of seeds that are being planted in each row as the seeds do not pass through the seeds sensor one at a time but in bunches. However, still in most cases it is advisable to keep working with the sowing density alarms on, setting a high seed tolerance value per programmed meter.

In the case of sowing while plowing it is advisable to follow these steps to set the sowing density:

1. Once the sower is set to the desired sowing quantity, carry out the sowing in a part of the batch to verify the S/m average sowing density value which is indicated by the second icon in the upper side of the screen.
2. Set this average crop density value through the option “SEED/m” of the MAIN MENU and, in the same menu, set up a high tolerance percentage through the proper option. See also “*Crop density setting (seeds per meter and tolerance)*” page 29.

In spite of the fact that the displayed density in these cases may not agree with the true seeds/m value, it will provide an estimate of the amounts that are being used in each sowing tube.

If, on the other hand, you wish to shut down the crop density failure alarm, you must set the screen with a tolerance of 99%. In this way, the monitor will only check if the seeds are actually passing through the sowing tubes, instead of their density.

7.2. Sowing or Fertilizing Failure

Crop or fertilizing failures occur when a sowing tube is blocked or when the seed or the fertilizer deposit is suddenly emptied. A visual/sound alarm will go off automatically; in the lower part of the screen a sign: “SOWING FAILURE” will appear and the bar representing the failing tube will start blinking indicating the tube number which is failing.

Figure 14 shows an example in which there is a crop failure in the fourth row of the sower

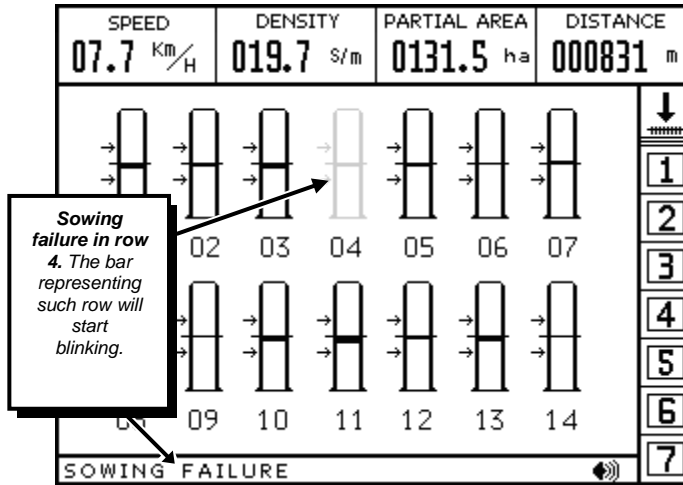


Figure 14. In this case, no seeds are flowing down one of the tubes

7.3. Sowing Speed Limit

The screen displays the sower's working speed at all times and at the same time compares such speed during sowing operations with a maximum or the speed limit set by the user. See also "Speed limit setting (maximum speed)" page 30.

If the sowing speed is higher than such limit (maximum speed), then the screen will display a visual / sound warning; at the lower part of the screen there will appear a message: "SPEED LIMIT" and the current speed value sign in the first square, in the upper side of the screen, will start blinking.

In Figure 15 there is a sowing speed of 12,3 km/h with a set speed value of 12,0 km/h as maximum; which is why the screen indicates that the sowing speed is faster than the set limit.

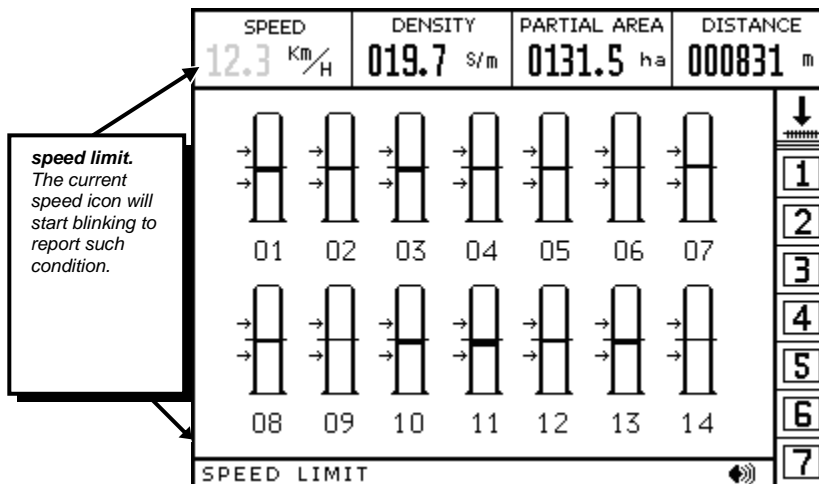


Figure 15. Above speed limit

7.4. Short-circuit of a Seed or Fertilizer Sensor

The monitor is checking at all times that there are no short-circuited sowing or fertilizing sensors. A short-circuit may occur if the wiring protection which connects a node box with a seed sensor is damaged causing the inside wiring filaments to touch. If a short-circuit occurs, the screen will automatically display a visual/sound alarm; in the lower part of the screen there will appear a message: "SHORT- CIRCUIT" and a blinking light on the bar which represents the sowing body will indicate the message: the number of the sensor in short-circuit.

Figure16 shows a clear example in which the sensor installed in the sowing line number 12 is in short- circuit.

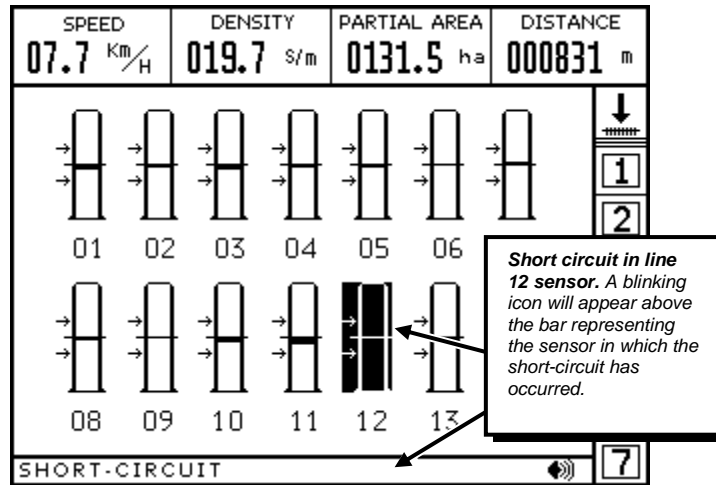


Figure 16. Seed sensor in short-circuit



In case a short-circuit occurs it is essential to determine which part of the wiring insulation is damaged. If the alarm stops buzzing when the socket connecting the short-circuited sensor with the node box is unplugged, then there is a problem with the sensor's cable and it must be replaced.

7.5. RPM Value Failure

The monitor can record a shaft's rotation speed; such shaft must have had its RPM sensor installed (optional). Such shaft's RPM values (revolutions per minute) are displayed in the fourth square in the upper part of the screen. See also "Upper Information Area" on page 12.

RPM value failure occurs when the measured value is different to the value set by the user. This range is adjusted by setting the nominal "RPM" values and the tolerance percentage value in the "SENSORS MENU." See also "RPM Range Setting" on page 40.

For instance, if the monitored shaft RPM value is set to 2000 with a tolerance of 15% in regards to such value, when the shaft rpm value reaches above 2300 rpm (2000 rpm + 15%) or below 1700 rpm (2000 rpm - 15%) there will be an RPM failure.

The screen will indicate such failure by means of a visual/sound alarm situated in the lower part of the screen. There will be a message reading "RPM FAILURE" and a blinking light will be displayed in the fourth square in the upper part of the screen.

Figure 17 shows an example of a shaft rpm value down to 1678 rpm, which was set to 2000 rpm as a nominal value with a tolerance of 15%, the screen displays an rpm failure of the monitored shaft.

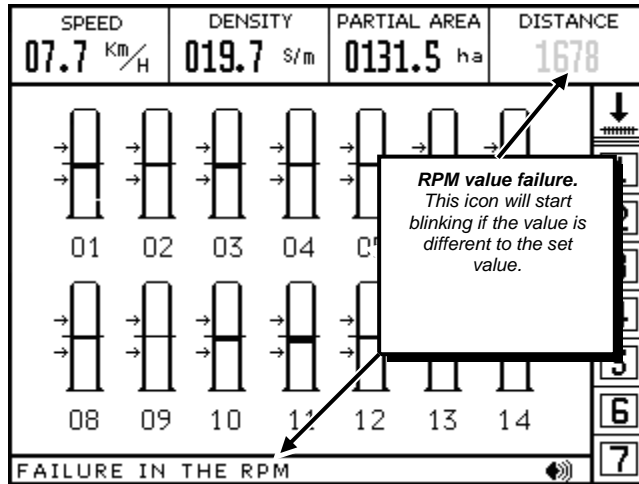


Figure 17. The monitored shaft is not rotating properly (lower revolutions)

7.6. Shaft Rotation Failure

The monitor is able to check the rotation of up to 7 shafts with their corresponding shaft rotation sensors installed (optional). If one of the monitored shafts stops rotating during a sowing operation due to a mechanical failure, the screen will indicate such failure by means of a visual/sound alarm displayed in the lower part of the screen –message area. In the dialog box at the bottom of the screen there will appear: "SHAFT FAILURE" and the number of the shaft which is failing will start blinking.

In *Figure 18* an example of this is shown. The numbers of the shaft sensors installed are displayed highlighted in black. In this case, only the first three shafts are installed and the failure occurs in the third one which is blinking.

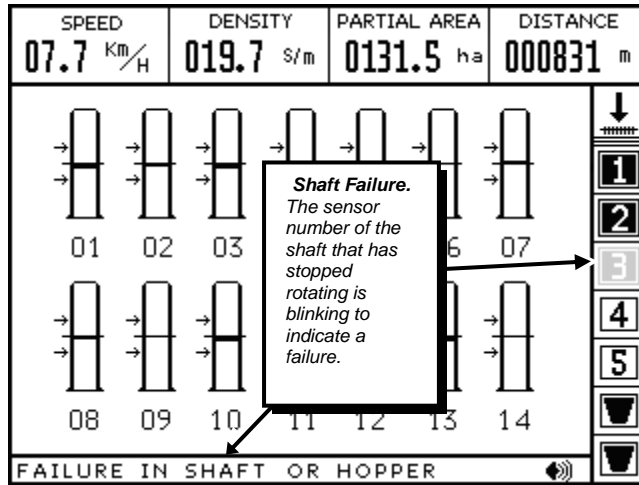


Figure 18. A monitored shaft is not rotating

7.7. Low Hopper Level of Seeds/Fertilizers

The monitor is also able to check the level of up to two seed/ fertilizer hoppers of the sower provided the proper hopper level sensors are installed (optional). If the hopper level is too low, the screen will display a visual/sound warning in the lower part of the screen –message area. There will appear a message reading “SHAFT/ HOPPER FAILURE” and the icon of the hopper with low level will start blinking.

Figure 19 shows an example in which there are two level sensors installed in two seed hoppers. The second hopper displays an extremely low level which triggers an alarm.

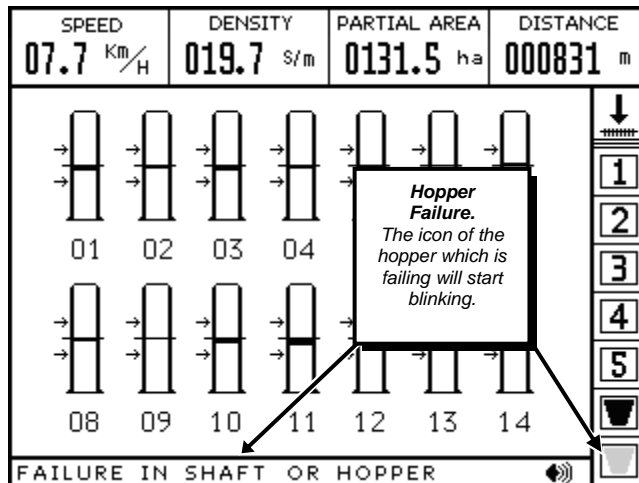






Figure 19. A seed/ fertilizer deposit reads a low level

8. Monitor Menus

8.1. Main Menu

To access MAIN MENU (*Figure 20*), from main screen, hold down  for a few seconds (until you hear two beeps).

There are nine options in the main menu, some of which are always activated and therefore its icon appears on the screen highlighted in black. If you wish to activate (select) another option, press  or  until such option is activated. To enter the selected option, press .

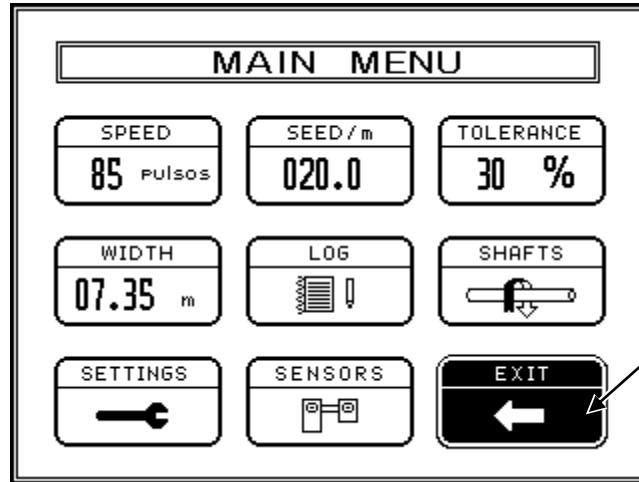


Figure 20. Main Menu

The following is a brief description of the steps to follow to enter an option in the MAIN MENU. A more detailed description of each function appears further on in this manual.



Allows **speed sensor calibration** (used only during screen installation procedures) Specs. on Page. 34.



Allows setting of the number of **seeds per meter** that will be sowed. Specs. on Page 29.



Allows setting of the **seeds per meter range** within which no sowing density failures will be registered. Specs. on Page 29.



Allows the setting of the **sower's width** (in meters). This option is only used during monitor installation procedures or when the amount or separation of the sower's bodies are modified. Specs. on Page 30.



LOG, all data of the work performed can be visualized, printed, copied to another PC or deleted. Details on page 27.



Allows the user to enter the **SHAFTS AND ADDITIONAL MONITORING** menu, where you can enable and disable the additional monitoring sensors (shaft rotation, RPM, or hoppers) Only used during installation procedures. Specs. in the next section.



Allows the user to enter the **SETTINGS** menu from which the screen CONTRAST, the alarm VOLUME and the background LIGHT intensity can be modified. Specs. on page 24.








Allows access to the **SENSORS** menu. Specs. on page 25.



Exits the MAIN MENU back to the working screen.

8.2. “SHAFTS AND ADDITIONAL MONITORING” menu

This menu is only accessed during installation procedures for an additional monitoring sensor. From this option it is possible to enable/disable the rotation monitoring of up to 7 shafts, shaft RPM control, and seed/fertilizer hopper level check up. By default all these additional options are disabled.

To enter the “SHAFTS AND ADDITIONAL MONITORING” menu (*Figure 21*) from the main working screen, enter the MAIN MENU holding down  for about two seconds (until two beeps are heard). Then press  or  until icon  is activated (selected) and press  to enter.

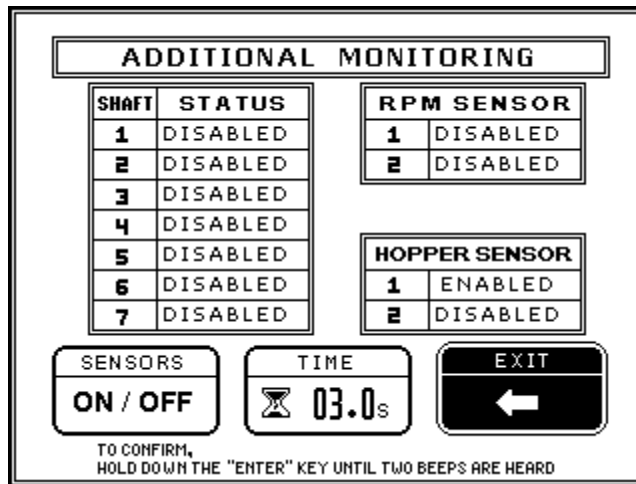


Figure 21. “SHAFTS AND ADDITIONAL MONITORING” Menu

The following is a brief description of the steps to follow to enter one of the three options in the menu. A more detailed description will be found in the next sections.



Starts additional monitoring sensors settings. Specs. on “How to enable/disable sensors” on page 38.








Sets the time before the screen indicates shaft rotation failure. Specs. in “Shaft Rotation Sensors” page 36.



Exits “Shafts and Additional Monitoring” menu and back to MAIN MENU.

8.3. SETTINGS Menu

Enter OPTION menu if you wish to modify the volume of the sound alarm, the contrast level or the screen's background light.

To enter the "SETTINGS" menu (*Figure 22*) from the main working screen, enter the MAIN MENU holding down  for about two seconds (until two beeps are heard). Then press  or  until icon  is activated (selected) and press  to enter.

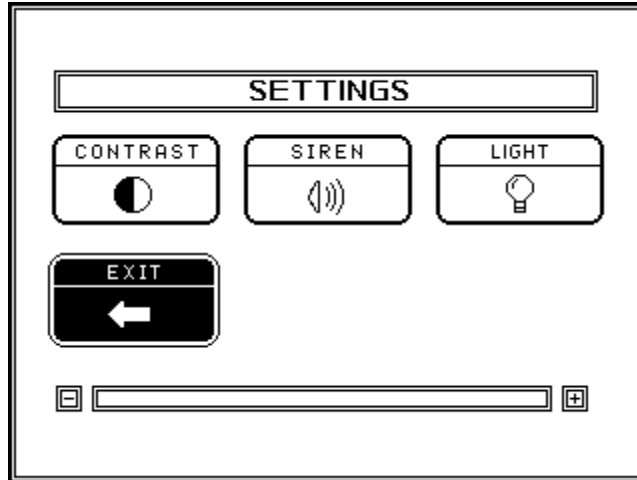


Figure 22. The "SETTINGS" Menu

Below is a brief description of the action performed when entering one of the three options in the OPTIONS menu. A more detailed description of it appears further below.



Modifies the screen's contrast level. See details on page 31.



Modifies the alarm's sound volume. Details on page 31.








Modifies the screen's background light intensity. Details on page 34.



Exits the SETTINGS menu back to the MAIN MENU.

8.4. “SENSORS” Menu

To enter the “SENSORS” menu (*Figure 23*) from the main working screen, first enter the MAIN MENU holding down  for two seconds (until two “beeps” are heard). Then press  or  until the  option is enabled (selected) and push  to enter.

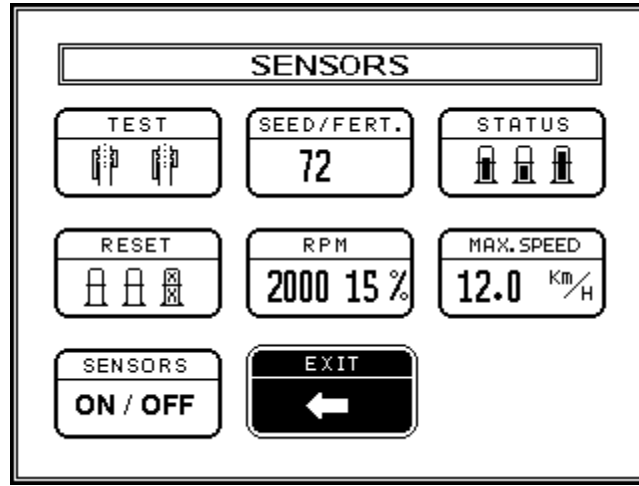


Figure 23. The “SENSORS” Menu

Below is a brief description of the action performed when one of the three options of the SENSORS Menu is accessed. A more detailed description will appear further on in the present manual.



Activates a sound message every time it detects the flow of seeds in front of a sensor during the sensors test (used to verify the correct installation and good condition of the sensor).



This parameter is programmed by the installer technician to differentiate sowing from fertilization lines. More details in “Configuration of fertilizer sensors (installation).” Page 41.



To access the screen that shows the dirt level of the sowing sensors. Details on page 26.



Allows the reconfiguration of the layout of the bars that represent the seed or fertilizer tubes, deleting those corresponding to the sensors that have been disabled. Details on page 41.



Allows the setting of the rpm range (nominal value plus or minus a tolerance percentage) which will not show the RPM failures (this in the case of sowers that have an rpm sensor). Details on page 39.



Specifies the speed limit. When speed is exceeded, an alarm indicating “Above maximum speed limit” will be activated. Details on page 30.



It enables/disables the seed or fertilizer sensors without having to disconnect them from the wiring. Details on page 41.












Exits the SENSORS menu back to the MAIN MENU.

9. Visualization of a sensor's dirt level

The monitor shows graphically the dirt level of each of the seed or fertilizer sensors.

To visualize the level of dirt and erosion of sensors, do the following:

1. While in the working screen area, go to MAIN MENU holding down  for two seconds (until two "beep" sounds are heard).
2. **Select the "SENSORS" option:** First, press  or  until  is activated, and press  to access this option.
3. **Select the "STATUS" option:** First, press  or  until  is activated, and press  to access this option. After that, the screen will indicate the status of the sensor, as shown on *Figure 24*.

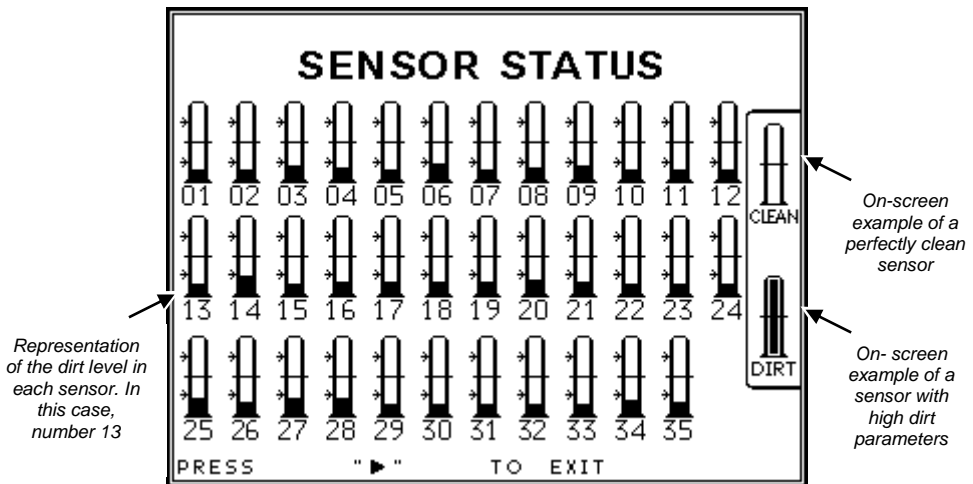







Figure 24. Visualization screen of dirt level in seed or fertilizer sensors

On this screen bars will appear representing each of the sensors with their respective numbers. A totally blank bar represents a sensor in perfect condition. Each bar will gradually be colored from its bottom as the dirt level of the said sensor rises, and will be totally black when the dirt level is higher.






4. **Go back to the main working screen:** First, press  to exit the SENSOR STATUS screen and go back to the SENSORS Menu. By then, the  option of the menu will be already activated; then press  to go back to the MAIN MENU. When the  option of the MAIN MENU has been selected, press  to exit the MAIN MENU and go back to the main working station.

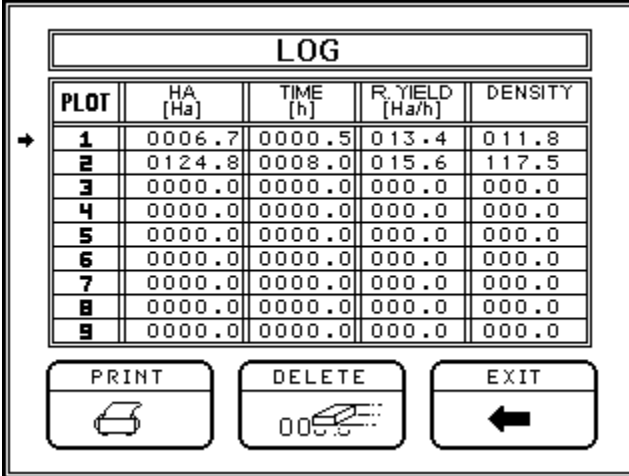
10. LOG

The monitor has a log that will be automatically updated with the information of the sowing work performed. This log can store up to 9 different plots.

Notice that data stored in the log is an independent source of information regardless of partial and total data of time and hectares worked, which can be viewed in the dialog box area on top of the main working screen.


To **access the log**, please do the following:


1. On the working screen, enter the **MAIN MENU** by holding down  for two seconds (until a “beep” sound is heard)
2. **Select the “LOG”** option as follows: First, press  or  until  is activated and press  to enter this option. After this the log of the monitor will appear as shown on *Figure 24*.



The arrow indicates the selected batch (In this case, BATCH number 1)

LOG				
PLOT	HA [Ha]	TIME [h]	R. YIELD [Ha/h]	DENSITY
1	0006.7	0000.5	013.4	011.8
2	0124.8	0008.0	015.6	117.5
3	0000.0	0000.0	000.0	000.0
4	0000.0	0000.0	000.0	000.0
5	0000.0	0000.0	000.0	000.0
6	0000.0	0000.0	000.0	000.0
7	0000.0	0000.0	000.0	000.0
8	0000.0	0000.0	000.0	000.0
9	0000.0	0000.0	000.0	000.0

PRINT 

DELETE 



EXIT 

Figure 25. Log with data of work performed

An arrow to the right of the plot number indicates the selected plot. On the figure above, the selected batch is number 1. All the sowing work performed is automatically stored in the selected plot, and is indicated on the table in the boxes next to the plot number. Data stored for each plot is the following:

- HECTARES [Ha] worked in the selected plot.
- WORKING TIME [h] in the selected batch (in hours and hours with decimals).
- WORKED (R.REAL [Ha/h]) of sowing work in the selected batch, i.e., mean hectares worked each sowing hour.
- Mean Sowing DENSITY, in seeds/meter.

To **change the selected plot**, where data of the work to be performed can be stored in a new plot, press  until the arrow points at the desired batch number.






To erase data of the selected plot, within the log notepad press  until the  option is activated and then press . A window will appear asking for confirmation to delete data of the selected batch, as shown in *Figure 26*. By pressing  all batch information will be deleted; however, if you press  such information will not be deleted.



Figure 26. Confirmation message to delete data from the selected plot

Notice that only data corresponding to the selected batch will be deleted. If you wish to delete information from other plots, you must select them and erase information one by one, repeating the procedure indicated above.

To print a ticket with information of the selected plot, press  while in the batch notepad until the  option is activated, and then press .

You must previously connect a MOBILE PRO PLUS® printer to the DB9 connector (optional) on the rear panel of the monitor. See also "3. Front and back view of the monitor" on Page 8.

Figure 27 illustrates an example of a ticket issued by the printer with information of the monitor, total data and data corresponding to Plot number 1 (the selected plot at the moment of the printing).






```

*****
*   AGROTAX   *
*   AG3000    *
*****
* By: Abelardo Cuffia *
* PHONE: +543472424282 *
* www.cuffiasa.com.ar *
*****
*PROGRAMING: *
* Planter Width: 07.35m*
* Rows: 14 *
* Constant Speed.:085 *
* Seeds/m: 020.0 *
* Tolerance.: 30 %*
*-----*
*TOTAL: *
* Time: 0008.5 H *
* Hectares: 0131.5 ha.*
*-----*
*PLOT: 1 *
* Time: 0000.5 H *
* Hectares: 0006.7 ha *
* Worked: 013.4 ha/H*
* Density: 011.8 S/m *
*****

```

Figure 27. Example of a ticket printed, containing information of the sowing work performed

Data transferred to a printer can also be sent to a PC connected to the DB 9 on the rear panel of the monitor. The "Terminal AG3000 – PC" software (optional) installed in the computer will allow the administration of sowing data.



























To go back to the main working screen, press  until the  option is activated; then press  to exit the LOG NOTEPAD and go back to the MAIN MENU. Then, the  option in the MAIN MENU will be selected; press  to exit the MAIN MENU and go back to the main working screen.

11. Setting of the Various Monitor Parameters

11.1. Density setting (seed per meter and tolerance)

The sowing density range is defined by the seed per meter and tolerance values which are set in the MAIN MENU. If by any chance a sowing row displays density values other than the one set by the range, the screen will inform of a “Sowing density failure”. See also “Sowing density failure monitoring” page 16.

To set the sowing density, do the following:

















1. In the working screen, enter the MAIN MENU press  for two seconds (until two beeps are heard”).
2. To modify the SEEDS PER METER value, follow these steps:
 2. a. **Select the “SEEDS/m” option** as follows: Press  or until  is activated and then press  to enter the estimated value. The first number will start blinking to indicate the number which has been selected to be modified following the procedure detailed in the next section.
 2. b. **Enter the desired seed per meter value**, by modifying the numbers which make up such value pressing  and , indicated as follows: Key  is used to modify the selected number value (which is blinking). By pressing  the number increases. If you keep pressing , when 9 is reached the sequence will repeat itself starting with 0 (1,2,3,4,5,6,7,8,9,0,1,2...and so on). Key  is used to change the selected number. Each time  is pressed, the next number to the right will be selected. Once the last number has been reached, if you keep pressing , it will go back to the first number.
 2. c. **Confirm the entered seed per meter value** by pressing .
3. To modify the TOLERANCE value, follow these steps:
 3. a. **Select the “TOLERANCE” option** as follows: Press  or  until  is activated and then press  to enter the estimated value. The first number will start blinking to indicate the number which has been selected to be modified following the procedure detailed in the next section.
 3. b. **Enter the desired tolerance value connected with the sowing density nominal value.** This procedure is carried out by modifying the numbers which make up such value using keys  and , as follows. Key  is used to modify the selected value (which is blinking). By pressing  the number increases. If you keep pressing , when 9 is reached the sequence will repeat itself starting with 0 (1,2,3,4,5,6,7,8,9,0,1,2...and so on). Key  is used to change the selected number. Each time  is pressed; the next number to the right will be selected. Once the last number has been reached, if you keep pressing , it will go back to the first selected number.
 3. c. **Confirm the entered tolerance value** by pressing .

4. **To go back to the main working screen:** Option  is already activated, press  to exit the MAIN MENU.

11.2. Sower Width Setting

The sower width is estimated by multiplying the distance between the sowing rows by the amount of sower bodies. Such data is set by selecting option: "WIDTH" in the "MAIN MENU".















Do the following:

- In the working screen, **enter the MAIN MENU** holding down  for two seconds (until two beeps are heard).
- Select the "WIDTH" option** as follows: Press  or  until  is activated and then press  to enter the estimated value. The first number will start blinking to indicate the number which has been selected to be modified following the procedure detailed in the next section.
- Enter the desired sower width value**, by modifying the numbers which make up such value pressing  y , indicated as follows.
 Key  is used to modify the selected number value (which is blinking). By pressing , the number increases. If you keep pressing , when 9 is reached the sequence will repeat itself starting with 0 (1,2,3,4,5,6,7,8,9,0,1,2...and so on).
 Key  is used to change the selected number. Each time  is pressed; the next number to the right will be selected. . Once the last number has been reached, if you keep pressing , it will go back to the first selected number.
- Confirm the entered sower width value** by pressing .
- To go back to the main working screen:** Option  is already activated, press  to exit the MAIN MENU.




11.3. Speed Limit Setting (maximum speed)

To set the speed limit, that is, maximum speed above which during sowing operations the correspondent alarm will set off, enter "MAIN MENU", then option "SENSORS" and finally, option "MAXIMUM SPEED"

Do the following:

- In the working screen, **enter the MAIN MENU** holding down  for two seconds (until two beeps are heard)
- Select the "SENSORS" option** as follows: Press  or  until  is activated and then press  to enter this option.
- Select the "MAXIMUM SPEED" option** as follows: Press  or  until  is activated and then press  to enter the estimated value. The first number will start blinking to indicate the number which has been selected to be modified following the procedure detailed in the next section.
- Enter the desired speed limit value**, by modifying the numbers which make up such value pressing  and , indicated as follows.
 Key  is used to modify the selected number value (which is blinking). By pressing  the number increases. If you keep pressing , when 9 is reached the sequence will repeat itself starting with 0 (1,2,3,4,5,6,7,8,9,0,1,2...and so on).










Key is used to change the selected number. Each time is pressed; the next number to the right will be selected. . Once the last number has been reached, if you keep pressing , it will go back to the first selected number.

5. **Confirm the entered speed limit value** by pressing  .
6. **To go back to the main working screen:** Option  from the SENSORS menu will be already activated; press to exit SENSOR menu and go back to MAIN MENU. The  option of the MAIN MENU will be selected; press to exit the MAIN MENU and go back to the main working screen.








11.4. Alarm Volume Setting

The sowing failures' alarm volume can be modified by the user. To modify this parameter enter "MAIN MENU" and select "OPTIONS" first and then "SIREN."

Do the following:

1. In the working screen, **enter the MAIN MENU** holding down  for two seconds (until two beeps are heard).
2. **Select the "OPTIONS" function** as follows: Press  or  until  is activated and then press  to enter this option.
3. **Select the "SIREN" option** as follows: Press  or  until  is activated and then press  to enter this option. Then at the bottom of the screen a pointer will appear above the bar which indicates the volume level. The closer the pointer is to the right corner of the bar, the higher the volume.











4. **Adjust siren volume to the desired level.** Pressing  the pointer will move towards the right and the volume will be higher. On the other hand, if you press  , the pointer will move left, selecting a lower volume. To confirm the desired value, press  .
5. **To go back to the main working screen:** Option  from the OPTIONS menu will be already activated; press  to exit OPTIONS menu and go back to MAIN MENU. The  option of the MAIN MENU will be selected; press  to exit the MAIN MENU and go back to the main working screen.

11.5. Screen Contrast Setting




The contrast can be modified to allow for a better visualization of the screen. The higher the contrast, the darker the screen display. To modify the contrast parameter, enter "MAIN MENU" and select "OPTIONS" first and then "CONTRAST."





Do the following:

1. In the working screen, **enter the MAIN MENU** holding down  for two seconds (until two beeps are heard).
2. **Select the "OPTIONS" option** as follows: Press  or  until  is activated and then press to enter this option.

3. **Select the “CONTRAST” option** as follows: Press  or  until  is activated and then press  to enter this option. Then at the bottom of the screen a pointer will appear above the bar which indicates the screen’s contrast. The closer the pointer is to the right corner of the bar (indicated by a plus + sign), the higher the contrast and the screen will be darker.












4. **Desired Contrast Adjustment.** Pressing  the pointer will move towards the right and the contrast will be higher. On the other hand, if you press  , the pointer will move left, selecting a lower contrast. To confirm the desired value press  .

5. **To go back to the main working screen:** Option  from the OPTIONS function will be already activated; press  to exit the OPTIONS menu and go back to MAIN MENU. The  option of the MAIN MENU will be selected; press  to exit the MAIN MENU and go back to the main working screen.




11.6. Backlight Light Setting





The monitor has a background light that improves visualization and allows the user to work at night. The intensity of such light can be adjusted by the user. To modify this parameter enter the “MAIN MENU” and select “OPTIONS” first, and then “LIGHT.”

Do the following:


1. In the working screen, **enter the MAIN MENU** holding down  for two seconds (until two beeps are heard).
2. **Select the “OPTIONS” function** as follows: Press  or  until  is activated and then press  to enter this option.
3. **Select the “LIGHT” option** as follows: Press  or  until  is activated and then press  to enter this option. Then at the bottom of the screen a pointer will appear above the bar which indicates the intensity of the screen’s background light. The closer the pointer is to the right corner of the bar, the brighter the light.



4. **Light intensity adjustment.** Pressing  the pointer will move towards the right and the intensity of the light will be higher. On the other hand, if you press  , the pointer will move left, selecting a lower intensity. To confirm the light’s intensity value, press  .

5. **To go back to the main working screen:** Option  from the OPTIONS function will be already activated; press  to exit OPTIONS menu and go back to MAIN MENU. The  option of the MAIN MENU will be selected; press  to exit the MAIN MENU and go back to the main working screen.

11.7. Sowing Calibration (Calibration Constant)

Hold down  for two seconds (until two beeps are heard) to make a *sowing calibration* while sowing. The monitor will adjust the sowing density value for all sowing rows to a constant value (calibration constant) to obtain, during calibration, an average sowing density equal to the seed per meter value set in the MAIN MENU. When this procedure is carried out, the screen will display a “CORRECTION” message in the messages area during a couple of seconds; from that moment on, the sowing density value for all tubes will be adjusted in accordance with the sowing calibration constant that results from this calibration process. This constant remains stored in the monitor even when it is turned off.

To remove the calibration constant, enter the seeds per meter option in the MAIN MENU and enter another seed per meter value or the same one. That is, every time a seed per meter value is set in the MAIN MENU, the previous sowing calibration value is automatically replaced.



12. Advanced Setting Options

Only to be used when the monitor is first installed. If by any chance any of these options need to be modified, please contact **technical assistance at our technical department**.

12.1. Node Box Setting (Installation Procedures)

Once the nodes are installed in the sower, their settings must be adjusted. For this purpose the installation function “NODE BOX SETTING” must be used. The node box setting only needs to be done when first installed as this is kept in the node box memory.

Do the following:

- 1. Unplug all four-way connectors which feed and connect the monitor with the node box and all other boxes.** That is, all four-way connectors at the end of the sower’s spearhead (which connect the monitor and the first node box) must be unplugged. If there are additional node boxes installed, all four-way connectors linking the boxes must be unplugged as well. Each node box installed in the sower generally contains two nodes.
- 2. Enter the NODE CONFIGURATION function** as follows: Turn on monitor by pressing  and immediately press  until two beeps are heard. By this time, in the message area a message reading “NODE CONFIGURATION” will appear which indicates that the process has started (*Figure 28*).

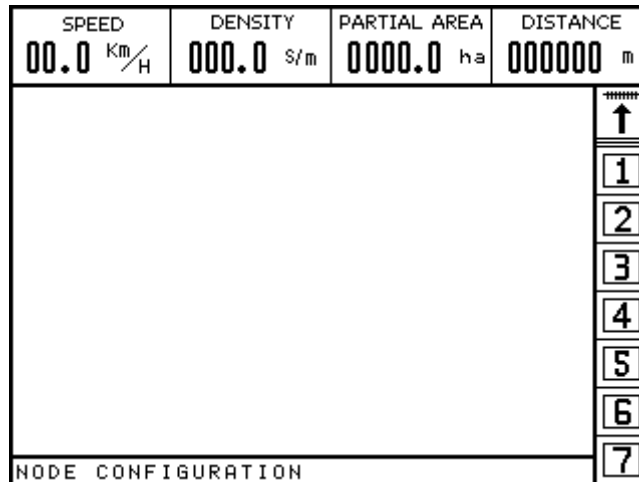


Figure 28. Starting Node Box Setting Procedure

3. **Plug in the spearhead's four-way connectors** (which connect the monitor with the first node box) and wait a few seconds until the monitor identifies the first two nodes inside the box and programs them automatically. Once this has taken place, two beeps will be heard and the following message will appear:

NODE CONFIGURATION 02

02 indicates that two nodes have been identified in the first box and have been programmed with 01 and 02 settings.


4. **Sowers with more than one node box must connect each node box, one at a time** and wait a few seconds until the monitor identifies the first two nodes inside the box and programs them automatically.

In this way, if there are three node boxes installed in the sower, when the second box is plugged to the monitor, two beeps will be heard and the screen will display:

NODE CONFIGURATION 04

When the third node box is plugged in, it will display:










NODE CONFIGURATION 06

When all the node boxes have been plugged in, confirm the setting process finalization by pressing . The monitor will produce a beep sound and will check all plugged in nodes and switch back to the main working screen.

12.2. Speed Sensor Calibration (Installation Procedure)





To determine the speed constant follow this calibration procedure: The sower must move a total distance of 100 linear meters (33.3 feet), driven in the ground, before selecting the "SPEED" option in "MAIN MENU".



To perform an automatic calibration along a 100 meter distance, follow these instructions:



1. **Establish the initial and final points of the 100 meters distance.**
2. **Move the sower to the initial point and the machine.**
3. **Enter MAIN MENU** and keep pressing  during two seconds (until you hear two "beep sounds").
4. **Select "SPEED" option** as follows: Press  or  until SPEED is activated, and then press  to start calibration (the first number of the speed constant previously set will start blinking).
5. Move forward with the sower toward the final point of the 100 meters. The speed constant will increase automatically starting from zero as the monitor starts reading data from the speed sensor. The working speed is not important during calibration. Once the distance is covered, stop the sower.
6. Confirm the obtained speed limit value by pressing .
7. **To go back to the main working screen:** Option  from the OPTIONS function will be already activated; press  to exit OPTIONS menu and go back to MAIN MENU. The  option of the MAIN MENU will be selected; press  to exit the MAIN MENU and go back to the main working screen


It is also possible to enter the speed constant value manually; this is in case such value is already known and the 100 meter distance has already been traversed. To enter the speed constant manually, do as follows:




Los pasos a seguir para cargar la constante de velocidad en forma manual son los siguientes:

1. **Enter MAIN MENU** holding down  during two seconds (until you hear two "beep sounds").
2. Select "SPEED" option as follows: Press  or  until SPEED is activated and then press .


3. By modifying the numbers which make up such value pressing  and  indicated as follows.

The key  is used to modify the selected number value (which is blinking). By pressing , the number increases.

If you keep pressing , when you reach 9 a sequence will repeat itself from 0 and on (1,2,3,4,5,6,7,8,9,0,1,2...).

The key  is used to change the selected number. Each time  is pressed; the next number to the right will be selected. Once you have reached the last number, if you keep pressing , it will go back to the first.

4. **Confirm entered speed constant value** by pressing .

5. **To enter back main working screen**, take the following steps: The option  is already activated; press to confirm that you wish to exit MAIN MENU.

12.3. Additional Monitoring Sensors Setting (Installation Procedure)

Additional monitoring includes shaft rotation sensors, RPM gauging and hopper level. Following there is the display of the screen of the menu "SHAFTS AND ADDITIONAL MONITORING" (*Figure 29*). This menu must only be accessed by the installer when setting additional monitoring sensors. The manufacturer has disabled all of these additional options.

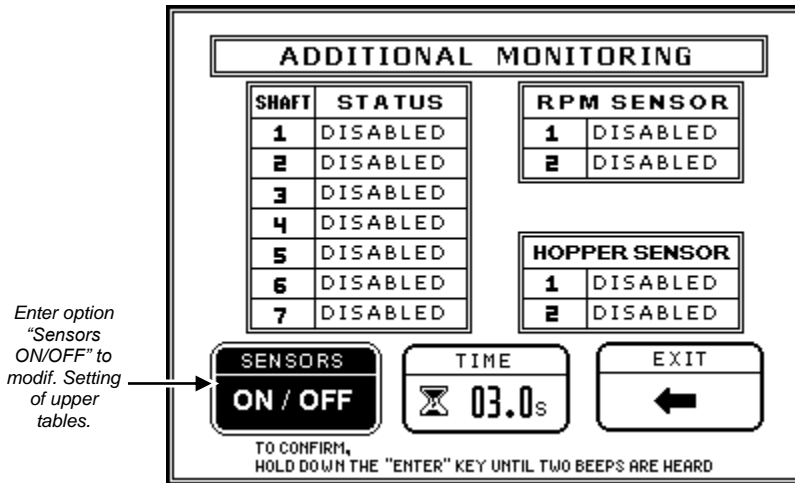









Figure 29. Screen for the setting of the additional monitoring sensors (rotation, rpm and hoppers)




12.3.1. How to enter "SHAFTS AND ADDITIONAL MONITORING" menu

he working screen, enter the MAIN MENU pressing  for two seconds (until two beeps are heard). Then



he must press  or  until the icon  is activated (selected) and press  to enter.

12.3.2. How to enable or disable sensors

Once at the menu "SHAFTS AND ADDITIONAL MONITORING" if you wish to modify the status of a particular sensor, first press  or  until the option  is activated (selected) and then press  to access tables displaying the shaft box ID number with its correspondent status to the right. One of the sensors will be selected, that is, a number at the table will be highlighted in black. Press key  to activate (select) the next sensor on the table (or the first of the next table, if you are situated at the end of a table) and by pressing  the previous sensor will be selected. Press  to change the selected (activated) sensor status. Each sensor may display one of the following status: DIACTIVATED, ACTIVATED OR AUTOMATIC. The equipment will not monitor those sensors set as DIACTIVATED; this option generally applies to the rows which have no sensors plugged. The plugged sensors must be set as ACTIVATED so that the equipment carries out the monitoring operation for those sensors. The option AUTOMATIC indicates the screen that it must determine automatically if a sensor is plugged or not.

Once the sensors are set, to confirm changes and exit sensor enabling tables, hold down  for two seconds until two beeps are heard. The option  will already be selected and if you press  you will exit the "SHAFTS AND ADDITIONAL MONITORING" menu

12.3.3. Shaft Rotation Sensors

It is possible to install two shaft rotation sensors per each node box set on the sower. Each node box has two terminals outlets labelled with an "E" (*Figure 30*). The first node box (containing nodes 1 and 2 and is plugged directly into the screen), is wired with shafts rotation sensors 1 and 2, displayed on screen as  and  respectively

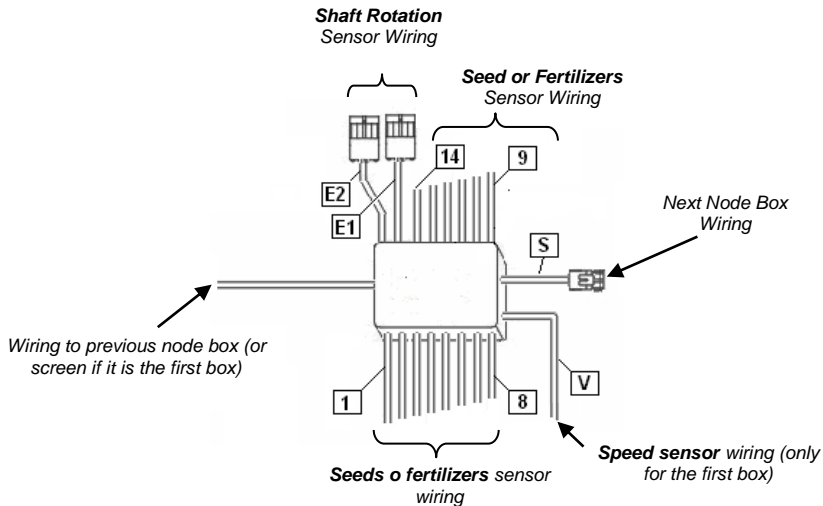







Figure 30. Diagram of its node box and its wiring

Rotation sensors  and  can be wired into the second node box. In the same fashion, rotation sensors  and  could be wired into the third box and rotation shaft  can be wired into box four, if any. That is, a

total of 7 shaft rotation sensors can be wired, two per each node box provided no more hopper level sensors are wired; the maximum quantity of hopper sensors and shafts sensor cannot be higher than 7.

Figure 31 displays the main screen where the user might notice that rotation sensors 1, 2, and 3 have been enabled as they are the only sensors highlighted in black.

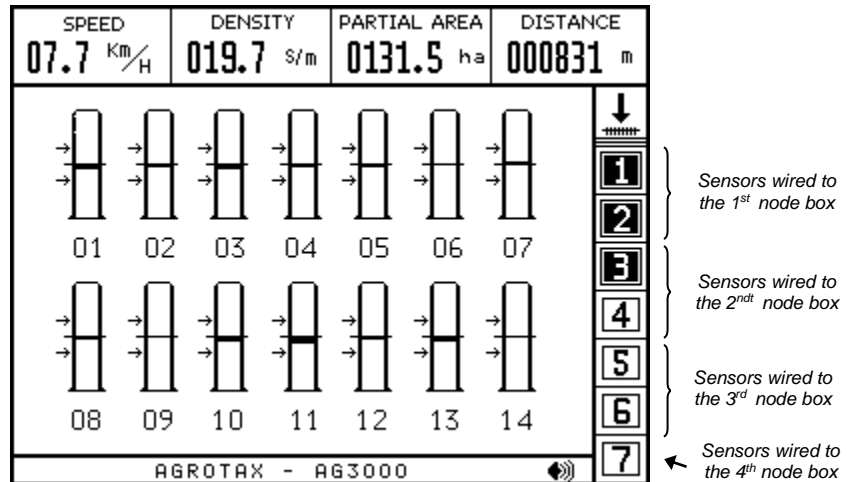



Figure 31. The first three rotation shafts have been installed and enabled (they are highlighted)

Figure 32 displays the correspondent setting. Only sensors 1, 2, and 3 are ACTIVATED, the rest have been set as DIACTIVATED, that is, corresponding monitoring capacities will not be used.

The waiting time (in seconds) before the “Rotation failure alarm” is set after shaft shut down can be modified

entering option 

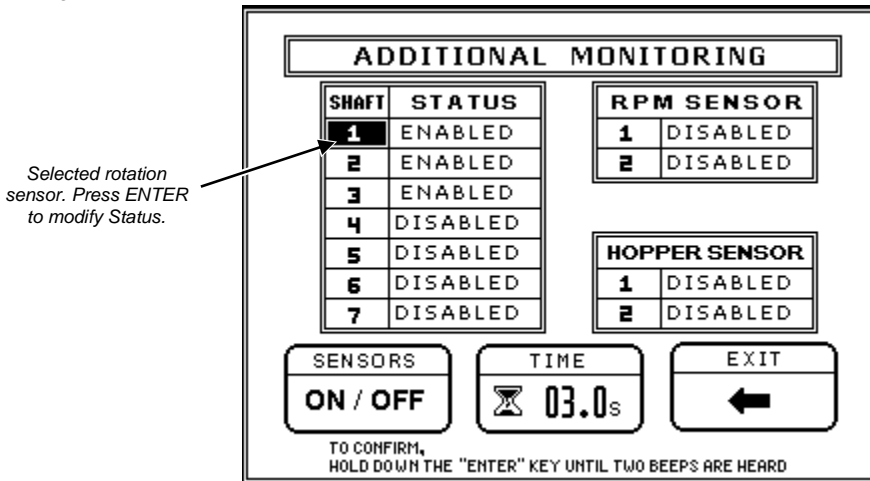


Figure 32. Shaft rotation Sensors Setting

12.3.4. Hopper Sensors

The hopper level sensors are wired in the same manner as the shaft sensors, in the connectors labelled “E” (*Figure 33*). Hopper sensors must always be wired to the last node box which is set on the sower. Notice that that box has been specially designed to monitor hopper level sensors. See also “Wiring General Diagrams” on pages 46 and 47.

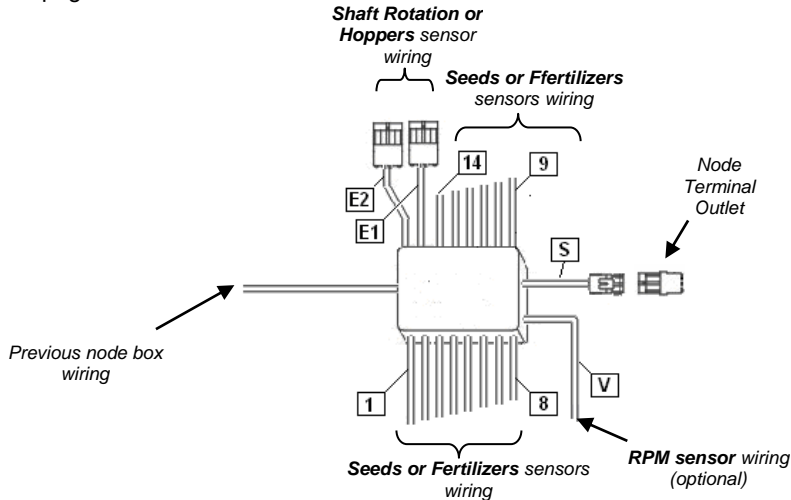


Figure 33. Last Node Box and its wiring



The node terminal outlet must always be wired to the outlet terminal through the last node box installed on the sower.

Remember that the speed sensor is plugged in the wire labelled “V” from the first node box, while the rpm sensor is wired in the same wire but always in the last node box.

What is more, the shaft rotation sensors are wired into the wires labelled “E”, starting from the two in the first node box and following the next in case more than two are needed. Likewise, the hopper sensor(s) are wired into the wired labeled “E” but always in the last node box, which is specially design for hopper monitoring.

Figure 34 shows screen main display, in which the user can notice that hopper sensors 1 and 2 have been installed. The first three rotation sensors are also shown as wired

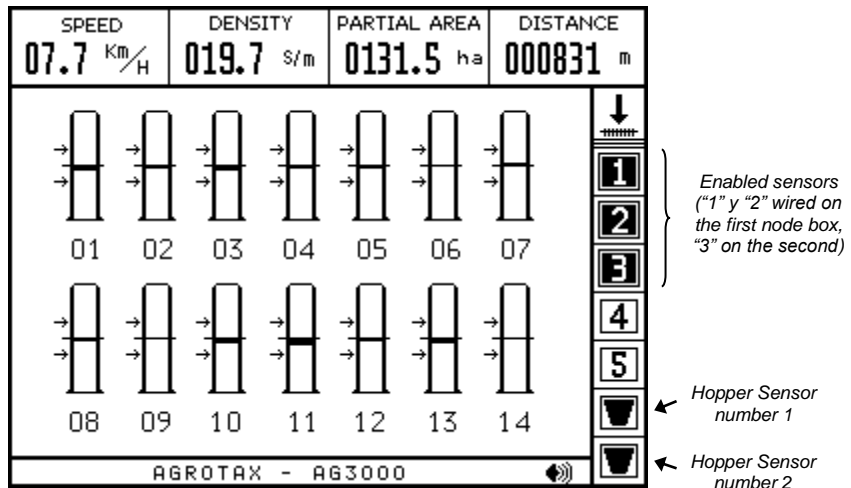


Figure 34. The first three shafts sensors and the two hopper sensors have been plugged

Figure 35 displays the corresponding setting. Both hopper sensor number 1 (installed at connector "E1") and hopper sensor number 2 (installed at connector "E2") are ACTIVATED. Rotation sensors 1, 2 and 3 are also ACTIVATED.

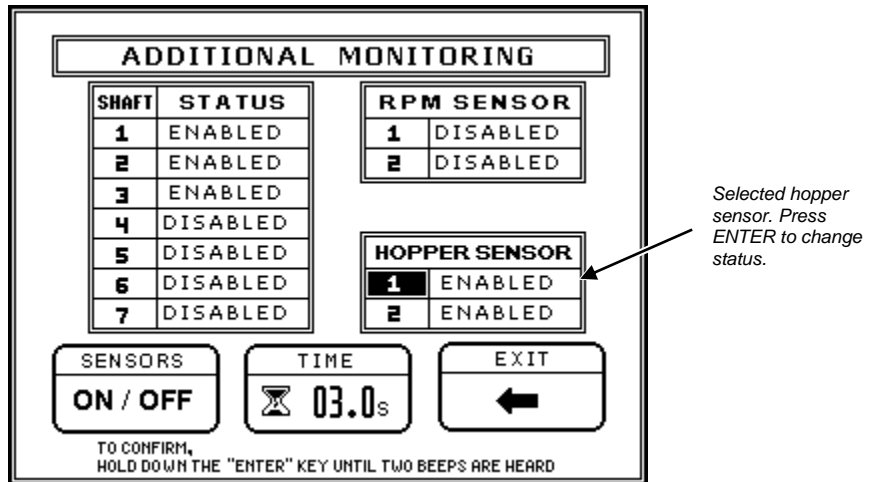
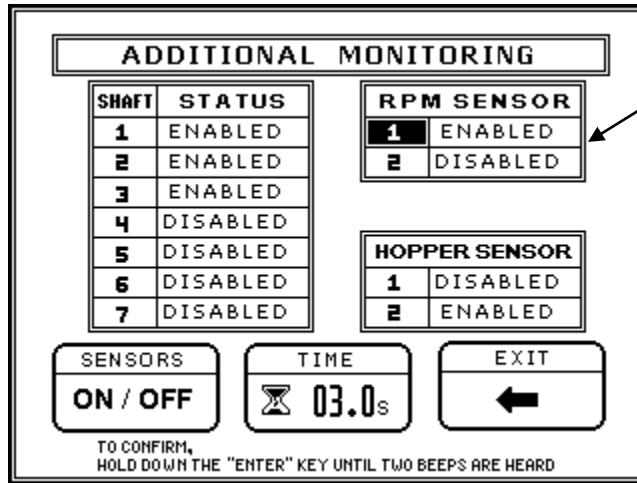


Figure 35. Seed hopper level sensors setting

12.3.5. RPM Sensor

The current screen version takes the installation of rpm sensor to gauge rpm. Such sensor must always be wired to the last node box, in the wiring labelled "V". That is to say, while this wiring labelled "V" is used to wire the speed sensor to the first node box, it is also used to wire the rpm sensor to the last node box. Notice that it is essential to count on two node boxes set at the sower so as to install an rpm sensor.

Figure 36 shows the display of the setting "SHAFTS AND ADDITIONAL MONITORING" function where the enabling of the rpm sensor is shown.





Selected hopper sensor. Press ENTER to change status.

Figure 36. RPM Sensor Setting

Rpm value will be displayed in the fourth square of the upper area of the screen; it will shown the value on screen and monitor at all times that the rpm value is within the set range, setting off an alarm in case it is not. See also "Upper information area" on page 12, and "RPM Value Failure" on page 19.

12.3.6. RPM Range Setting

To set rpm nominal value and tolerance for such value, first enter MAIN MENU, then menu  and finally option  to set desired values.

13. Seeds and Fertilizers Sensor Setting

13.1. Automatic Detection of Sensors Plugging or Unplugging



The screen will automatically detect the seeds or fertilizers sensors that connect to the node boxes installed on the sower. As sensors are plugged, the bar representing them will show on the screen.

Likewise, when a sensor that had been formerly plugged is unplugged, the monitor will automatically detect such change and will show it with a crossed out bar, as shown in *Figure 37*.






Figure 37. Symbol representing a seed or fertilizer sensor unplugged from the wiring.

13.2. Sensor Reconfiguration

If you have reconfigured the sower to work with fewer sensors and want the sensors that were initially connected but later on disconnected to leave the screen, you must enter "RESET"  in the "SENSORS" menu .

13.3. Disabling sensors without disconnecting them

It is also possible to disable the sensors without having to disconnect them off the node boxes. To do this enter the "SENSORS ON/OFF" function  within the "SENSORS" menu , and change the status of the sensors in the corresponding tables as done with the configuration of additional monitoring sensors. To exit the configuration tables, hold down the  key for two seconds (until two "beep" sounds are heard).

13.4. Configuration of the number of seed and fertilizer sensors

The wires that come out of the node boxes and are labeled with numbers are used to connect in a sequence the seed and/or fertilizer sensors. In case sowing and fertilizer lines are monitored simultaneously, the seed sensors must be connected in the first lines and the fertilizer sensors in the remaining ones.

In the fertilization lines, only the flow or passing of the fertilizer will be monitored, and there will be a failure in case it detects a halt in the flow of fertilizers (fertilization failure). However, in the sowing lines, in addition to the flow of seeds, the monitor will constantly check that the number of seeds in each line is within the range specified by the user.

You must tell the monitor in which line the sowing sensors end and the fertilizer ones begin. To do this, after installation, you must program *the number of the last row* in the option "SEED/FERT" in the "SENSORS" menu.

For example, if there are 16 rows and 16 fertilization lines monitored, 32 sensors will be used. The first 16 sensors (connected in the first node boxes) will be used for the sowing rows, while the remaining 16 (connected to the last node boxes) will be assigned to the fertilization lines. Option "SEED/FERT" from the Sensors Menu must be programmed with value 16 (the number of the last row).

14. Troubleshooting

Below is a simple guide with solutions to potential problems. **Please contact our technical department if necessary.**

Problem 1. *The monitor does not show speed information, i.e., in the main working screen the speed box displays: “00.0 km/h” even though the sower is operating.*

Try this: Check that the pulse value of the speed sensor (in the MAIN MENU) is a number other than zero. In case the value is zero, you must calibrate the speed sensor again. See “Calibration of the speed sensor (installation)” on page 34.

Also check that the speed sensor is properly plugged and installed, and that the wire connected to the node is not damaged. Also, check the separation between the speed sensor and the magnets when the latter pass in front of it, which should be between 3 and 8 millimeters.

Notice also that the speed sensor must always be connected to the speed cable (labeled with a “V”, for “Velocity”) of the first node box, i.e., the one connecting directly to the monitor.

Finally, if you wish to check the voltage level of the watertight jack to which the speed sensor is connected, you must use a multi-meter to measure DC voltages of about 6 volts. Between terminal B (black ground wire) and terminal C (red feed wire), the measured voltage should be 6 volts. Otherwise, there is a problem in the ground or feed wires connected to the sensor. If the result rendered by such measurement is correct, you must also measure between terminal A (green signal wire) and terminal C (red feed wire) to ensure that the signal wiring is correct, that is, 6 volts. See also “Appendix 3. Electric levels in watertight ” on page 59.

If the results of these tests are correct, then the sensor may be damaged. Disconnect the speed sensor and set-up “an electric bridge” between terminals A and C of the speed jack connected to the node. If the monitor shows a speed other than zero, then the problem is not in the wiring but in the speed sensor.

Problem 2. *The value ‘hectares worked’ shown is not correct.*

Try this: If the monitor shows an incorrect value of the hectares worked as well as the speed measurement and distances estimation, check the speed sensor and their calibration as indicated above. However, if the measurement of speed and distances is correct and it results that the sum of hectares is not proper, check that the sower width (in the MAIN MENU) has been properly loaded. See also “Sower Width Setting”, on page 30.

Problem 3. *The values of speed/distances traveled shown are incorrect.*

Try this: If the main working screen shows a steady speed but higher or lower than the real working speed, it may be that the pulse value of the speed sensor (in the MAIN MENU) is incorrect. This value results from the automatic calibration process of the speed sensor; therefore, such calibration must be repeated if this value is incorrect. In these cases the monitor should also show a wrong value in the measurements of distances and hectares. See also “Calibration of the Speed Sensor” on page 36.

It may happen; however, that the speed box shows an unstable value. This may be due to excessive spacing between the speed sensor and the magnets installed in the shaft. This separation should be 3 to 8 mm. Also check that the sensor’s bracket is not too flexible, thus causing excessive vibration on the sensor, and that the magnets are properly installed.

Problem 4. In all seed bars, the density shown is incorrect; either it is higher or lower than the number of seeds/meter actually being sown.

Try this: Check that the monitor properly indicates the distance traveled and the speed value. If the speed sensor is not properly calibrated or installed, thus indicating wrong speed and distance values, the monitor will also show a wrong value in the sowing density, in seeds/meter, since this parameter depends on the forward speed of the sower. In this case, check the installation and calibration of the speed sensor as shown above.

But if the speed sensor is properly installed and calibrated, then you must check the correct installation of the seed sensor and the sensor's dirt level. A high dirt level may result in a decrease in seed flow sensibility; therefore, the sensors will show a lower sowing density. In this case, you must clean the seed sensors.

Make sure you have properly determined the value of seeds that the sower is actually sowing. See also "Sowing density failure (Shutting down)," on Pág.18.

Problem 5. The monitor indicates a SOWING FAILURE in one or more rows; however, sowing in those rows is being performed correctly

Try this: The monitor has a sowing sensor testing function to check that each sensor, its installation in the sowing tube and the wires that connect it to the node boxes are in perfect condition. As seeds fall through a down-tube, the message: SENSOR TEST will appear in the monitor, and the bar corresponding to the tube through which the seeds are falling will start blinking. This shows that the sensor and its installation are in perfect condition. Otherwise, check that the sowing sensor placed in the down-tubes in the row with the apparent failure is properly plugged and installed, and that the wire connecting it to the node box is not damaged.

Also check the sensor's dirt level. An excessively high level may cause the sensor to operate defectively.

Finally, if you want to check the voltage level in the watertight jack to which the sowing sensor is connected, use a multi-meter to measure DC voltages of about 6 volts. Between terminal B (black ground wire) and terminal C (red feed wire) you should measure 6 volts. Otherwise, there is a problem in the sensor grounding or feeding. If the result of this measurement is correct, you must also measure between terminal A (green signal wire) and terminal C (red feed wire) to ensure that the signal wiring is correct, you should get a 6 volts reading. See also "Appendix 3. Electric levels in watertight jacks and wiring," on page 54.

If the results of these tests are correct, the sensor may be damaged. You may disconnect the faulty seed sensor and set up a bridge between terminal A and C of the jack connected to the node. If SENSORS TEST appears in the monitor's dialog box while you are doing this and the tube representing such sensor starts blinking, then the sensor is damaged and must be replaced.

To make sure that the sensor is actually damaged, you can exchange its connection system by one in an adjacent seed sensor. For example, if sensor number 4 shows a sowing failure and number 5 works properly you must connect the sensor that is mounted on body number 4 to the jack connected to the node box where the sensor of body number 5 is connected, and the sensor of body number 5 must be connected to the connector in the node box where the sensor of body 4 was connected. If sowing failures show up in seeding body 5 when you exchange the sensors while number 4 starts working properly, then the problem is in the sensor and must be replaced.

Problem 6. There are no node signals. When you switch on the monitor, no nodes are detected; therefore, the bars representing the seed and fertilizer sensors do not appear on the working screen.

Try this: When you switch on the monitor, after the introduction, it will show the number of nodes that are installed in the sower. Notice that generally each box has two nodes; therefore, if there are two node boxes

in the sower, when you switch on the monitor it should detect nodes 01 to 04 (in this case it will show the numeric sequence 01, 02, 03 and 04).

However, if no node is detected (it does not show the numeric sequence mentioned above), then you must first check that the 4-way plugs that connect the monitor to the first node box on the spearhead are plugged in and make good electric contact. Then check that the cable that connects the first node box to the monitor (above the sower's spear end) is in good condition. A short-circuit of the filaments in the wire or if one of them has been cut, communication between the monitor and the nodes might be affected.

If you accidentally access the "Node Configuration" function while all nodes are connected, the nodes will have lost direction; therefore, the configuration must be restarted. See also "Node Configuration" on page 35.

Problem 7. *The monitor has no communication with one of the nodes (if there is more than one node box installed). When you turn on the monitor, it only detects some of the nodes installed in the sower; therefore, only some of the bars representing the seed sensors will show up on the screen.*


Try this: When you turn on the monitor, after the introduction, the monitor will show in the dialog box area, the number of nodes installed in the sower. Notice that generally each box has two nodes; therefore, if there are two node boxes in the sower, when you switch on the monitor it should detect nodes 01 to 04 (in this case it will show the numeric sequence 01, 02, 03 and 04).

However, if it detects only a few nodes (for example in the sequence mentioned above it only shows nodes 01 and 02 and approximately half of the bars representing the seed sensors appear on the screen), then you must first check that the 4-way plugs that connect the monitor to the first node box in the spearhead are plugged in and make good electric contact. Also check the other 4-way plugs that connect each node box to the other. Then, make sure that the cable connecting the node box to the next is in good condition. A short-circuit of the filaments in the wire or if one of them has been cut, communication between the monitor and the nodes might be affected.


If you accidentally access the "Node Configuration" function while all nodes are connected, the nodes will have lost direction; therefore, the configuration must be restarted. See also "Node Configuration" on page 35.

Problem 8. *The monitor shows fewer rows than the number of rows installed in the sower*

Try this: Make sure that when the monitor is switched on, it effectively detects all the nodes installed in the sower, as previously indicated.

Bear in mind that the monitor shows up to 36 lines at a time. If the sower has more than 36 lines and you wish to see the remaining ones, press the  key. See also "Visualizing bars in more than one screen (graphic mode)" on page 16.

Problem 9. *The monitor cannot be switched off*

Try this: Remember that the monitor can be switched off only if it is in the main working screen. If you are in the MAIN MENU or any of the submenus, you must first go back to the main working screen and then press the key  to switch off the device.

Problem 10. *The monitor shows the message "Sensor Short-circuit" and a black cursor representing a seeding or fertilization body blinks to show the faulty sensor's number.*


Try this: You must identify the part of the wiring where the short-circuit originated and eliminate it. See “Short-circuits in Seed Sensors” on page 20.

Problem 11. *The monitor does not start.*

Try this: Check that the fuse located in the fuse-holder on the monitor’s rear panel has not burnt out. If it is burnt, check the wire that goes to the connector in the sower’s spearhead and connects to the first node box, making sure that it is in good condition. Also check the wire that passes above the first node box and the wires that communicate the boxes to each other. If the protector is damaged, you must replace it.

Then, replace the fuse. Always use a fuse of the same value as the original (5 x 20 x 1.5 A). Never use any with a fusion voltage value exceeding 1.5 amps.

Problem 12. *One or more bars representing the seed or fertilizer sensors appear on the screen with crosses on them.*

Try this: The icon  represents a seed or fertilizer that was initially connected but was then disconnected. If the sensors that appear with a cross have been intentionally disconnected because the sower has been reset to work with fewer rows, and you wish the disconnected sensors not to appear on the screen, you must reset the sensors, as specified in “13.2. *Reconfiguration*” on 44..

Otherwise, check that the sensor is connected to the wiring. Make sure that the terminal switches are making good electric contact and control the wiring of the sensor that appears to be disconnected looking for any damaged section. If the problem persists, it may be due to a failure in the sensor and it must be replaced.

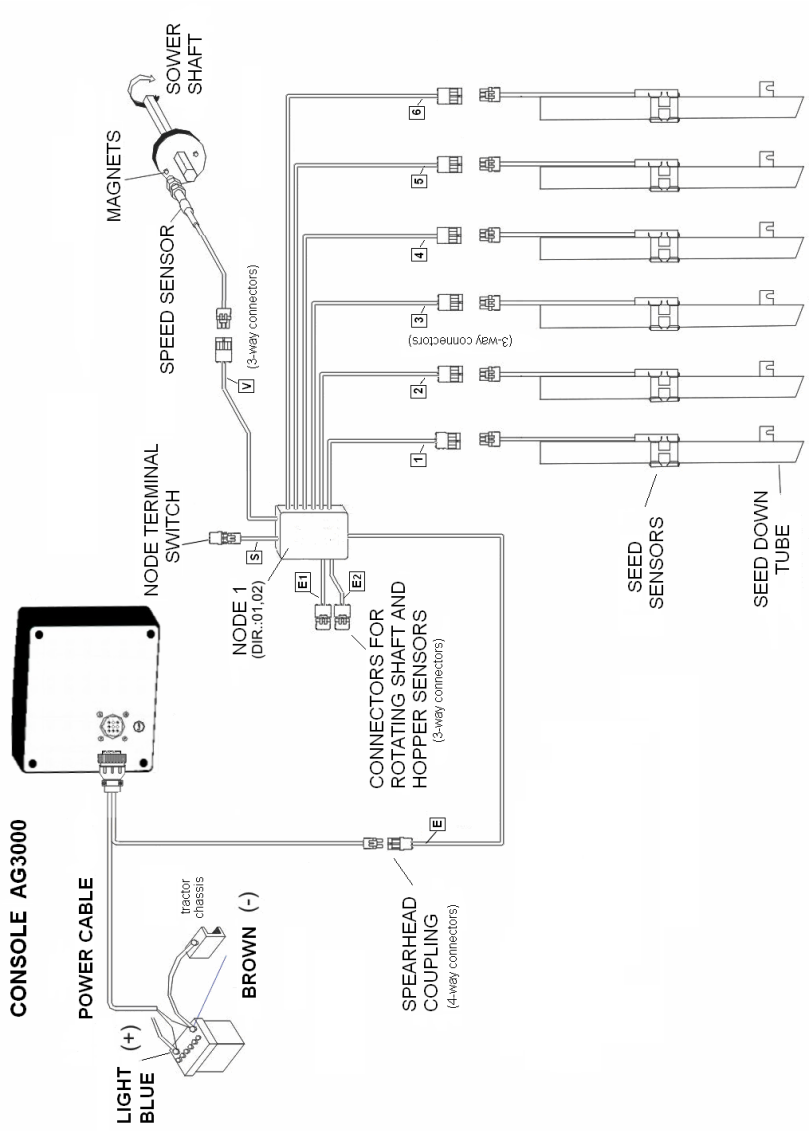
Problem 13. *The message “NODE DOES NOT RESPOND” appears on screen.*

Try this: The monitor shows the message “NODE DOES NOT RESPOND” when it cannot communicate with one or more node boxes installed in the sower. Check the condition of the 4-way connector of the spearhead, as well as of the wiring that connects the monitor to the node boxes. If the wiring is damaged or the connectors are not making good electric contact due to a high dirt level, there will be a communications problem between the monitor and the nodes.

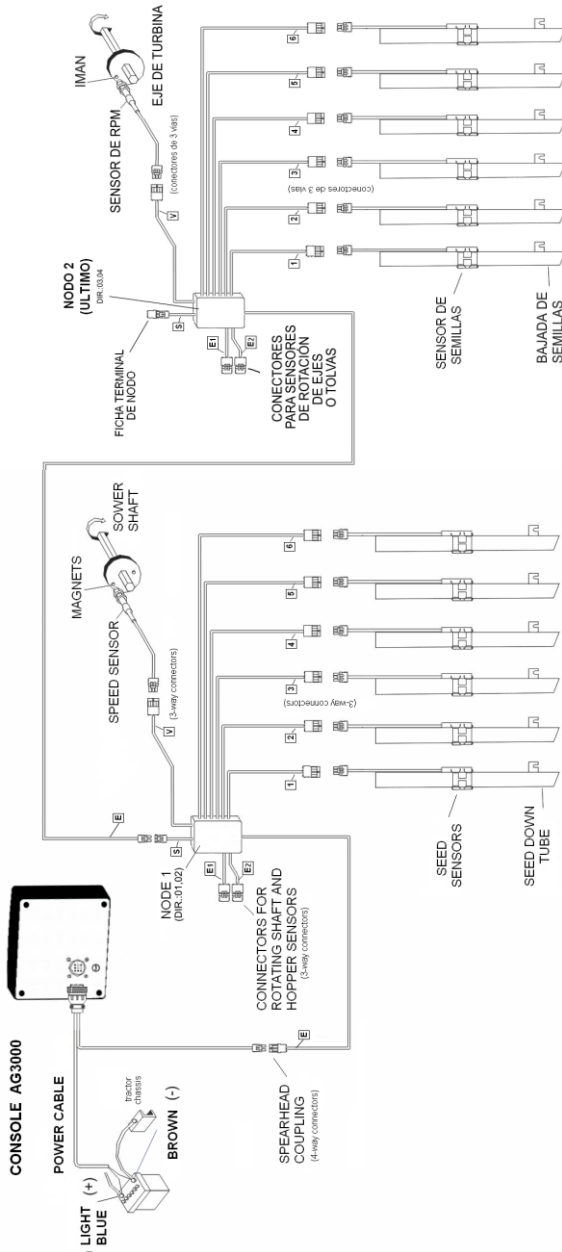
Notice that next to the message “NODE DOES NOT RESPOND” appear the number of nodes that are not communicating with the monitor. If the first pair of nodes is not responding, then the problem is surely in the wiring that connects the first node box to the monitor. However; if the non-responsive nodes are not the first ones, the problem will be in the wires that connect the node box to the next one.

15. Monitor Connection – Overview.

15.1. Diagram of a Monitor with a Single Node Box



15.2. Diagram of a monitor with two or more node boxes



In monitors with more than two node boxes, the connection must be performed similarly as the one indicated in the previous diagram, bearing in mind the following:

1. The speed sensor is always connected to the wires labeled with a "V" of the first node boxes
2. The rpm sensor (optional) is always connected to the wires (labeled with a "V") of the last node box
3. The rotation sensors (optional) are connected to the wires (labeled with an "E") of the first node boxes (E1 and E2 in the first box, E3 and E4 in the second, E5 and E6 in the third, E7 in the fourth).
4. The hopper level sensors (optional) are always connected to the wires (labeled with an "E") of the last node box. This is a node box especially prepared to connect hopper level sensors.

Appendix 1. Installer functions reference

To access these functions, turn on the monitor (press) and pressing on one or two keys (as shown below), as required in each function.



Node Configuration

To enter the “Node Setting” function, switch on the monitor and press until two beeps are heard.



Delete the maximum working speed stored in the monitor

To delete the maximum working speed, switch on the monitor and hold down and simultaneously until two beeps are heard.

Note. The maximum sowing speed will appear for a few seconds in the box corresponding to the sower SPEED.



Setting of the minimum amount of seed down-tubes through which seeds must fall to enable the monitor to start in the “Sowing” mode

To modify the number of seed down-tubes that must be started to allow the monitor to enter the *Sowing* mode, switch on the monitor and hold down and simultaneously until two beeps are heard. In the dialog box area at the bottom of the screen the parameter’s current value will appear. Use and to set new values for this parameter.

Note. The default parameter is 03, i.e., when seeds fall down three or more tubes, the monitor will enter the Sowing mode.





Use ‘speed’ to enable the monitor to enter the “Sowing” mode

To enable or disable ‘speed’ as a parameter so the monitor enters the *Sowing* mode, switch on the monitor and immediately hold down until two beeps are heard.

When ‘speed’ is activated, the monitor will enter the Sowing mode receiving pulses from the speed sensor. This function must only be activated in special cases (for example, when only shaft rotation is monitored). The speed sensor must be installed on one of the sowing shafts.



Reset the monitor memory (default values)

In order to reset the monitor memory, switch on the monitor and hold down  and  simultaneously until two beeps are heard.

When this function is confirmed, all data values (batch data, partial and total work performed, maximum speed, etc.) will be deleted and all parameters (speed constant, seeds/meter, tolerance, etc.) will be loaded with the factory default values.

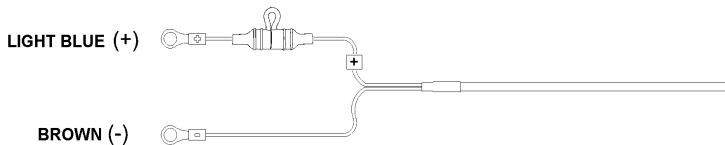
Appendix 2. Monitor Installation

A2.1. Mounting the monitor in the tractor cab

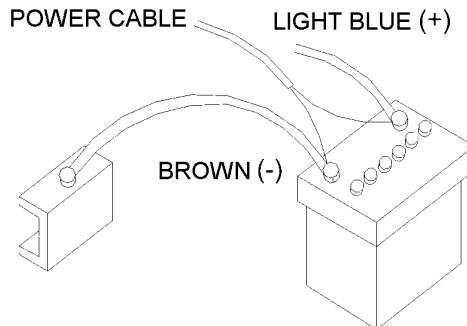
The monitor mounting bracket must be positioned in the cab to permit a good visualization of the screen during operation. If an additional mounting bracket is needed, be sure it does not cause too much vibration or oscillations on the monitor during operation. Also, avoid placing the monitor in a place with excessive sunlight in order for optimal visualization of the screen, avoiding overheating.

A2.2. Power Connection

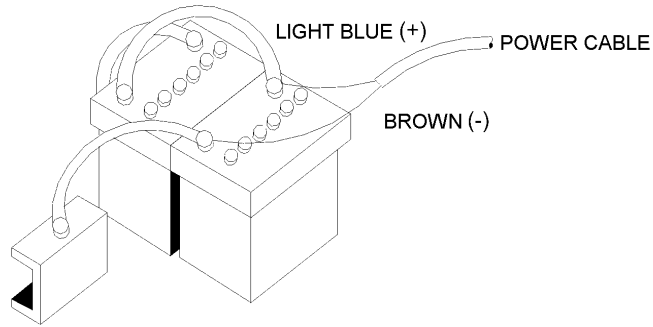
The monitor operates with a power voltage of 12 volts. Its power cable must always be directly connected to the battery terminals. The light blue cable (labeled with a + sign) is connected to the positive terminal, while the brown cable is connected to the negative terminal.



Some tractors have a 24 volts system, i.e., they have two in-series connected batteries (the positive terminal of one battery is connected to the negative terminal of the other). In this type of tractor, the monitor must be directly connected to the terminals of the battery that has its negative terminal connected to the tractor's chassis.



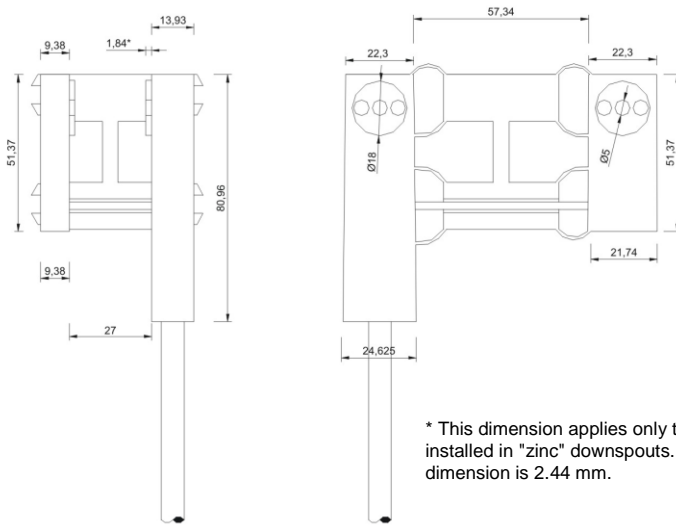
Connection to a 12-voltos battery



24-volt system using two 12-volt batteries

A2.3. Description of the Seed or Fertilizer Sensor

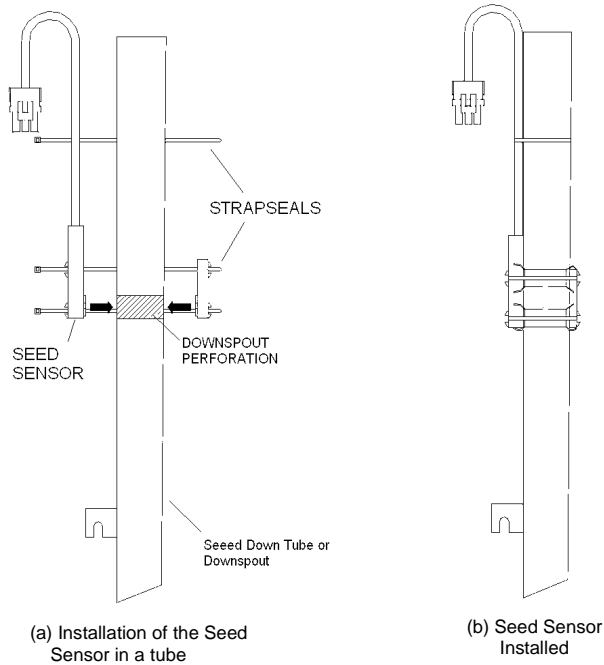
It is an optical device, which is installed in the seed/fertilizer down-tube, and provides the following information: seed shedding, tube obstruction, lack of seeds or fertilizers.



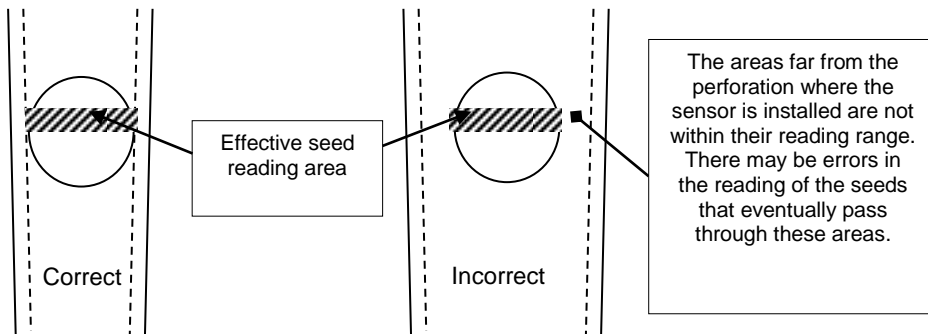
* This dimension applies only to sensors that will be installed in "zinc" downspouts. For plastic ones, the dimension is 2.44 mm.

A2.4. Installation of the seed or fertilizer sensor in a down-tube

The sensor is placed in the down-tube by making two perforations, one in front of the other in the section closer to the ground to prevent it from being touched by other parts of the sower while in motion. Once the sensor is placed in the tube, its plug is connected to the corresponding node connector. Seal the entire installation to prevent damage by contacts with other parts of the sower in motion.

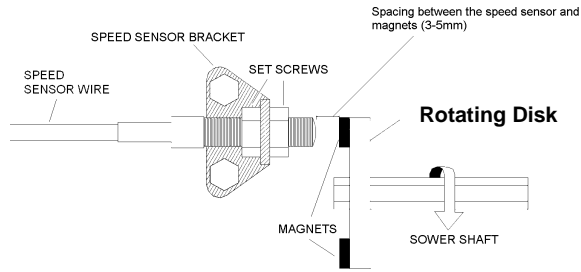


The perforation in the seed down-tubes for three-LED sensors must be performed with a 19-mm diameter “hole saw” drill bit whilst the perforation for 4-LED sensors must be done with a 24-mm diameter “hole saw” drill bit. This perforation must be done in such a way to almost touch the tube’s internal walls, as shown in the figure below. This prevents an area from being out of the sensor’s effective reading range, which may cause an error in density reading.

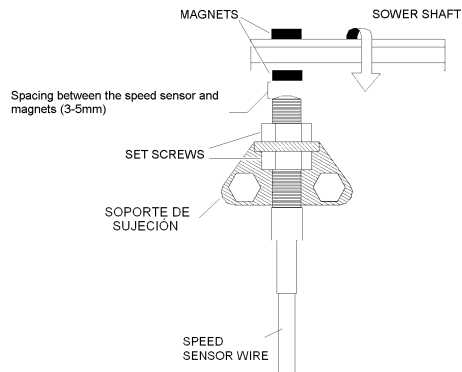


A2.5. Installation of Speed, RPM or Shaft Rotation Sensors

These sensors must be placed near a gear, shaft or tire. Once the installation spot has been determined, two magnets must be symmetrically attached to the shaft or gear (either glued or fastened). The speed sensor has two ends, one with the plug that connects to the wiring harness and the other with a bronze screw to which a bracket must be attached with a separation of 3 to 5 mm from the magnets. The magnets must be placed in a way that when rotating with the shaft, they pass exactly in front of the speed sensor. All wiring must be properly sealed. All wires must be secured and sealed with care.

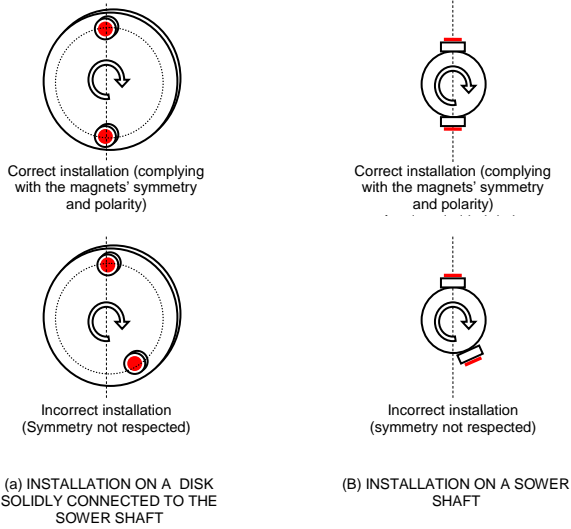


(a) Installation of magnets on a disk with integral rotation to the sower



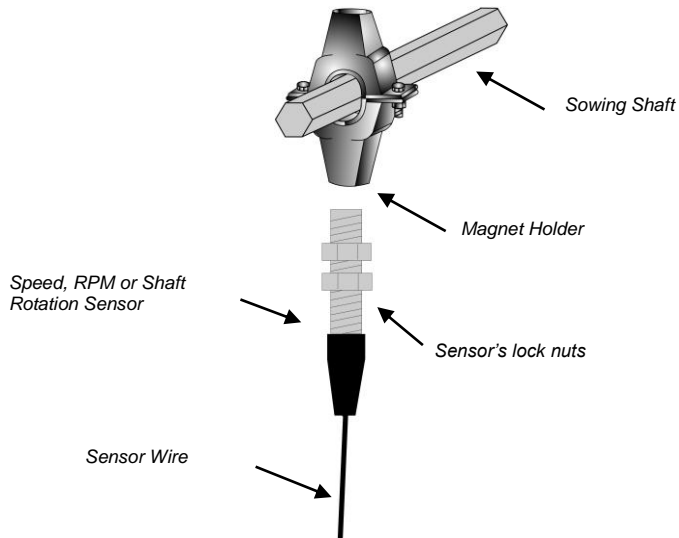
(b) Installation of magnets on the sower shaft

Remember that the magnets must be symmetrically installed on the shaft or disc and with the correct polarity, as shown in the following figures. The side of the magnet that must face the speed sensor is marked with a red label.



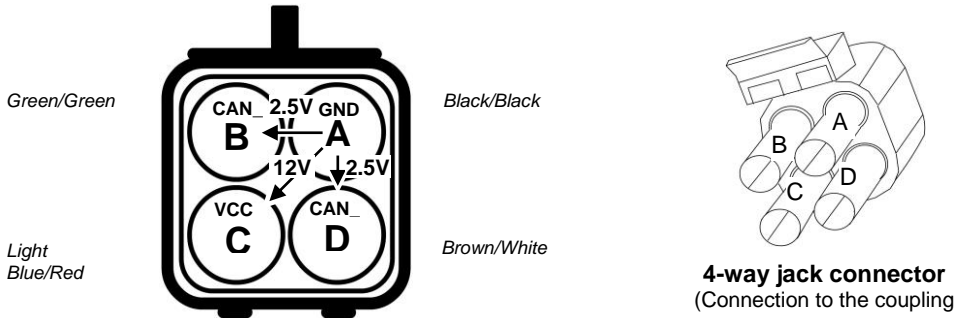
A2.6. Installation of the Magnet Holder

With the magnet holders, magnets can be installed on the sower shaft without having to glue or screw them. The magnet holders are fitted with two screws around the shaft, as shown below:



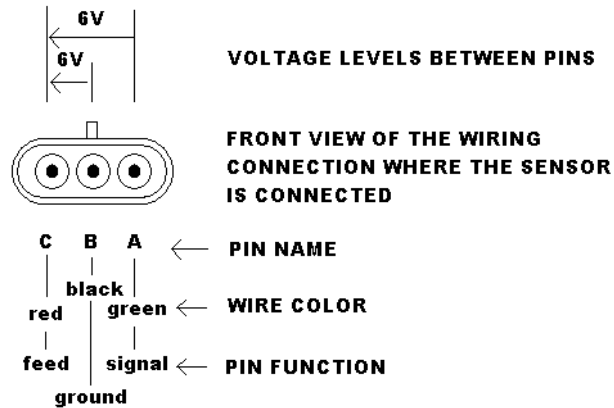
Appendix 3. Electric levels in watertight jacks and wiring.

A3.1. 4-way watertight connector AG3000 (node communication)



C voltage with regard to A = 11 Vdc ~ 14Vdc
 B voltage with regard to A = 2.5 Vdc
 D voltage with regard to A = 2.5 Vdc

A3.2. 3-way watertight connector AG3000 (sensor connection)



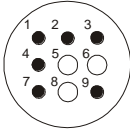
C Voltage with regard to A = 6V
 B Voltage with regard to A = 6V

A3.3. Power Cable and Connections to the first AG3000 Node

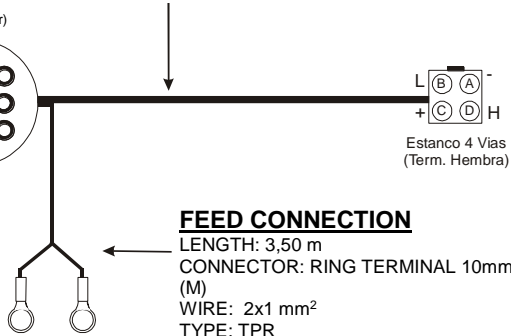
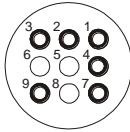
NODE CONNECTION

LENGTH: 4,00 m
 CONNECTOR: CPC9 (H) / CPC 4 (M) Leaktight, with lid
 10mm/ Term. P/ CPC (M)
 WIRE: 4x1 mm²
 TYPE: TPR

CPC Connector 9
 Plug (monitor)

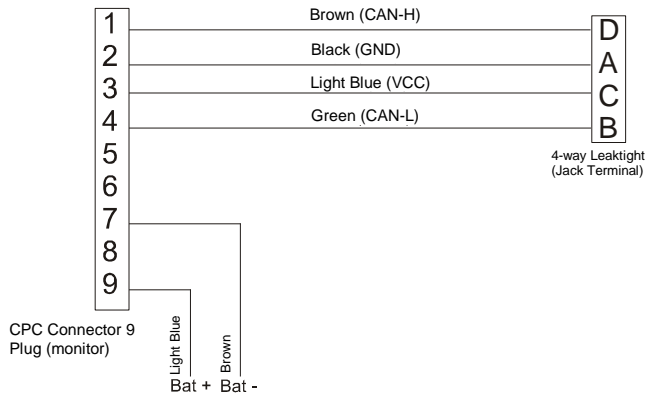


Jack Terminal
 (to the monitor)



FEED CONNECTION

LENGTH: 3,50 m
 CONNECTOR: RING TERMINAL 10mm/ Term. P/ CPC
 (M)
 WIRE: 2x1 mm²
 TYPE: TPR



Appendix 4. Monitor Specifications

Specification	Description
Weight	0.925 kg
Dimensions	188.5 x 160.8 x 76.1 mm
Power Voltage	10 V to 15 V



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