

# GeoPlough



## User Guide

### Sw2.50

## Foreword.

Read this manual carefully before operating the plough control.  
Assure yourself that the plough control is installed well by experienced qualified personnel.

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## Warnings.

- Misuse or maladjustment of the plough and / or plough control can cause excessive wear of the plough. Ensure adequate lubrication of the pivot points of the plough.
- Never transport a plough on public roads with the plough control enabled.
- Remain outside the plough it's adjustment range when the tractor engine is.
- Move adjust the plough manually or automatically when the tractor is standing still and the plough is in or on the ground
- Keep the control panel always free from water and moisture. And not spray directly on connectors and components of the plough control during cleaning of the plough.

### Operation

With ploughcontrol you can correct the working width of the plow for the deviation of the position of the furrow relative to the AB line of your Autopilot system. This prevents the deviation in working width caused by the variation in soil to increase further during the next passes.

In your Autopilot system, enter a swath width equal to the desired working width of the plow. To a limited deviation at the beginning, you can shift the AB line to the start position of the tractor. You can also let the autopilot steer the tractor at the first pass to obtain a straight first furrow. Depending on the tractor, you can connect the automatic mode switching with the tractor lift control.

### Control monitor.



1. ON / OFF switch.

2. Joystick for manual operation and (dis)engaging automatic mode.

Operation for plough control:

wider  
smaller

auto / manual mode

Operation for side shift:

left - right

auto / manual mode

Used the joystick to engage the automatic control (auto mode) or the manual control (manual mode). If the tractor changes swath line while working in automatic mode the system will go in stand-by. Stand-by returns to automatic as soon as the tractor goes back to the original swath line. The auto mode can also be control with button C or through the lift command.

### A. (Auto) Centering ON/OFF

The (auto) Center function is primarily used for the Side Shift operation. When pressing A in the **manual mode** the implement will center (when operating a plough, it is set to the desired working width).

When pressing A in the **auto mode** the Autocenter-mode will become active. When the working mode changes from **auto** to **manual** the implement will be automatically centered. Centering can be stopped by pressing A again.

### B. Operation direction

It is important for the system to know what the operation direction of the plough is. It determines whether the plough should go wider or narrower. The operation direction is shown by the icon and changed with button B. You can automate this by using a reversing sensor. The possible operation directions depend on the operation type.

Operation Type	Operation Direction	icons
Reversible plough	Current swath line plough to the left or right	
conventional plough	Plough always to the left or right	
Side shift	No choice	

### C. Switching AUTO mode or Swap Valve

With button C you can control the auto mode.

When the Autopilot manifold can control the plough or side shift through a swap valve, then button C can be configured to engaged the swap valve.

mode manual	
mode auto	
mode stand by	

### D. AUXILAIRY ON/OFF..

Used to start or stop the auto mode switching with the tractor lift when it is connected to the lift command.

#### + . plus button

Press to scroll up or increase values.

#### ↩ . Enter button

Press to go the the next or previous menu or to enter changed values.

#### - . min button

Press to scroll down or decrease values.



### Work screen

offline dist	0	line	fix	---
working width	124	0		
swath width	160	shift		0
		roll		0
		config.	◀	1
center OFF		valve auto pilot	mode manual	

The work screen has 4 user levels: **basic**, **advanced**, **expert** and **diagnose**.

In **basic** you see :

offline distance	line number	fixed line number
swath width	configuration	◀

In **advanced** you see :

offline distance	line number	fixed line number
actual working width		
swath width	configuration	◀

In **expert** you see :

offline distance	line number	fixed line number
actual working width	shift	
swath width	roll	
	configuration	◀

In **diagnose** you see :

offline distance (heading)	line number	fixed line number
actual working width (desired working width)	shift	
swath width	roll	
	configuration	◀

The offline distance shows negative readings when the line is at the left side of the tractor.

The cursor ◀ can scroll up and down between **shift**, **roll** and **config**. With the *plus* and *minus* buttons. With the *enter* button you get into the *configuration menu* or you can change the **roll** or **shift**. Before changing the **roll** of **shift** the cursor will flip horizontally ▶

With *Shift* you can move the line (offline distance increase or decrease) to compensate the plough working wider in heavier soil conditions. This way the tractor offline distance remains around zero.

With *Roll* you can compensated for roll errors without having to change the tractor calibration so the plough works evenly wide back and forth.



## Configuration screens.

Scroll the cursor to **config**. and press *enter* to go into the configuration menu. There you have the choice of 5 submenus. For the user, the following settings are important.

- Implement (Implement submenu). You can store 4 different Implement configurations.
- Furrow Width (calibration submenu). Sets the desired working width.
- Adjust Width (calibration submenu). Determines how much the furrow width may be adjusted maximally in the automatic mode.
- User level (screen submenu). Specifies how much information you want to see in the work screen.

The full list can at the end of the manual. Most of them are for your dealer to set or calibrate your plough or sideshift.

## Getting started.

Set the first plough to the desired working width, depth, first furrow width, and level horizontally and vertically without using the plow control. Varying the working width can affect your plough adjustments.

Set the correct swath width of the implement in the Auto-Pilot screen. And enter the desired **furrow width** in the **calibration** submenu. Position the tractor for the first pass and move the AB line to "here" when desired. So you can start with a minimum offline distance. While doing this it is important that the tractor stands straight in the furrow.

Check on the basis of the plow icon or the direction of operation is good. If not press button B once to turn it around. Switch plow control in **AUTO** mode with the C button or joystick. Or press button D to activate the **mode AUX**. The plough will go to the required width. If all is well you can start ploughing.

On the other headland you switch (or automatically) back into manual mode during or after lifting the plough, but before you turn the tractor and reverse the plough.

When you do not switch off the plough control, it will keep adjusting the working width to correct for the offline distance of the tractor and puts the automatic control in standby for the next pass.

## Indication for roll offset correction

By uneven in the tire pressure, ploughing depth and weight distribution of the (suspended) cab an unintended roll offset can occur, resulting in a difference in working width while going back and forth.

With **roll** you can compensate for this roll offset deviation without changing the tractor calibration so the plough works at the same width back and forth.

Determine the difference between the wide and narrow pass and divide it by 4. Set the **roll** to this new found value. On the narrow swaths you make a positive roll adjustment and on the wider swaths a negative roll adjustment.

For example: Going forth you plough 1m60 and going back 1m80. The difference is 20cm. Divide by 4 gives a roll correction of 5 cm. While ploughing at 1m60 set the **roll** at +5. (Or -5 ploughing at 1m80). You need to set the **roll** only once. The roll correction changes automatically at headland turns. After entering a roll correction, it takes 4 passes before the working width is stabilized.

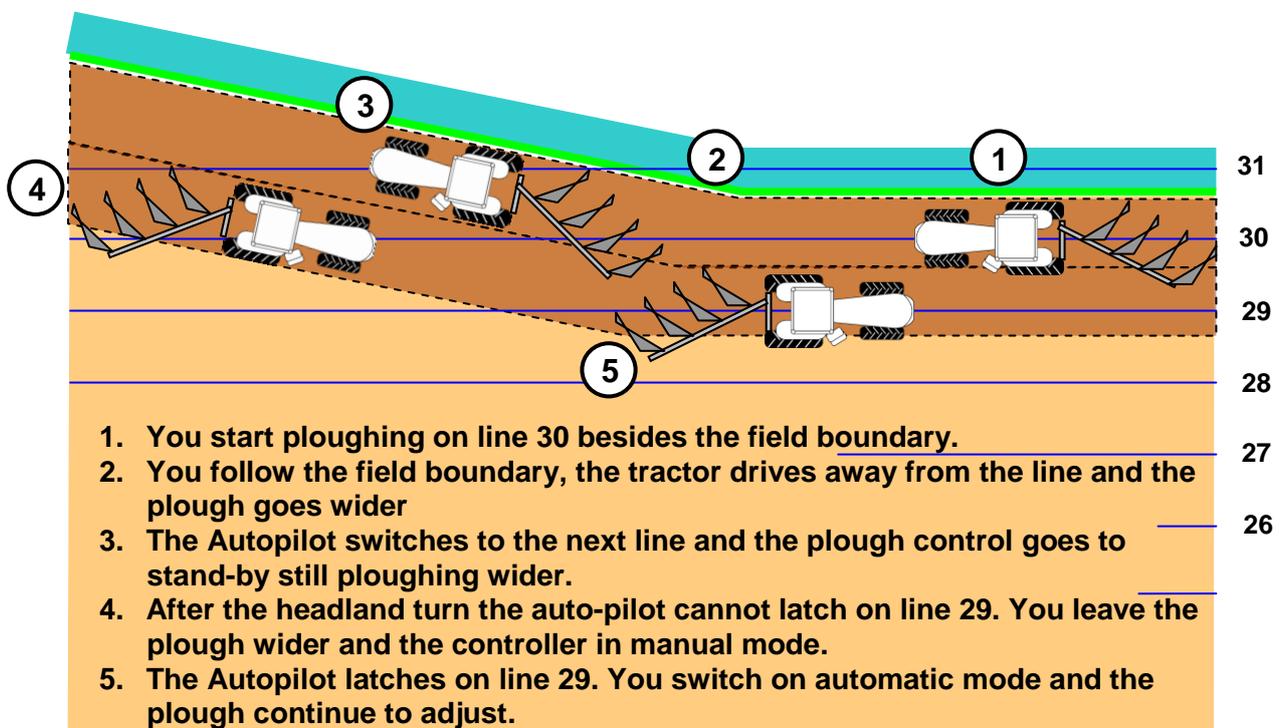
### Indication for shift correction

With **Shift** you can shift the line (reduce or enlarge offline distance) to compensate for the widening of the plough's working width in heavy soil. So the tractor can stay close to the line.

For example: You have the plough set to 1m60. Due to the heavier soil the plough runs wider and ploughs in reality 1m65. The next pass the tractor will drive 5cm besides the AB line and set the plough to 1m55. Due to the heavier soil the plough will still run wider and ploughs in reality 1m60. The control loop is now in balance and you will see an offline distance of 5cm and a working width of 1m55. on all passes.

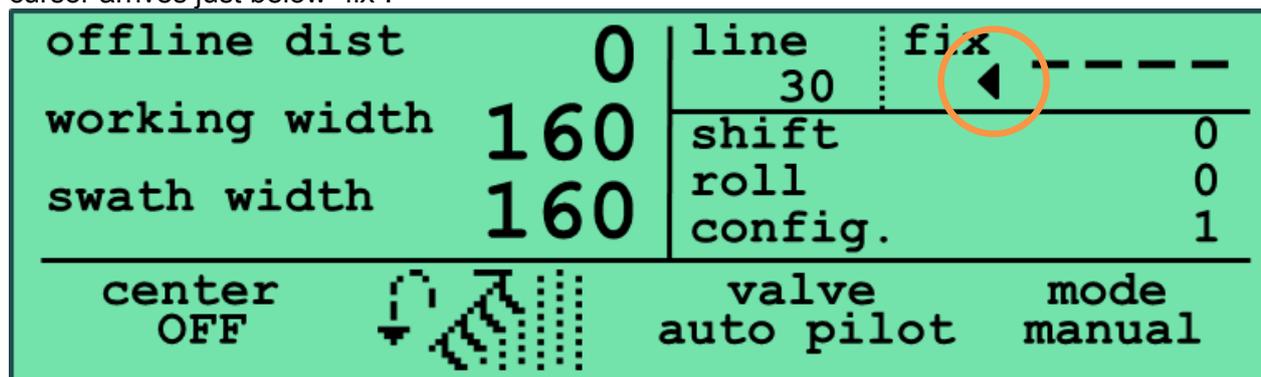
To bring the offline distance back to 0, you can add an extra 5 cm offline distance with **shift**. The plough will do one pass at 1m50. Then the system will come to a new balance and you will see an offline distance of 0cm and a working width of 1m55. on all passes.

### Ploughing wedges. (do not use AUX mode)



### Ploughing wedges with the AutoGeer option.

You put the tractor on line 30 in de direction of the line. Then you press the "+" button until the cursor arrives just below "fix".



Now press "ENTER" and the AutoGeer indicator appears under **fix** before the cursor. The mode indicator jumps from "manual" to "ready" en besides fix appears the line number in the corner.

offline dist	0	line	fix	30
working width	160	30	▲	---
swath width	160	shift		0
		roll		0
		config.		1
center OFF		valve auto pilot	mode ready	

The AutoGeer indicator must point upwards if you intend to plough with increasing line numbers. In our example we are dealing with falling line numbers (30, 29, 28, etc). Press the "ENTER" button again to make the Auto indicator Geer point downwards. (Press the "ENTER" button another time, to make the indicator disappear and set the Auto Geer to off) Now you may lower the plough in the ground and turn the controller into automatic mode.

offline dist	0	line	fix	30
working width	160	30	▼	
swath width	160	shift		0
		roll		0
		config.		1
center OFF		valve auto pilot	mode auto	

Along the field the line will jump from 30 to 31 and switch the controller in "stand by" mode.

offline dist	0	line	fix	30
working width	184	36	▼	
swath width	160	shift		0
		roll		0
		config.		1
center OFF		valve auto pilot	mode stand by	

On the other headland you might already be on line 36. You raise the plough and switch off automatic control.

You turn the tractor, reverse the plough and drive in front of the new line 35. The line fix number will jump to 29 and the manual mode to ready.

offline dist	0	line	fix	29
working width	184	35	▼◀	---
swath width	160	shift		0
		roll		0
		config.	◀	1
center OFF		valve auto pilot		mode ready

When you lower the plough into the ground and switch on automatic control it will jump to stand by. When the tractor arrives at line 29, the automatic control will jump to mode auto.

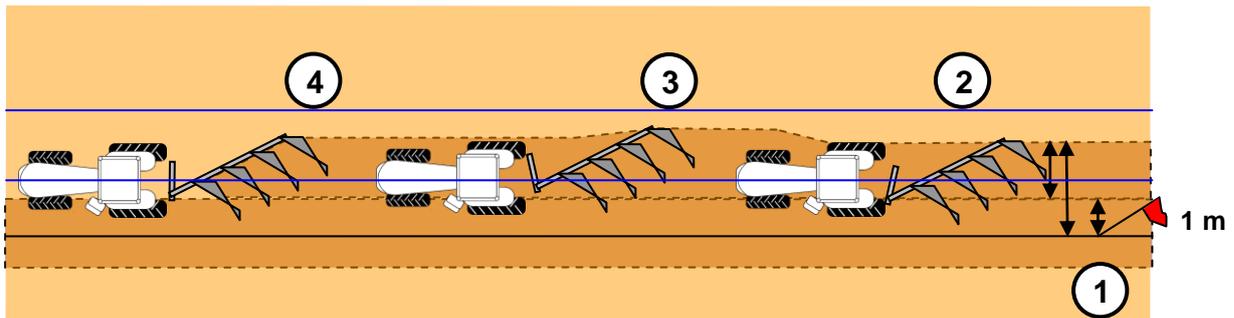
offline dist	0	line	fix	29
working width	184	29	▼◀	
swath width	160	shift		0
		roll		0
		config.		1
center OFF		valve auto pilot		mode auto

While maneuvering the tractor during work breaks or other interruptions, it is recommended not to switch in and out of the **auto** Mode. To prevent the system from changing the line fix unintended. When using a lift sensor it is better to go out of the AUX mode in these cases.

## Calibration of a plough controller with the plough in the ground.

When experiencing a lot of variation in the plough width between forward and return runs, it could be caused by a large difference between the theoretical calculated plough width and the actual width plowed.

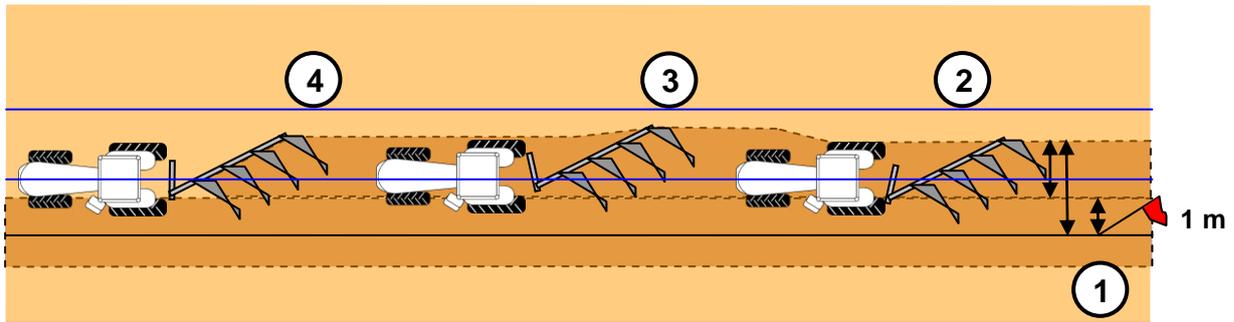
The solution is to calibrate the plow in the ground (at work).



1. Be sure to work in representative and consistent area of the field. Set a flag or pole exactly at 1m of the cutting edge of the furrow. Plough past the flag. Measure the distance from the cutting edge of the new furrow to the flag. Subtract 1m of this value and you have the plow width.
2. Set the plough at minimum width and plough a couple of meters. Determine the plough width. (Leave Plough control in Manual Mode) Divide the plow width by the number of shares and you have the minimum share/furrow width. Calibrate the *minimum furrow width* and the *minimum sensor position*.
3. Set the plough at maximum width and plough a couple of meters. Determine the plough width. (Leave Plough control in Manual Mode) Divide the plow width by the number of shares and you have the maximum share/furrow width. Calibrate the *maximum furrow width* and the *maximum sensor position*.
4. Sensor offset determination. Set de *sensor offset* calibration op "0". Set the *desired furrow width* in the middle of the maximum and minimum. Shift de Autopilot AB-line to "Here" so the offline distance becomes "0". As soon as the plough control has adjusted the plough, you switch it to Manual Mode Plough a couple of meters and determine the plough width. Divide the plow width by the number of shares and you have the actual share/furrow width. At the *sensor offset* calibration you enter the number of millimeters which the actual furrow width is bigger than the desired furrow width. Verify the outcome by comparing the displayed plough width in the work screen with the measured value.

For varying soil types you can store different configurations.  
For example **config 1** for sandy soil and **config 2** for heavy clay.

Calibration of a plough control on draught point adjustment.



1. To determine the plough width set a flag/pole 1m away from the furrow. Plough past the flag/pole and measure the distance from the flag/pole to the new furrow. Subtract 1m and you have the plough width.
2. Set the draught adjustment to the minimum (acceptable), plough a few meters and determine the plough width. Subtract the furrow width of the second to the last furrow and you have the minimum furrow width (of the first furrow). Set the Calibration *number of shares* on 1, and calibrate the *minimum plough width* and the *minimum sensor position*.
3. Set the draught adjustment to the maximum (acceptable) , plough a few meters and determine the plough width. Subtract the furrow width of the second to the last furrow and you have the maximum furrow width (of the first furrow).. Calibrate the *maximum plough width* and the *maximum sensor position*.
4. Sensor offset calibration (optional = difficult to determine). Set the *sensor offset* calibration on "0". Set the *Desired plough width* in the middle of the range. Skip the Autopilot swath line "to here" so the offline distance is "0" and switch of the automatic control as soon as the plough is adjusted. Plough a few meters and determine the plough width. Subtract the furrow width of the second to the last furrow and you have the actual furrow width. Enter the millimeters that the actual furrow width is bigger than the desired furrow width in the *sensor offset* calibration.

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mainmenu	submenu	description
return	return	Return to work screen
implement	Implement	Plough 1, ... 2, ... 3 or ... 4
	type	reversable, conventional side shift
	reverse sensor	Not installed State high State low
	Swap valve	No Yes
calibration	Furrow width	Desired plough width in millimeters (per furrow). Dependent the working width. Adjustable between 200 and 600mm.
	Adjust width (range)	Maximum allowed adjusting width per furrow in millimeters in automatic mode. Adjustable from 1 to 400. For example, a value of 100 mm will allow the plough to go up to 100 mm narrower or wider per furrow, if necessary. For larger off-line distances you will need more passes to straighten the furrow but the ploughed soil will be more even.
	Number of furrows	Depending on the plough.
	Minimum width	Minimum furrow width in millimeters. Set the plough at its minimum width and measure the working width of the individual ploughshares. When measuring large variation in the width between the shares, take the average. Adjustable between 200 and 600.
	Minimum sensor	Set the plough at the minimum width entered at the previous calibration step minimum width. In the display you can see the voltage of the potentiometer.
	Maximum sensor	Set the plough at the maximum width to be entered at the next calibration step maximum width. In the display you can see the voltage of the potentiometer.
	Maximum width	Maximum furrow width in millimetres. Set the plough at its maximum width and measure the working width of the individual ploughshares. When measuring large variation in the width between the shares, take the average. Adjustable between 200 and 600.

mainmenu	submenu	description
calibration	PWM wider	Adjustable between 0 and 100% Choose the value as low as possible but the plough must still be able to widen in a normal way. It should take around 10-12 seconds going from minimum to maximum width.
	PWM smaller	Adjustable between 0 and 100% Choose the value as low as possible but the plough must still be able to narrower in a normal way. It should take around 10-12 seconds going from maximum to minimum width.
	Stop dead zone	Number of millimetres before the desired width is the achieved at which the controller stops adjusting. By default 10. Adjustable between 10 and 100. Only raise the value with a slow responding hydraulic valve or one that gives too much oil and therefore over compensates. The stop Dead Zone must always be smaller than the Start Dead zone
	Start dead zone	Number of millimetres that the actual plough width may differ from the desired width before the controller starts adjusting. By default 20 for a 4 furrow plough. Adjustable between 10 and 100. With larger ploughs the value probably needs to be raised to achieve stable control. The stop Dead Zone must always be larger than the Start Dead zone
	1ste furrow	Many plough are not 100% variable. The 1st share is too close to pivot point of the plough frame. Measure the distance between the pivot points of the 1 <sup>ste</sup> and 2 <sup>de</sup> share and the distance between the pivot points of the 1 <sup>ste</sup> share and the pivot point of the plough frame. Divide the distance between the pivot point of the 1 <sup>ste</sup> share and the pivot point of the plough frame by the distance between the pivot points of the 1 <sup>ste</sup> and 2 <sup>de</sup> share. Multiple the result by 100. Now you have the Relative range of the 1st share in a percentage. For full vario-ploughs always leave the value at 100.
	Sensor offset	Set the plough width in the middle of the range. The calculated furruwidth is shown by the display. Measure the real furrow width and enter the difference width the calculated value

mainmenu	submenu	description
screen	User level	See the workscreen paragraph
	language	Nederlands, English, etc.
	liftsensor	Pulse, state high, state low Choose the correct signal type when there is a liftsensor connected for remote engage
	aux input	Analog (V+), Digital (gnd) Choose the correct connection type when there is a liftsensor connected for remote engage
	autopilotscreen	FMD, FmX
diagnose		
test		

Notes				
Calibration	Plough 1	Plough 2	Plough 3	Plough 4
Furrow width				
Adjust width (range)				
Number of furrows				
Minimum width				
Minimum sensor				
Maximum sensor				
Maximum width				
PWM wider				
PWM smaller				
Stop dead zone				
Start dead zone				
1ste furrow				
Sensor offset				

