SBGuidance 4.0

SmartGrid module
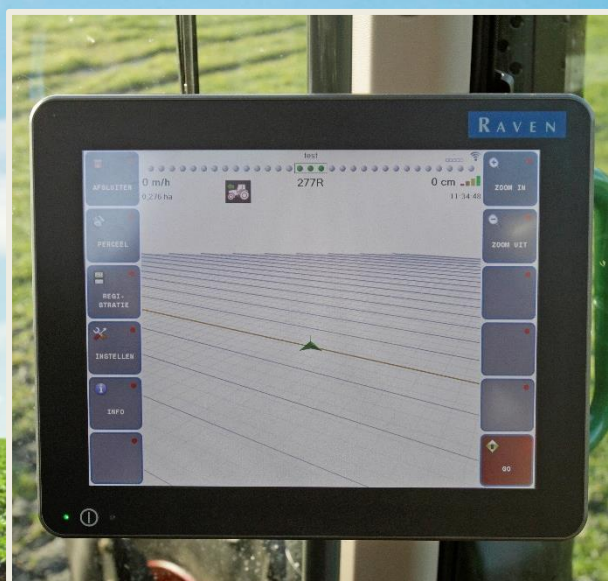
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> ⚠️ **WARNING!**
> This user manual must be available for people who operate, service and repair this product.

Name of device:	
Type designation:	
Serial no. of manifold:	
Serial no. of terminal:	
Serial no. of sensor box:	
Serial no. of dynamIQ:	
Year of manufacture:	
Options:	
Installed software module:	
1	
2	
3	
4	
5	

Your dealer:

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Preface

This operating manual is intended for those persons who are competent to operate the SBGuidance software. The operating manual contains important information and instructions that must be complied with when setting up, operating and servicing the SBGuidance system. This operating manual must therefore be read and understood by competent persons BEFORE the system is set up and must always be kept in the close vicinity of the machine.

The greatest possible care has been taken in the compilation of the manual. However, SBG Precision Farming accepts no liability for any errors or incomplete information contained in this document.

Remarks or queries can be submitted to: *info@sbg.nl*

Neither SBG Precision Farming nor any of its suppliers may be held liable for any injury or damage to property that may arise from the use of the system SBGuidance System.

The installed SBG systems produces less than 70 dBA.

In this manual several terms are used that are intended to draw attention to particular aspects of the SBGuidance System and its operation.

Tip:
Provides recommendations on how certain activities can be performed much easier.

Please note!
Indicates certain problems that the user should take note of.

Caution!
Indicates that the machine can be damaged.

Warning!
Indicates a risk of injury.

Disclaimer

! Warning!
The safety instructions contained in the operating manual of the tractor or the machine must be complied with at all times.

! Warning!
It is strictly forbidden to use the SBGuidance system on public roads.

! Warning!
It is strictly forbidden to leave a machine being operated with or without the SBGuidance steering system activated.

! Warning!
In order to prevent personal injury or fire, defective or blown fuses may only be replaced by fuses of the same type and amperage**.**

! Warning!
The SBGuidance steering system is not capable of identifying and avoiding obstacles. Any obstacles along the driving path must be avoided by the driver.

! Warning!
Only allow authorised persons to operate the system. Authorised persons include: Persons who have read and understood the operating manual and who are both physically and mentally fit to operate the system.

! Warning!
The system contains moving parts! Make sure the immediate environment is clear of people before operating the system.

! Warning!
Always wear personal protective equipment when operating/adjusting/repairing the system outside of the tractor cabin.

! Warning!
In case of system failure or breakdown switch of the tractor and disconnect the electrical power source to avoid further damage. Contact your dealer for further instructions on how to repair your system.

! Caution!
Always start the machine first, before activating the SBGuidance steering system in order to prevent the occurrence of a peak voltage.

! Caution!
Only touch the touch-screen with your finger or with a special touch-screen stylus. Sharp objects may cause irreparable damage to the touch-screen.

! Caution!
Only clean the screen using a damp cloth. Never use caustic or other aggressive substances.

i Please note!
If the terminal is not used for a long period, better remove the terminal from the tractor and store in a heated environment. This will extend the life span of the electronic components.

i Please note!
To prevent theft, it is better to not let the

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terminal and GPS-antenna unattended in
the tractor on the field.

Table of contents

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1. Introduction

The SmartGrid module is intended to generate grid points according to a certain pattern. These grid points are linked to an AB-based operation. Three different patterns are possible:

- Square/rectangle connetion
- Triangular connection
- Plot seeding

Please note!:

This manual only deals with the operation of the SmartGrid software module. Additonal operations may be required to allow the grid module to work. Therefore, please contact your installer for questions about the installed options.

2. Main menu

If the grid module is activated, an extra button with the name **SMART GRID** is shown in the main menu.

By pressing this button all the settings can be done for the grid module.

Tip:

For detailed information about the main menu, refer to the general SBGuidance user manual.
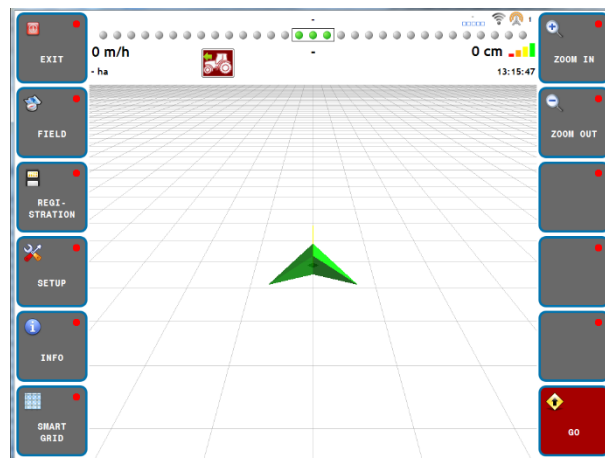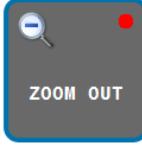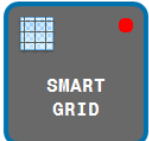
Figure 1 Main menu

An overview of the available buttons (soft keys) in the main menu is shown below.

EXIT	Shut down software. Hold the button for ± 3 seconds. Software closes and the Loader will be visible gain.	Zoom in	ZOOM IN
FIELD	Go to field menu	Zoom out	ZOOM OUT
REGI-STRATION	Go to registration menu		
SETUP	Go to settings		
INFO	Go to info menu		
SMART GRID	Go to smart grid menu	Steering activate/deactivate	GO

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3. SmartGrid

To use the grid module, certain conditions must be met and a number of settings must be checked/changed. See below for the actions that should be done before starting.

3.1. Creating/loading Field + Operation

To use the grid module a field has to be created/loaded first with a corresponding operation.

For more info about creating fields and operations see the general SBGuidance user manual.

ℹ️ **Please note!:**
The grid modul can only generate grid points on a straight operation and on a A+, AB or Contour field. Curve or contour operations are not supported. In addition, the operation may not contain deviating spray paths.
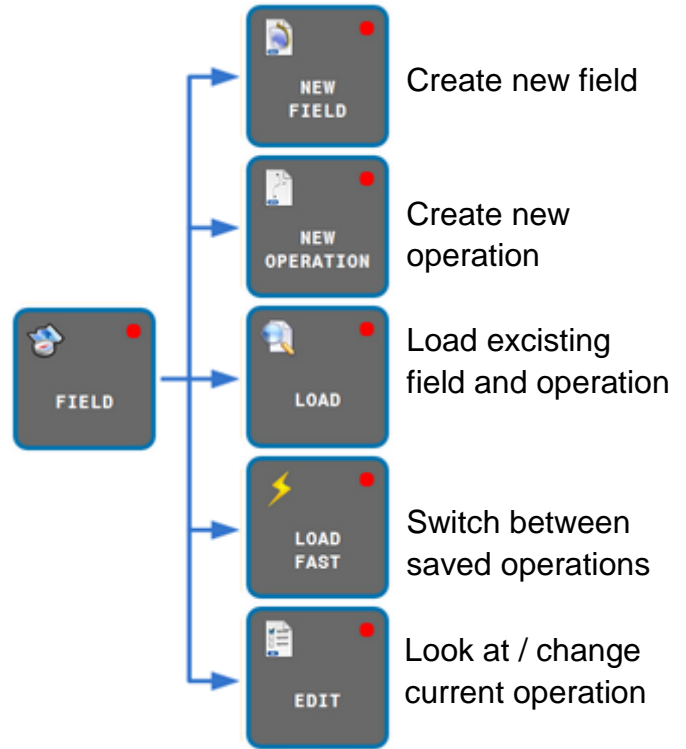
3.2. SmartGrid menu

Press on the **SMART GRID** –button to continue. The grid module menu will open. (**Figure 3**).

3.2.1. Settings

Activate grid

Click on **STATUS** to activate the grid module.

- Status OFF = grid not active
- Status ON = grid active

When the grid module is active, grid points appear in form of marks on the screen, and at the right top the distance appears to the nearest grid point. (**Figure 4**).

Create new field

Create new operation

Load exisiting field and operation

Switch between saved operations

Look at / change current operation

Figure 2 Field menu
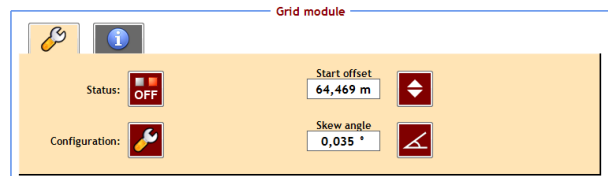
Figure 3 Grid module menu
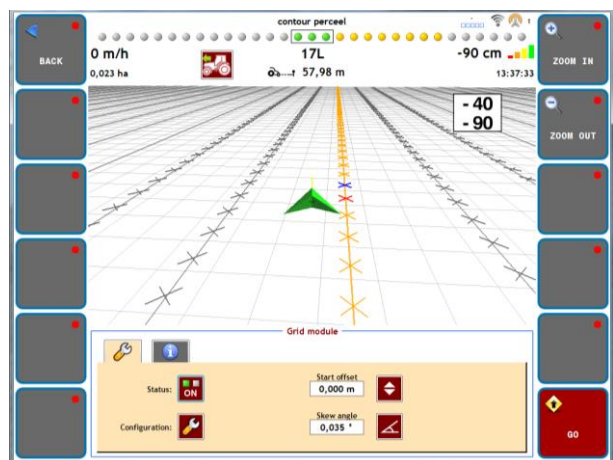
Figure 4 Grid module ON

Grid set up

Click on **CONFIGURATION** to set the desired grid configuration. A wizard appears to make the necessary settings.

On the first page you can choose between three different modes:

- Rectangle (**Figure 5**)
- Triangle (**Figure 6**)
- Plot seeding (**Figure 7**)

Depending on the chosen mode the next parameters are visible:

S: Distance between the rows (=linked to the working width of the operation)

M: Margin in driving direction to give a grid signal instead of giving a failure.

D: Distance between plants in the row.

D1: Distance 1 at plot seeding

D2: Distance 2 at plot seeding

D3: Distance 3 at plot seeding

PATTERN: With the set distances D1, D2 and D3 a repeatable pattern can be set. In the desired order, press **D1**, **D2** and **D3** buttons to create a pattern.

Press the [eraser]-button to erase the pattern.

[i] **PLEASE NOTE!:**
Small margins at high driving speeds can cause more failures. Not every grid point will be detected and the signal will not show up.

The signal specific settings will be done on the second page. (**Figure 8**):
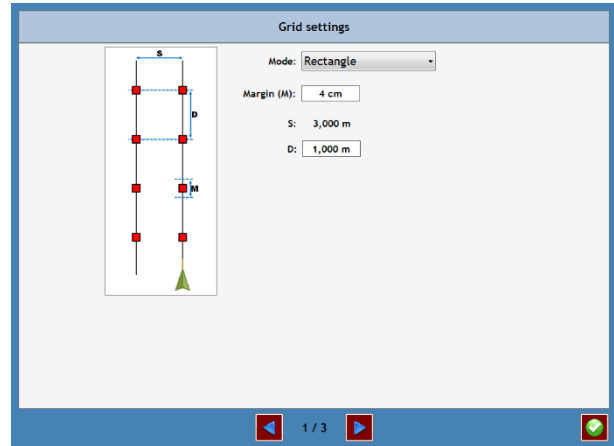
Figure 5 Rectangle mode
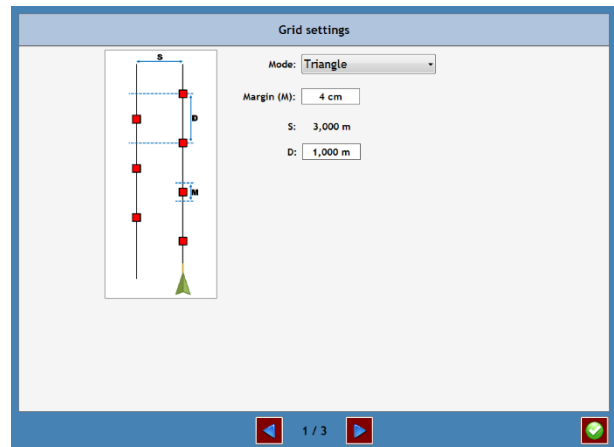
Figure 6 Triangle mode
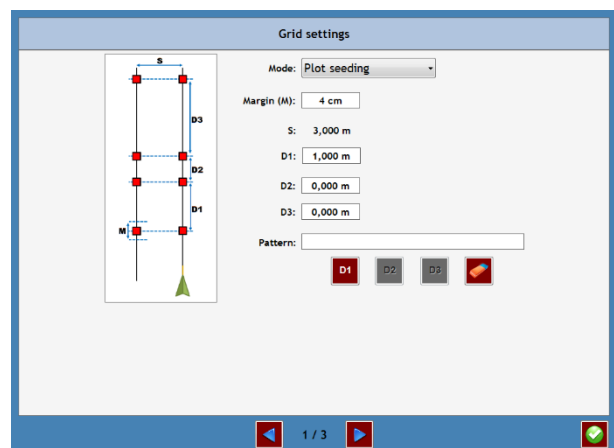
Figure 7 Plot seeding mode

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REFERENCE POINT: The reference point that will be used for detecting grid points has to be chosen. Possibilities: Antenna (Main/tractor), Antenna (AUX/implement). Implement rear, implement front. At implement rear and implement front the reference point on the implement will be used. For more information about the settings on a implement see the general SBGuidance user manual.

Figure 8 Signal settings

ANTENNA OFFSET: If the antenna (MAIN or AUX) is used as reference point there is a possiblity to set up an offset. The offset moves the grid point in front of or behind the antenna relative to the driving direction

PLEASE NOTE!:
Filling in an positive value will move the grid point to the front, a negative value will move the grid point to the rear.

SIGNAL 1: Choose the signal type that should be given at a grid point. Possibilities: Beep, Light, Drive, Side-Shift L/R.

SIGNAL 2: In addition to the primary signal (Signal 1) an extra signal can be added optionally. For example a Beep signal in combination with a steering signal to the machine.

PLEASE NOTE!:
Choosing the desired signal depends on the installation on the used machine/tractor.

PULSE LENGTH:

    Length of the signal in milliseconds.

DELAY COMPENSATION:

    At the Drive signal, a distance can be entered to compensate for rolling out of the machine.

On the third page the conditions and extra options of the grid module are shown (**Figure 9**).

AUTOSTEER MUST BE ACTIVE:

    Grid signal is only given if the vehicle's auto control is ON.

FORWARD DRIVING REQUIRED:

    Grid signal is only given if the vehicle is driving forward.

ONLY INSIDE FIELD BOUNDARY:

    Grid signal is only given if the vehicle is inside the field boundary

LINK TO HEADLAND DETECTION: Additional grid signal is generated on each headland line (if excisting).

2ND HEADLAND SIGNAL OFFSET:

    Second extra grid signal is generated on an adjustable distance from the headland line.

LINK TO REGISTRATION:

    When crop registration is used, position registration can be linked to the grid module. As a result, each grid point will be a registration point. In the crop registration the coordinates of each grid point will only be recorded.

LOG DIAGNOSTIC:

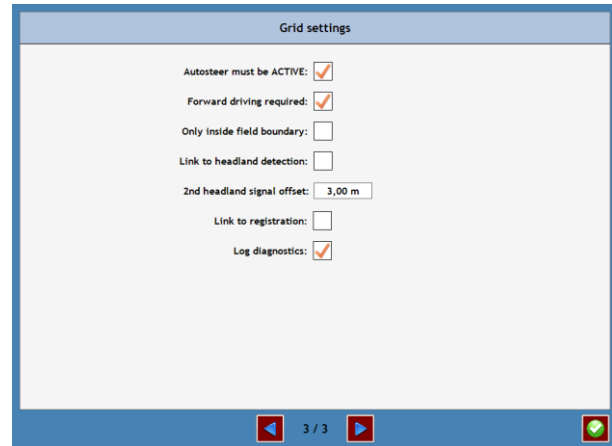   Diagnostic data is stored to determinate any problems.

Figure 9 Grid conditions

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Press confirm to save the settings.

Start offset

This offset determines the staring postiion of the grid points in the driving direction. The displayed value is the distance in the driving direction to the A-point of hte AB Line. The start offset is manually adjustable by pressing the number value or automatically by placing the start offset under the current reference point of the tractor/machine.

Press [icon] to set the offset automatically. Now the first grid point is defined, this is marked with the two red dotted lines which are right angle to work line 1. On work line 1 are also two red dotted lines which mark the axes of the grid (**Figure 10**).

Skew angle

This offset determines the angle between the axes of the grid (which are marked with the double dotted lines). An angle offset 0 means that the axes are right angles to each other. The angle can be set manually by pressing the number value or can be placed parallel to the nearby field sides or

headland lines (if excisting) by pressing [icon] .
Press repeatedly to switch between multiple field sides or headland lines. In **Figure 10**, the first grid point is placed on the headland line by using the angle offset button.

PLEASE NOTE!:
If the automatic **SKEW OFFSET** is used, the **START OFFSET** will also be moved to the field side or headland where the grid is placed parallel to.
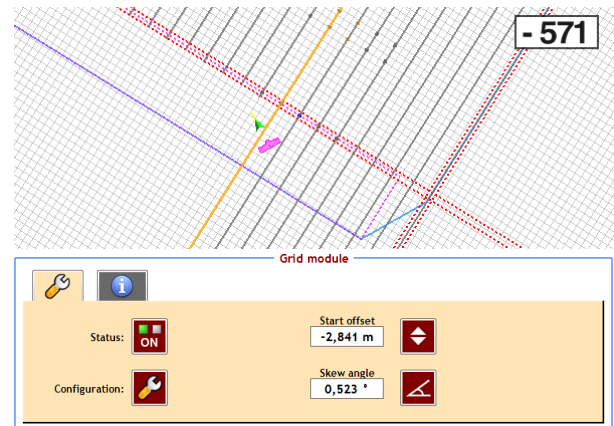

Figure 10 Start offset en Skew angle

3.2.2. Grid information

Press on the second tab (**i**-icon) to look at the diagnosis information (**Figuur 11**).

The available information about grid and gridpoints are shown in this menu.
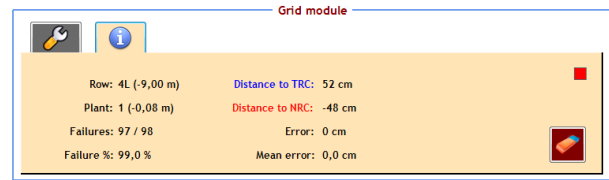
Figuur 11 Grid diagnostic information

ROW: The row number (row 1 = working line 1 = line between the two red dotted lines). The value between the brackets next to the rownumber is the distance to working line 1.

PLANT:
Plant number in the row (plant 1 is the plant between the red dotted lines right angle on the driving direction) the value between the brackets next to the plant number is the distance from the closest plantnumber to the A-point of the AB line.

FAILURES:
Number of failures since the start of the count.

FAILURES %:
Percentage missed grid points relative to the total number of grid points.

DISTANCE TO TRC:
Distance to the next grid point (TRC= Target Raster Coordinate). Blue mark on the screen

DISTANCE TO NRC:
Distance to the closest grid point (NRC= Nearest Raster Coordinate) Red mark on the screen.

ERROR: Error relative to the last grid point.

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MEAN ERROR:

Average of all errors made on the grid points.

With the -button the **FAILURES**, **FAILURES %**, **ERROR** en **MEAN ERROR** values can be reset

The red square at the top right of the diagnostic menu indicates when a grid point is detected. The square turns green once a grid point is detected. At this point, a grid signal is given.

4. RCU module

4.1. RCU Grid

For controlling machines based on a grid pattern, a RCU Grid module is available (Figure 12). This can be connected to the SBG CANbus cabling. On the 7-pin Amphenol connector different output signals are available, shown in Table 1.

Figure 12 RCU Grid

Table 1 Pinout 7-polige Amphenol connector RCU Grid

Pin	Output signal
1	High/low primary
2	High/low secundary
3	Pulse primary
4	Pulse secundary
5	Headland status
6	N.C.
7	GND

The high/low output signal becomes high when a grid point is detected and low when the next grid point is detected. To invert the high/low signal press **INVERT HIGH/LOW** (Figure 12).The lamp in the button lights up when the signal output is high. At the pulse output signal, a pulse is generated with the lenght as set in the configuration wizard. By pressing the **PULSE RTK-FIXED** button a pulse can be generated manually (Figure 12). The lamp in the button lights up as long as the GPS receiver is in RTK-fixed mode. The lamp stops lighting for 200 ms when a pulse is generating. The lamb stays blinking continuously as long as the GPS receiver is not in RTK-fixed mode.

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! The output of the RCU Grid module will not be updated when the GPS receiver is not in RTK-fixed mode. Wait till the GPS receiver is in RTK-fixed mode.

If a virtual implement is connected and the headland signal is activated, no output signal is generated by the RCU Grid module when the reference point is on the headland. Only the headland status will be high. The headland signal can be inverted by pressing the **INVERT HEADLAND** button (Figure 12). The lamb in the button lights up when the headland status is high.

i The RCU Grid module will not generate a output signal when the reference point is on the headland.

4.2. RCU Start – Stop

For starting and stopping a vehicle on detected grid points a RCU Start-Stop module (Figure 13) is available. This can be connected to the SBG CANbus cabling. On the 4-pin Amphenol connector are different output signals available, shown in Table 2.

Figure 13 RCU Start - Stop

Table 2 Pinout 4-pin Amphenol connector RCU Start – Stop

Pin	Output signal
1	Beep when RTK-fixed signal is lost
2	Start 12V
3	Stop 12V
4	GND

In **AUTO** mode the vehicle will be stopped on every grid point by making stopsignal output high and startsignal low. By pressing button 1 (start) the driving can be resumed. The stop signal output becomes low and the start signal is high at that moment. In **MAN** (manual) mode the module only responds by pressing the buttons **1** (start) or **0** (stop) manually.

> ℹ️ The white lamb between **1** (start) and **0** (stop) lights up when startsignal output is high.

> ℹ️ In **AUTO** mode startsignal output can only be high when automatic steering is activated!

If a virtual implement is connected and the headland signal is activated, no output signal is generated by the RCU Start Stop module when the reference point is on the headland.

The RCU Start Stop module can be used without (activated) grid module to stop a vehicle on the

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headland line. In **AUTO** mode the stopsignal output become high and the startsignal output become low when the headland line is detected. It is required to activate the headland signal of the virtual implement. In **MAN** (manual) mode the module only responds by pressing the buttons **1** (start) or **0** (stop) manually.

When turning on the headland (without activated automatic steering) it is necessary to switch the rotary knob to **MAN** (manual) mode. Then the driving can be resumed by pressing button **1** (start).

! In **AUTO** mode the vehicle will be stopped when the GPS receiver is not in RTK-fixed mode. The stopsignal output becomes high and the startsignal output becomes low. The beeper output becomes high for 1 second. Wait till the GPS receiver is back in RTK-fixed mode.

i The white lamb between **1** (start) and **0** (stop) lights blinks when the GPS receiver is not in RTK-fixed mode.

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