

Yara N-Sensor User Guide



Help & Support

Between the Hours off 8am-5pm, Monday to Friday

- Office: +441904 501950

For the best help and support we recommend joining are WhatsApp group, you can Join via the QR code below or simply ask a member of Taylored-Agri Ltd to add you.

The WhatsApp group is monitored before and after usual working hours as well as weekends, post any issues or agronomic questions into the group and a member of Taylored-Agri will get back to you ASAP.



Introduction

Please note this document is designed as a reference guide for the use of the Yara N-Sensor and will not cover all features and operations of the use of the Yara N-Sensor

The purpose of this document is to be used as a guide for the operation of the Yara N-Sensor and should not be considered to replace or constitute the advice given by a “FACTS” qualified advisor.

If not maintained properly or used without due care or attention the result could cause damage to the crop health or failure.

Aim

The Yara N-Sensor is designed to deliver precise levels of N input according to the crop's requirement, helping to both reduce environmental impact whilst increasing profit margins and nitrogen efficiency.

Principle of Use

The Yara N-Sensor is a tool for “Real-Time Variable Rate Nitrogen”. In active use the N-Sensor determines the nitrogen/chlorophyll content using an S1 Index. From this base reading we then use Yara's in-built agronomy to determine the nitrogen uptake (SN) of a variety of crops at different growth stages. From knowing crop N-Uptake this allows the N-Sensor to change the N-Recommendation to the implement Rate Controller.

Contents

1. Operational Modes	Page 4
2. Quick Start Guide	Page 8
3. Creating a New Task	Page 12
4. Absolute N-Application OSR	Page 18
5. Absolute N-Application Cereals	Page 30
6. Target Rate Application	Page 42
7. Target Rate Application (Grassland)	Page 56
8. Scanning	Page 70
9. N-Application	Page 76
10. Base Application	Page 90
11. Warning Symbols	Page 98
12. Windows Tablet	Page 102
13. N-Sync	Page 106
14. Maps	Page 110
15. Growth Stages	Page 112
16. Rate Calculator	Page 118

Operational Modes

Absolute N-Application OSR

The purpose of Absolute OSR is to achieve a total of $250 \pm \text{Kg N /ha}$ over 2 applications for a 4.5 t/ha Crop.

After autumn growth the N-Sensor on the first application we expect to see around $60 \pm \text{Kg N /ha}$ in the crop and the sensor will supply around $90 \pm \text{Kg N/ha}$ totalling $150 \pm \text{Kg N/ha}$ after the first pass.

On the second application the N-Sensor is expecting to see around $140 \pm \text{Kg N/ha}$ and would supply the crop with $110 \pm \text{Kg N/ha}$ to total the $250 \pm \text{Kg N/ha}$ after application.

Absolute N-Application Cereals

The Purpose of Absolute Cereals in Winter Wheat and Winter Barley, is to achieve the optimum amount of N for the Crop at its growth stage. This is done over 3 applications.

For both Winter Wheat and Winter Barley, the first application should be done as a flat uniform rate.

This quantity can be calculated as 120Kg N/ha – the Soil N Status (SNS) this should provide a good indicator as to the first application rate.

The second application in Winter Wheat and Winter Barley is independent of expected yield, in “Winter Wheat” for example at GS31 the N-Sensor hopes to see around 65 SN (Nitrogen Uptake) and would apply around 50Kg N/ha .

The third application adapts and uses the nitrogen readings (SN) to recommend a rate in response to the nitrogen response curve of a 9T/ha Winter Wheat & 8T/ha Winter Barley crop, the recommendation is then corrected by the expected yield and soil mineralisation status.

Target Rate Application

Target Rate Application allows you to variably apply your own recommended rate variable, The target rate can be provided by yourself, an agronomist or by the Yara N-Tester.

The rate is then evenly distributed as “Low SN = Higher rate” and “High SN = lower rate” Selecting the Protein dressing mode can reverse this however.

Simply pick the rate you wish to apply in Kg N/ha and then and then allow the N-Sensor its limitations of a maximum rate and minimum rate, e.g.

Minimum rate: 60Kg N/ha

Target Rate: 90Kg N/ha

Maximum rate: 120Kg N/ha

You do not necessarily need to have a balanced change; some customers previously have set the following:

Minimum rate: 90Kg N/ha

Target Rate: 90Kg N/ha

Maximum rate: 120Kg N/ha

This change means the sensor has the ability increase the rate in the poor area's whilst not restricting the rate in the higher SN areas.

Crops include: Winter Wheat, Winter Barley, Winter OSR, Oats, Winter Rye, Potatoes, Maize, Triticale, Spring Wheat, Spring Barley, Spelt Durum Wheat and Standard Grassland

Target Rate Application - Grassland

The Grassland module in “Target Rate Application” works under the same principles however instead of crop changes we have changes in “Cuts”

“Cut 1 Top Dressing”, “Cut 2 Top Dressing” – Applications 10+ Days prior to Mowing (Recommended)

“Cut 1”, “Cut 2”, “Cut 3-6” – Applications within 2 Days prior to mowing date.

Scanning

The Scanning mode allows you to scan a crop and take a biomass reading without application. Simply tell the N-Sensor the Crop and the implement width on the vehicle and record.

N-Application

The original N-Sensor mode, This mode requires the operator to do a calibration run up a tramline in which a reference value in nitrogen uptake (SN) is calculated, you are then required to tell the system the quantity (Kg N/ha) the rate you wish to apply over the calibration strip, from this you can now add a maximum and minimum rate and the sensor will adjust its rate depending on the SN.

Crops include: Winter Wheat, Winter Barley, Winter OSR, Oats, Winter Rye, Potatoes, Maize, Triticale, Spring Wheat, Spring Barley, Spelt and Durum Wheat

Base Application

Base Application is used for the application of fertilisers and minerals using pre-made prescription maps. Prescription maps should be in the form of either,

- .rst - Raster Maps
- .grd – Grid File
- .shp – Shape File (file must include .shp + .dbf + .shx)

Protein Dressing's & Plant Growth Regulators

At GS 37+ in “Target Rate Application” & “N-Application” you will see the “Application Index” can be changed from “Booting” to “Protein Dressing” this now reverts what the N-Sensor usually does in these modes, meaning, Higher SN = Higher Rate & Lower SN = Lower Rate.

For growth regulators you can then tell the N-Sensor the N% in the Fertiliser product is now 100% and instead of working in Kg N/ha you can work in total product, e.g. N%100,

Minimum rate: 100 Kg N/ha = 100L/ha

Target rate: 150 Kg N/ha = 150L/ha

Maximum rate: 200 Kg N/ha = 200L/ha

Quick Start Guide

1. Check all Warning Symbols are Grey and ready for Operation
2. Start a “New Task” in Task Selection
3. Check or change the “Operational Mode” in Task Selection
4. Check or change the “Agronomic Calibration” Settings
5. Press “Start”
6. Check the product rate is correct and changing on the fertiliser/product rate controller screen, Press the VRA Icon on the N-Sensor monitor to view the product rate in Kg/ha or L/ha, not Kg N/ha

Liquid Nitrogen Customer (Except Yara Liquid N)

Make sure to change you're N% in the fertiliser from a “Weight by Weight” metric to a “Weight by Volume” metric, see page 118

If you have any issues, questions or need help setting up the N-Sensor please do not hesitate to ask.

Biomass Cutoff (Recommended by Taylored-Agri)

Absolute OSR, (SN)

- 1st Application = 25 SN
- 2nd Application = 40 SN
- Dead Biomass 10%

Absolute Cereals, (%)

- 2nd Application = 100%
- 3rd Application = 100%

Target Rate Application, (%)

All Crops excluding Grassland

- GS 22-30 = 20%
- GS 30-32 = 40%
- GS 35-39 = 50%
- Protein/PGR, GS37+ = 10%

Grassland,

- Cut 1 Top Dressing = 10%
- Cut 2 Top Dressing = 20%

N- Application (SN)

- GS 22-30 = 5 SN
- GS 30-32 = 25 SN
- GS 35-39 = 40 SN
- Protein/PGR, GS37+ = 10 SN

Biomass Cutoff Factor = 100%

Base Application

When selecting a new task,

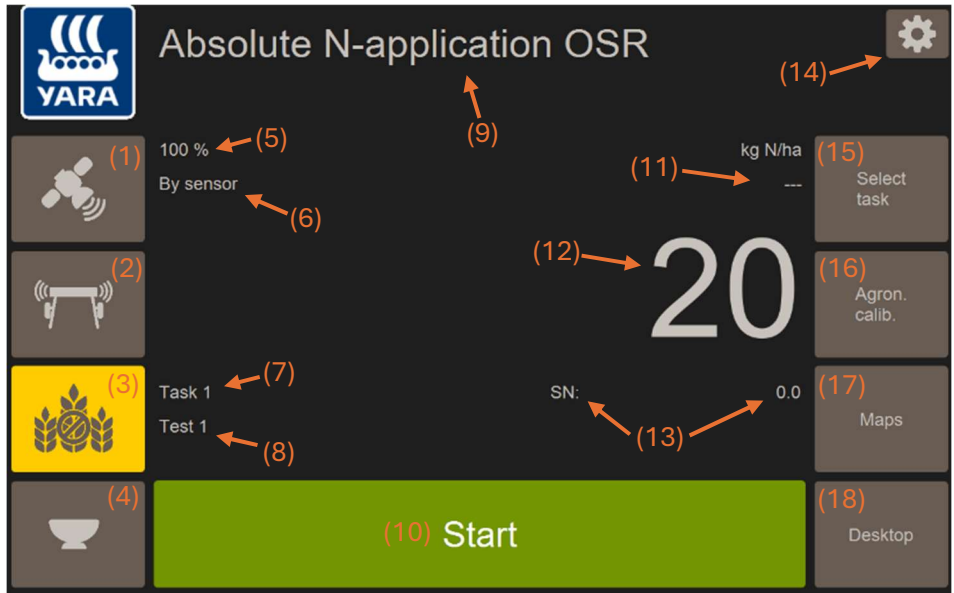
1. Application Mode,
 - Select, “Overlay Map”

2. Agronomic Calibration

“Agent Content” and “Map Factor”

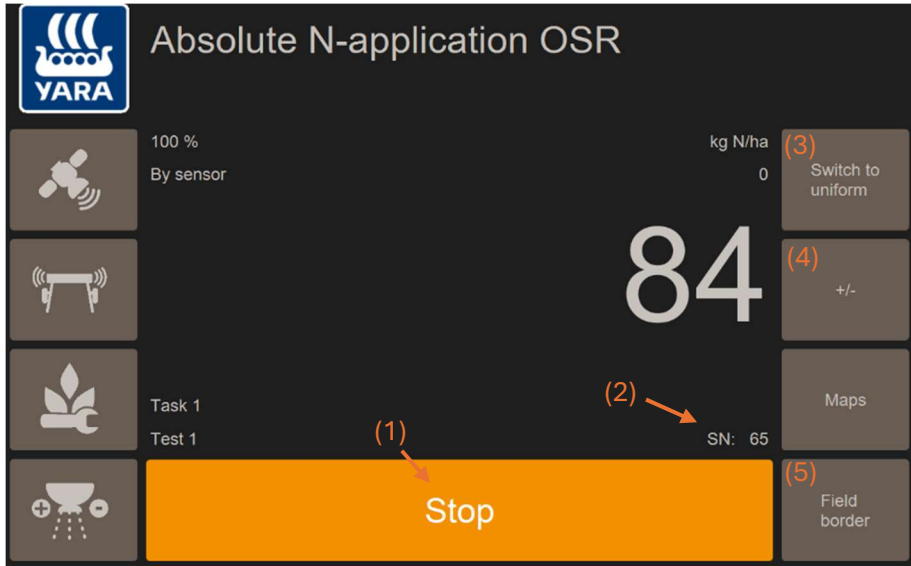
- 100%

Main working page layout



- | | |
|--|---|
| 1.) GPS Data | 11.) As-Applied Rate
(Bidirectional only) |
| 2.) N-Sensor Data | 12.) Recommended Rate
(Kg N/ha) |
| 3.) Agronomy / Low Biomass | 13.) SN (Nitrogen Uptake Value) |
| 4.) Variable rate | 14.) Settings |
| 5.) Percentage alteration | 15.) Task Selection |
| 6.) Application by sensor or by
map (Base Application Only) | 16.) Agronomic Calibration |
| 7.) Task Number | 17.) Maps |
| 8.) Task / Field Name or Number | 18.) Windows Desktop /
Additional Programs |
| 9.) Current Operational Mode | |
| 10.) Start / Stop | |

Main working page layout

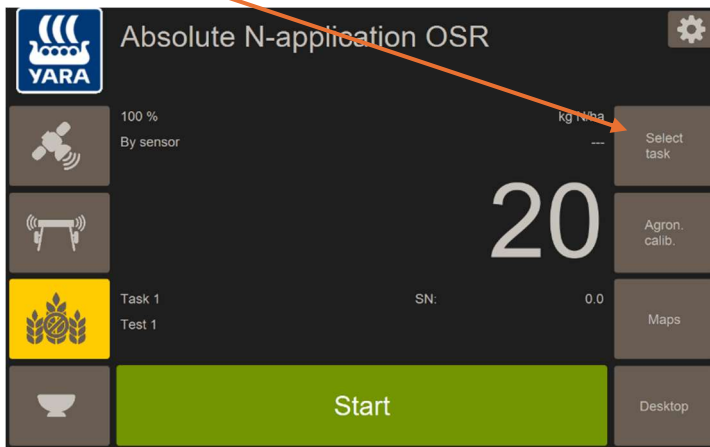


- 1.) Stop / Start
- 2.) SN (Nitrogen Uptake),
In this example the N-Sensor can see 65 Kg N in the canopy
- 3.) Switch to Uniform (Flat Rate) / Switch to Sensor
- 4.) Rate Percentage Changer (Kg N/Ha)
- 5.) Field Border (ALS-2 Only)
Turn off one head to improve headland accuracy

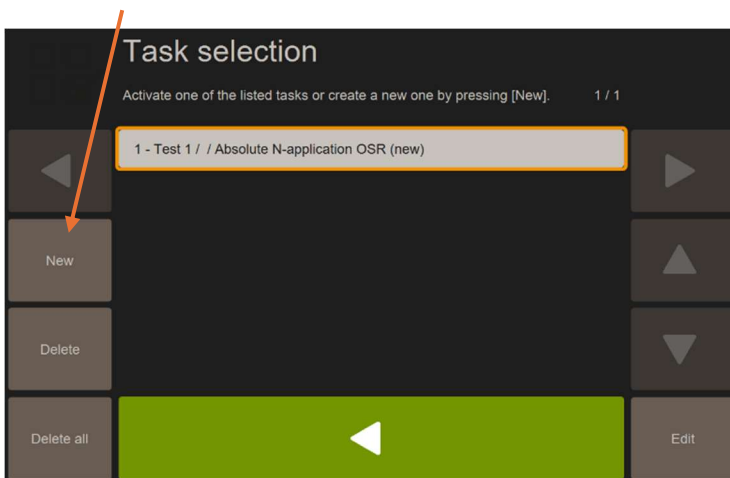
Creating a “New Task”

Every Field you enter to do an application or scan will need to do an **individual** task, even if you have previously done an application or task before, **always create a new task!**

1. Press the “Select task” option



2. Press “New”



3. You can now add details about the task your about to begin. The most important details are the “Operation mode” and the name of the field you are in.

Task editor		1 / 2
Change the properties of task 2		
Operation mode	Absolute N-application OSR	
Field name	Field 2	
Raster map		
Application mode	Overlay map	
Field size	0.0 ha	
Customer	Customer	

Press “Operation mode” to view and select the correct operational mode. (Please see page 4 for more details on operation mode types)

Press the mode you wish to select until it is highlight in a solid colour, and not just an orange ring around it.

Operation mode		1 / 2
Enter the operation mode for the selected task.		
	Absolute N-application OSR	
	Absolute N-application cereals	
	Base application	
	Device test	
	N-Sensor scanning	
	N-application	

Then Press the Green “Select and Return” button

You will then return to the “Task Editor” page. You should now notice the “Operational Mode” has changed to the desired mode

The screenshot shows the 'Task editor' interface with the subtitle 'Change the properties of task 2' and a page indicator '1 / 2'. The interface is divided into several sections. The top section contains 'Operation mode' (set to 'Absolute N-application cereals') and 'Field name' (set to 'Field 2'). Below this is a 'New' section with 'Raster map' and 'Application mode' (set to 'Overlay map'). The 'Delete' section shows 'Field size' (0.0 ha) and 'Customer' (Customer). At the bottom, there is a 'Delete all' button, a large green button with a white triangle, and a 'Select' button. Two orange arrows point to the 'Operation mode' and 'Field name' fields.

Now Press “Field name” to change the name.

The screenshot shows the 'Field name' input screen with the subtitle 'Enter the name of the field for task Task'. The input field contains 'Big Field'. Below the input field is a numeric keypad with digits 1-0 and symbols like '-', 'x', and a trash icon. The number '1' is highlighted with an orange box. To the right of the keypad are icons for deleting, clearing, and a home icon. At the bottom, there are three buttons: a green 'OK' button, an orange 'Cancel' button, and a 'Select' button. An orange arrow points to the 'OK' button.

Just start typing and the preset field ID will be removed and replaced with the name of the field/task. Once you are happy with the selection press “OK”

You should now be back on the “Task creation” screen again

Task editor

Change the properties of task 2 1 / 2

	Operation mode	Absolute N-application cereals	
	Field name	Big Field	
New	Raster map		
	Application mode	Overlay map	
Delete	Field size	0.0 ha	
	Customer	Customer	
Delete all			Select

When you are happy with the selected options, Press the Green “Select and Return”

You will then go back to the “Task Selection” Page, You should then see the “New task” you have just created and the system will automatically select the task make sure the task is selected with the orange ring around and that the task is highlighted in a different colour, you may also notice the (new) after the task.

Task selection

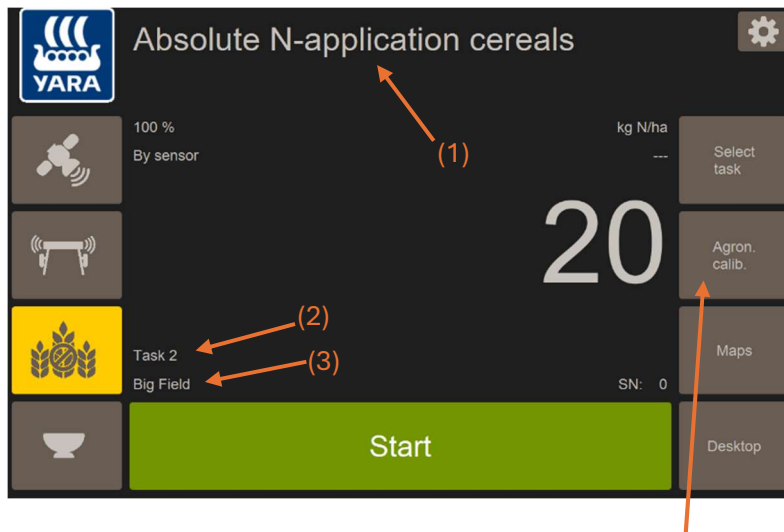
Activate one of the listed tasks or create a new one by pressing [New] 1 / 1

	1 - Test 1 / / Absolute N-application CSR (new)	
	2 - Big Field / / Absolute N-application cereals (new)	
New		
Delete		
Delete all		Edit

Then press the “Select and Return” icon to return back to the main running page.

On the main running page, you should now see 3 changes.

- 1.) Operation mode has Changed
- 2.) We are now on a new task, or the task number has changed
- 3.) The field name entered is now displaying.



All that is left is to check/adjust the crop agronomy (Agronomic Calibration) and you are ready to start using the Yara N-Sensor

Please see individual operational mode guides for help setting up the “Agronomic Calibration”.

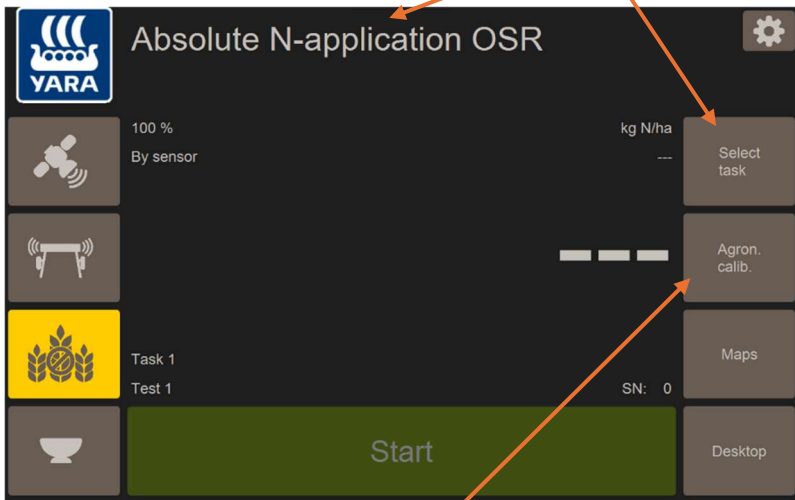
- | | |
|---------------------------------------|--------|
| ➤ Absolute N-Application OSR | pg. 18 |
| ➤ Absolute N-Application Cereals | pg. 30 |
| ➤ Target Rate Application | pg. 42 |
| ➤ Target Rate Application (Grassland) | pg. 56 |
| ➤ Scanning | pg. 70 |
| ➤ N-Application | pg. 76 |
| ➤ Base Application | pg. 90 |

Notes

Absolute N-Application OSR

1.) Create a new task,

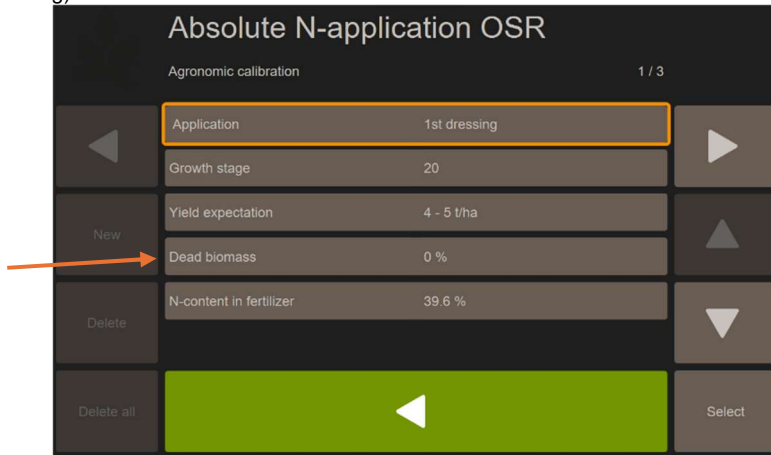
To start you must first create a new task in the task Selection, in Operational Modes make sure to select “Absolute N-Application OSR” for further details on how to do this see the “Creating a New Task” section.



2.) Now select the “Agronomic Calibration”

You will then get 2 different selections depending if this is the 1st Application or the 2nd Application

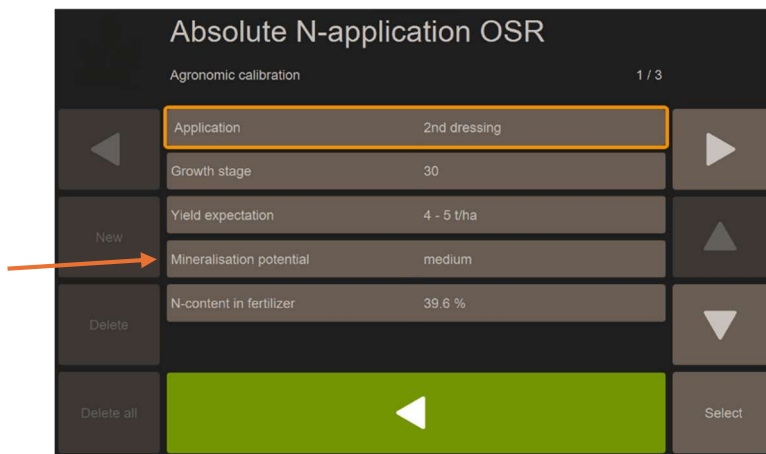
(1st Dressing)



Agronomic calibration 1 / 3

	Application	1st dressing	
	Growth stage	20	
New	Yield expectation	4 - 5 t/ha	
	Dead biomass	0 %	
Delete	N-content in fertilizer	39.6 %	
Delete all			Select

(2nd Dressing)



Agronomic calibration 1 / 3

	Application	2nd dressing	
	Growth stage	30	
New	Yield expectation	4 - 5 t/ha	
	Mineralisation potential	medium	
Delete	N-content in fertilizer	39.6 %	
Delete all			Select

You will notice the only change between the 2 dressings is the change from Dead Biomass (1st Dressing) to Mineralisation Potential (2nd Dressing)

Growth stages

- 1st dressing is between GS10 – GS25
- 2nd dressing is between GS26 – GS39

To select the correct growth stage, hit the “Growth stage” button

The screenshot shows the 'Absolute N-application OSR' screen. At the top, it says 'Agronomic calibration' and '1 / 3'. Below this is a table with the following fields:

Application	1st dressing
Growth stage	20
Yield expectation	4 - 5 t/ha
Dead biomass	0 %
N-content in fertilizer	39.6 %

On the left side of the table, there are buttons: 'New' (next to Yield expectation), 'Delete' (next to Dead biomass), and 'Delete all' (next to N-content in fertilizer). On the right side, there are navigation arrows: a left arrow, a right arrow, an up arrow, and a down arrow. At the bottom, there is a large green button with a white left arrow and a 'Select' button.

This will take you through to the GS selection page,

The screenshot shows the 'Growth stage' selection screen. At the top, it says 'Valid range: 10 - 25 BBCH'. Below this is a numeric keypad with the following numbers:

7	8	9
4	5	6
1	2	3
	0	

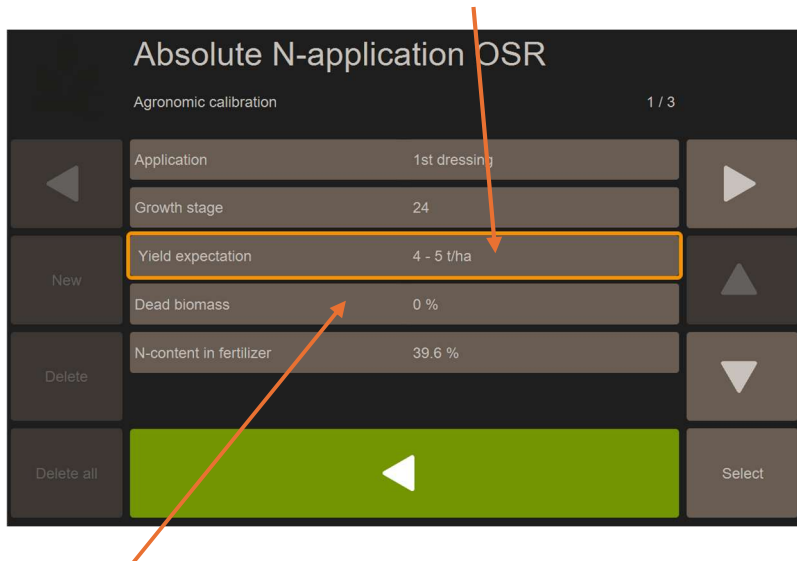
At the top of the keypad, there is a field showing '20 BBCH' and a delete button (X). On the right side of the keypad, there is a delete button (X). At the bottom, there are three buttons: a green 'OK' button, an orange 'Cancel' button, and a 'Select' button.

Select the correct Growth stage on press “OK”

You then need to choose the correct yield expectation

- Less than 4T/ha
- Between 4 – 5T/ha
- More than 5T/ha

Simply tap the “Yield expectation” to change/scroll between options.



Dead Biomass (1st Dressing only), by increasing the dead biomass or amount of yellow/damaged leaves in the canopy by 10% the N-Sensor will see this as a potential $7 \pm$ Kg N/Ha return to the soil later for a resupply later in the growing season.

Dead biomass options,

- 0%
- 10%
- 20%
- 30%
- 40%

On the “2nd dressing”, “Dead biomass” will change to “Mineralisation potential”

The screenshot shows the 'Absolute N-application OSR' app interface. At the top, it says 'Agronomic calibration' and '1 / 3'. Below this is a table with the following rows:

Application	2nd dressing
Growth stage	30
Yield expectation	4 - 5 t/ha
Mineralisation potential	medium
N-content in fertilizer	35.0 %

On the left side of the table, there are buttons: 'New' (next to Yield expectation), 'Delete' (next to N-content in fertilizer), and 'Delete all' (at the bottom). On the right side, there are navigation arrows: a left arrow, a right arrow, an up arrow, and a down arrow. At the bottom right, there is a 'Select' button. A large green bar with a white left arrow is at the bottom of the screen.

Selecting the button will change between High, Medium and Low.

High mineralisation potential (**-10±Kg N/Ha**)

- High organic matter soil,
- High soil N core values
- SNS 3+
- Low Rainfall or Drought

Medium Mineralisation potential (**Standard N-Uptake scale**)

- Medium or mixed Soils
- SNS 1 or 2
- Average / High Rainfall

Low Mineralisation potential (**+10±Kg N/Ha**)

- Low Organic Matter soils
- Sandy Soils
- SNS 0

N-Content in fertilizer, to change the N% tap the “N-Content in fertilizer” button

Absolute N-application OSR

Agronomic calibration 1 / 3

Application	1st dressing
Growth stage	24
Yield expectation	4 - 5 t/ha
Dead biomass	0 %
N-content in fertilizer	39.6 %

Buttons: New, Delete, Delete all, Select

N% valid range from 0.1% to 100%, remember this is N% (**Weight by Volume**), Liquid (Weight by Weight) manufacturers need to be converted, see Rate Calculator for more information.

N-content in fertilizer

Valid range: 0.1 - 100.0 %

35 %

Buttons: 7, 8, 9, 4, 5, 6, 1, 2, 3, 0, ., OK, Cancel, Select

Select the correct N% and press “OK”

Absolute N-application OSR

Agronomic calibration

1 / 3

◀	Application	1st dressing	▶
	Growth stage	24	
New	Yield expectation	4 - 5 t/ha	▲
	Dead biomass	0 %	
Delete	N-content in fertilizer	35.0 %	▼
Delete all	◀		Select

Move to the next page,

Or back a page.

Absolute N-application OSR

Agronomic calibration

2 / 3

◀	Minimum rate	30 kg N/ha	▶
	Maximum rate	120 kg N/ha	
New	Uniform rate	80 kg N/ha	▲
	Biomass cutoff	25.0 (SN)	
Delete			▼
Delete all	◀		Select

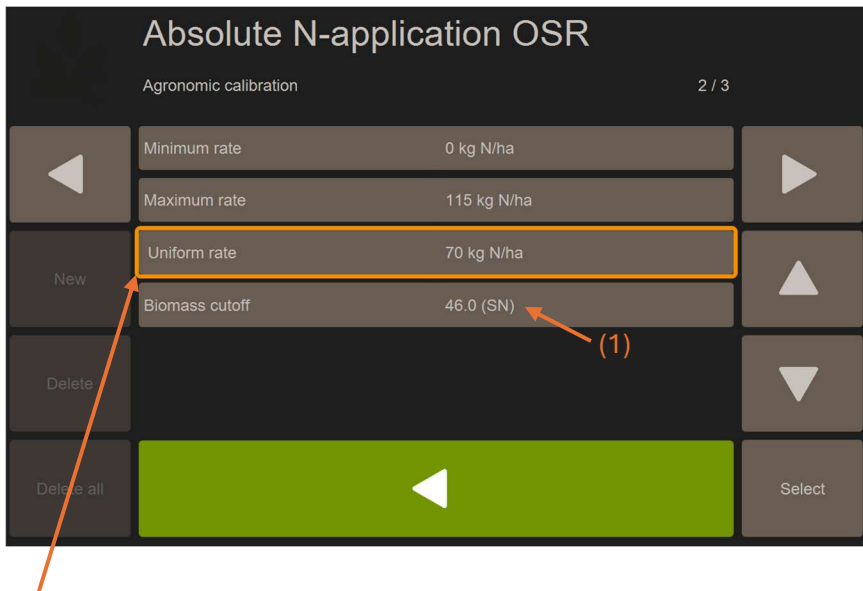
Select either the “Minimum rate” “Maximum rate” and “Uniform Rate” to change the limits. Remember the system works in Kg N/ha not product.

The screenshot shows the 'Absolute N-application OSR' screen with the subtitle 'Agronomic calibration' and '2 / 3'. It features a list of settings: 'Minimum rate' (30 kg N/ha), 'Maximum rate' (120 kg N/ha), 'Uniform rate' (80 kg N/ha), and 'Biomass cutoff' (25.0 (SN)). Navigation buttons include left and right arrows, a 'New' button, a 'Delete' button, a 'Delete all' button, and a 'Select' button. A large green arrow points from the 'Minimum rate' field towards the 'OK' button in the subsequent screen.

- 1st dressing the minimum & maximum rate is 0-120 Kg N/H
- 2nd dressing the minimum & maximum rate is 0-150 Kg N/Ha

The screenshot shows the 'Minimum rate' input screen with the subtitle 'Valid range: 0 - 120 kg N/ha'. It displays a numeric keypad with digits 0-9. The current value is '30 kg N/ha'. Navigation buttons include up and down arrows, left and right arrows, a delete button (X), and an 'OK' button. A red arrow points from the 'OK' button to the text below.

Chose the quantity required then select “OK”,



Uniform Rate

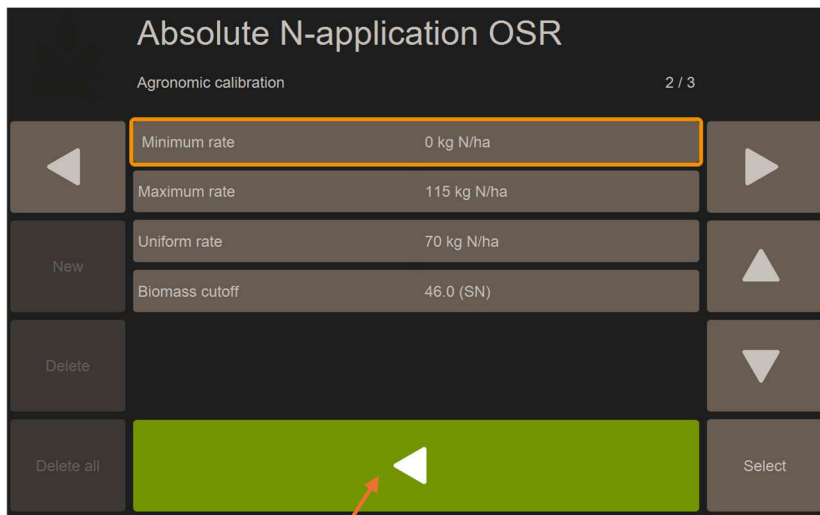
If the N-Sensor failed or malfunctioned the sensor would go into a flat rate or uniform mode, this is the rate you would put on if you were not using the N-Sensor.

Biomass Cutoff (1)

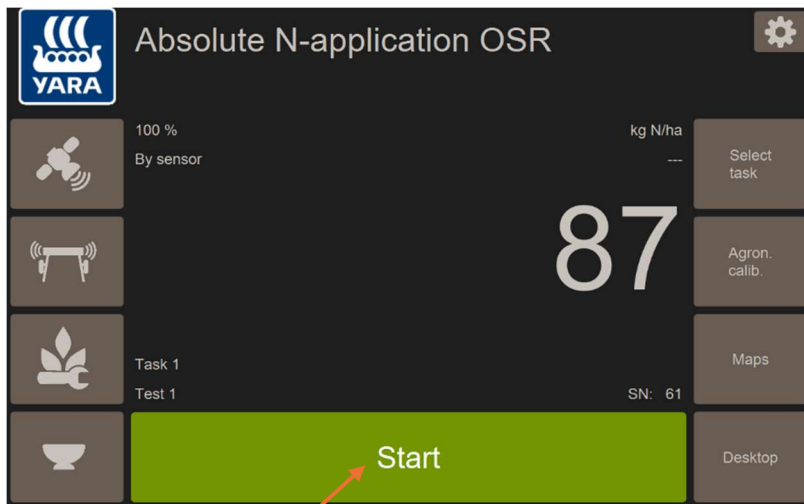
To stop over application on poor areas the N-Sensor includes a biomass cutoff feature, you can tell the N-Sensor when it should cut to the minimum rate to stop the over application. Increasing this figure will make the system cut in sooner, decreasing this figure will make the system cut off to the minimum rate later.

In the Absolute N-Application OSR mode the biomass cutoff works off the actual SN readings (the amount of Nitrogen the N-Sensor can see in the crop). In the Example photo above (1) the Biomass Cutoff has been set to “46”, this means any crop the N-Sensor see under 46Kg of N Uptake in the canopy the rate will start to reduce down to save input costs, rather than increasing. The further the figure is below the cut off value the more severe the rate will cut back by.

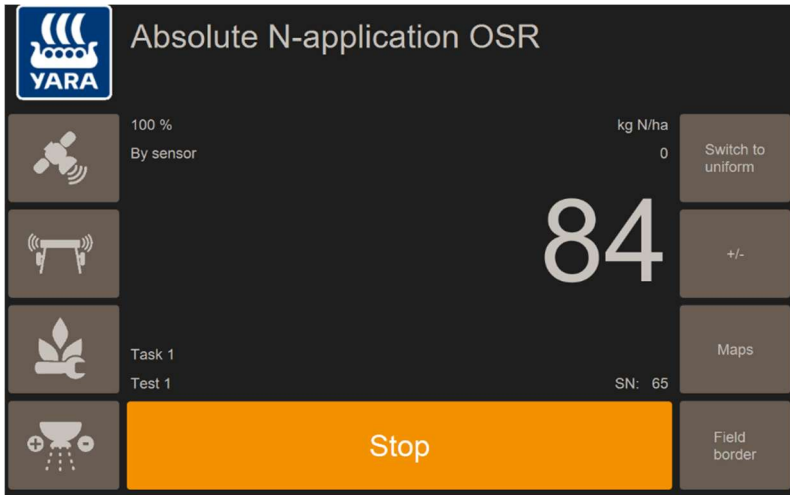
Once you are happy with your selections,



Press the Green “Select and Return Icon”



When ready press “Start” to activate and use the N-Sensor.



If you have not finished the field and need to refill, press “Stop”, Refill and then go back to the same position you were in where you pressed “Stop” and press “Start” again to continue operation.

It is important to press “Stop” when not in operation, not pressing “Stop” will cause the recording of improper data and manipulated calibrations.

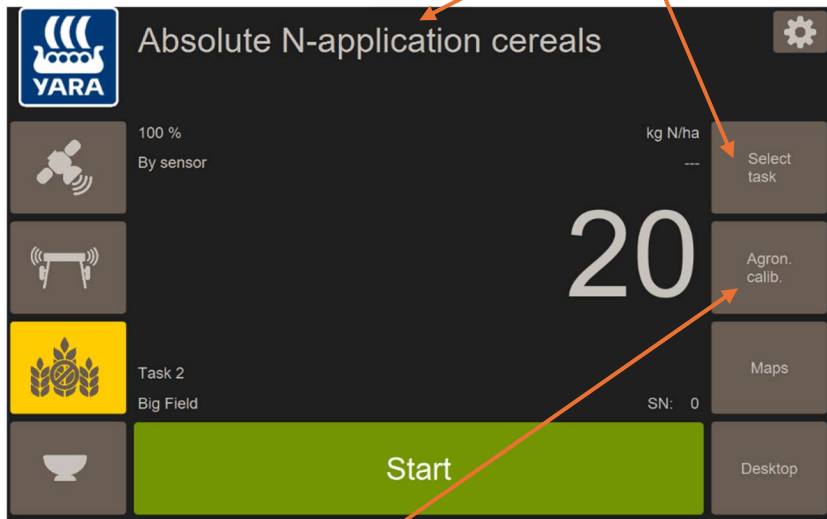
Once you have finished applying to the Task/Field, press “Stop” to complete.

When moving to the next Field, Remember to change “Task” and check the “Agronomic Calibration” before proceeding.

Notes

Absolute N-Application Cereals

To start you must first create a new task in the task Selection, in Operational Modes make sure to select “Absolute N-Application Cereals” for further details on how to do this see the “Creating a New Task” section.



Now select the “Agronomic Calibration”

Select “Crop type” to change between “Winter wheat” and “Winter barley”

A screenshot of a software interface titled "Absolute N-application cereals". At the top, it says "Agronomic calibration" and "1 / 3". The interface has a dark background with several input fields. The "Crop type" field is highlighted with an orange border and contains the text "Winter wheat". An orange arrow points from the text above to this field. Other fields include "Application" (2nd dressing), "Growth stage" (30), and "N-content in fertilizer" (27.0 %). On the left, there are buttons for "New", "Delete", and "Delete all". On the right, there are navigation arrows and a "Select" button. At the bottom, there is a large green button with a white left-pointing triangle.

Once selected, press “Select & return”

A screenshot of a software interface titled "Crop type". At the top, it says "Agronomic calibration / Absolute N-application cereals" and "1 / 1". The interface shows two options: "Winter wheat" and "Winter barley". The "Winter wheat" option is highlighted with an orange border. An orange arrow points from the text above to the green button at the bottom. The green button has a white left-pointing triangle. On the right, there is a "Select" button. Navigation arrows are present on the left and right sides.

You will also get two different layouts depending on if this is the 2nd N Application or the 3rd N Application.

Growth stages

- 1st dressing, Flat Rate (**Not using N-Sensor**)
- 2nd dressing is between GS30 – GS32
- 3rd dressing is between GS37 – GS53

(2nd Dressing)

The screenshot shows the 'Absolute N-application cereals' interface for the 2nd dressing stage. The title 'Absolute N-application cereals' is at the top, followed by 'Agronomic calibration' and '1 / 3'. The interface is a list of fields with navigation buttons on the left and right. The 'Crop type' field is highlighted with an orange border and contains 'Winter wheat'. The 'Application' field contains '2nd dressing'. The 'Growth stage' field contains '31'. The 'N-content in fertilizer' field contains '27.0 %'. At the bottom, there is a green bar with a white left arrow and a 'Select' button.

Field	Value
Crop type	Winter wheat
Application	2nd dressing
Growth stage	31
N-content in fertilizer	27.0 %

(3rd Dressing)

The screenshot shows the 'Absolute N-application cereals' interface for the 3rd dressing stage. The title 'Absolute N-application cereals' is at the top, followed by 'Agronomic calibration' and '1 / 3'. The interface is a list of fields with navigation buttons on the left and right. The 'Crop type' field contains 'Winter wheat'. The 'Application' field is highlighted with an orange border and contains '3rd dressing'. The 'Growth stage' field contains '37'. The 'Yield expectation' field contains '9 t/ha'. The 'Mineralisation potential' field contains 'medium'. The 'N-content in fertilizer' field contains '27.0 %'. At the bottom, there is a green bar with a white left arrow and a 'Select' button. Two orange arrows point to the 'Growth stage' and 'Yield expectation' fields.

Field	Value
Crop type	Winter wheat
Application	3rd dressing
Growth stage	37
Yield expectation	9 t/ha
Mineralisation potential	medium
N-content in fertilizer	27.0 %

You will notice the only change between the 2 dressings is the additional settings in the “3rd dressing” adding Yield Expectation and Mineralisation Potential

To change the growth stage select the “Growth Stage” button

The screenshot shows a software interface titled "Absolute N-application cereals" with a subtitle "Agronomic calibration" and a page indicator "1 / 3". The interface includes several input fields: "Crop type" (Winter wheat), "Application" (2nd dressing), "Growth stage" (30), and "N-content in fertilizer" (27.0 %). The "Growth stage" field is highlighted with an orange border, and an orange arrow points to it from the text above. On the left side, there are buttons for "New", "Delete", and "Delete all". On the right side, there are navigation arrows (left, right, up, down) and a "Select" button at the bottom right. A large green button with a white left-pointing arrow is at the bottom center.

Enter the correct growth stage and then select “OK”

The screenshot shows a "Growth stage" input screen with a subtitle "Valid range: 30 - 32 BBCH". The current value is "30 BBCH". Below this is a numeric keypad with numbers 0-9. The number "7" is highlighted with an orange box. An orange arrow points from the text above to the "OK" button at the bottom. The "OK" button is green, and the "Cancel" button is orange. There are also "Select" and "Delete" buttons on the right side. Navigation arrows are on the left side.

(3rd dressing only), Press “Yield expectation”

Absolute N-application cereals

Agronomic calibration 1 / 3

◀	Crop type	Winter wheat	▶
	Application	3rd dressing	
New	Growth stage	37	▲
	Yield expectation	9 t/ha	
Delete	Mineralisation potential	medium	▼
	N-content in fertilizer	27.0 %	
Delete all	▶		Select

Enter a valid and true yield expectation between 6-12T/Ha, and press “OK”

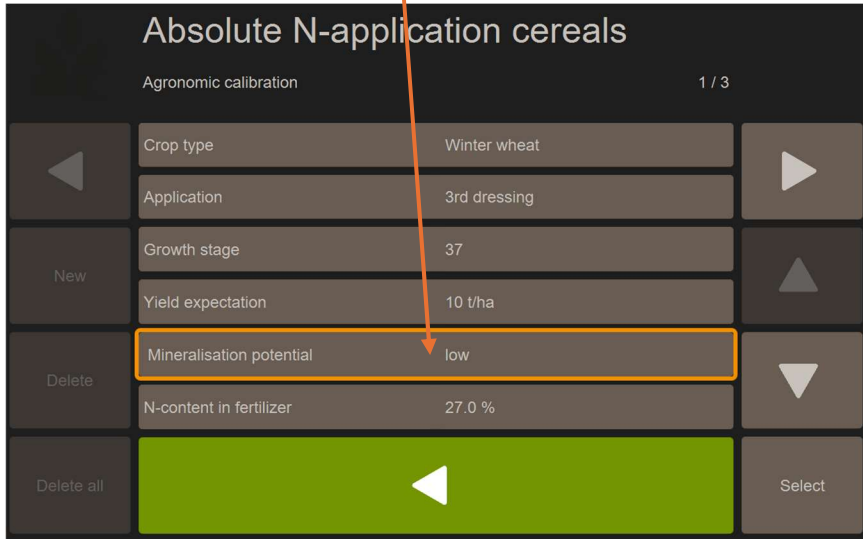
Yield expectation

Valid range: 6 - 12 t/ha

10 t/ha

▲	7	8	9	⌫
▼	4	5	6	✖
◀	1	2	3	
▶	0			
	OK	Cancel	Select	

(3rd dressing only), Press “Mineralisation Potential” to change between High, Medium and Low.



Absolute N-application cereals		1 / 3
Agronomic calibration		
◀	Crop type	Winter wheat ▶
	Application	3rd dressing ▶
New	Growth stage	37 ▶
	Yield expectation	10 t/ha ▶
Delete	Mineralisation potential	low ▶
	N-content in fertilizer	27.0 % ▶
Delete all	▶	
	Select	

High mineralisation potential (**-20±Kg N/Ha**)

- High organic matter soil,
- High soil N core values
- SNS 3+
- Low Rainfall or Drought

Medium Mineralisation potential (**Standard N-Uptake scale**)

- Medium or mixed Soils
- SNS 1 or 2
- Average / High Rainfall

Low Mineralisation potential (**+20±Kg N/Ha**)

- Low Organic Matter soils
- Sandy Soils
- SNS 0

Now select the N-Content in fertilizer, to change the N% tap the “N-Content in fertilizer” button

Agronomic calibration 1 / 3

←	Crop type	Winter wheat	→
	Application	2nd dressing	
New	Growth stage	30	↑
Delete	N-content in fertilizer	27.0 %	↓
Delete all			Select

N% valid range from 0.1% to 100%, remember this is N% (**Weight by Volume**), Liquid (Weight by Weight) manufacturers need to be converted, see Rate Calculator for more information.

N-content in fertilizer

Valid range: 0.1 - 100.0 %

↑	35 %			⌫
	7	8	9	
↓	4	5	6	✖
	1	2	3	
←		0	.	
→	OK		Cancel	Select

Select the correct N% and press “OK”

Absolute N-application cereals

Agronomic calibration

1 / 3

New	Crop type	Winter wheat	▶
	Application	2nd dressing	
	Growth stage	30	
Delete	N-content in fertilizer 35,0 %		▼
Delete all	◀		Select

Move to the next page,

Or back a page,

Absolute N-application cereals

Agronomic calibration

2 / 3

New	Minimum rate	20 kg N/ha	▶
	Maximum rate	100 kg N/ha	
	Uniform rate	60 kg N/ha	
Delete	Biomass cutoff factor 100 %		▼
Delete all	◀		Select

Select either the “Minimum rate” “Maximum rate” or “Uniform Rate” to change the limits. Remember the system works in Kg N/ha not product.

Absolute N-application cereals

Agronomic calibration 2 / 3

Minimum rate	30 kg N/ha
Maximum rate	100 kg N/ha
Uniform rate	46 kg N/ha
Biomass cutoff factor	100 %

New

Delete

Delete all

Select

- 2nd and 3rd dressing the minimum & maximum range is 0-100 Kg N/Ha

Minimum rate

Valid range: 0 - 100 kg N/ha

30 kg N/ha

7 8 9

4 5 6

1 2 3

0

OK Cancel Select

Chose the quantity required then select “OK”,

Uniform rate, If the N-Sensor failed or malfunctioned the sensor would go into a flat rate or uniform mode, this is the rate you would put on if you were not using the N-Sensor.

The screenshot shows a mobile application interface titled "Absolute N-application cereals" with a subtitle "Agronomic calibration" and a page indicator "2 / 3". The interface features a central table with four rows of settings, each with a left navigation button, a text input field, and a right navigation button. The settings are: Minimum rate (30 kg N/ha), Maximum rate (100 kg N/ha), Uniform rate (46 kg N/ha), and Biomass cutoff factor (100 %). The "Biomass cutoff factor" row is highlighted with an orange border. To the left of the table are three buttons: "New", "Delete", and "Delete all". To the right are three buttons: an upward arrow, a downward arrow, and a "Select" button. At the bottom, there is a large green button with a left arrow.

	Minimum rate	Maximum rate	Uniform rate	Biomass cutoff factor
	30 kg N/ha	100 kg N/ha	46 kg N/ha	100 %

“Biomass cutoff factor”, To stop over application on poor areas the N-Sensor includes a biomass cutoff feature, you can tell the N-Sensor when it should cut to the minimum rate to stop the over application. Increasing this figure will make the system cut in sooner, decreasing this figure will make the system cut off to the minimum rate later.

In the Absolute N-Application Cereals mode the biomass cutoff works off a pre-prescribed N-uptake value, which increases and decreases per growth stage.

The predetermined value can be adjusted to the user own preference, a value of 100% can be adjusted from 50% to 200%.

Press “Biomass cutoff factor” to change the value

Biomass cutoff factor

Valid range: 50 - 200 %

75 %

7 8 9

4 5 6

1 2 3

0

OK Cancel Select

Select the value and press “OK”

Absolute N-application cereals

Agronomic calibration 2 / 3

Minimum rate 30 kg N/ha

Maximum rate 100 kg N/ha

Uniform rate 46 kg N/ha

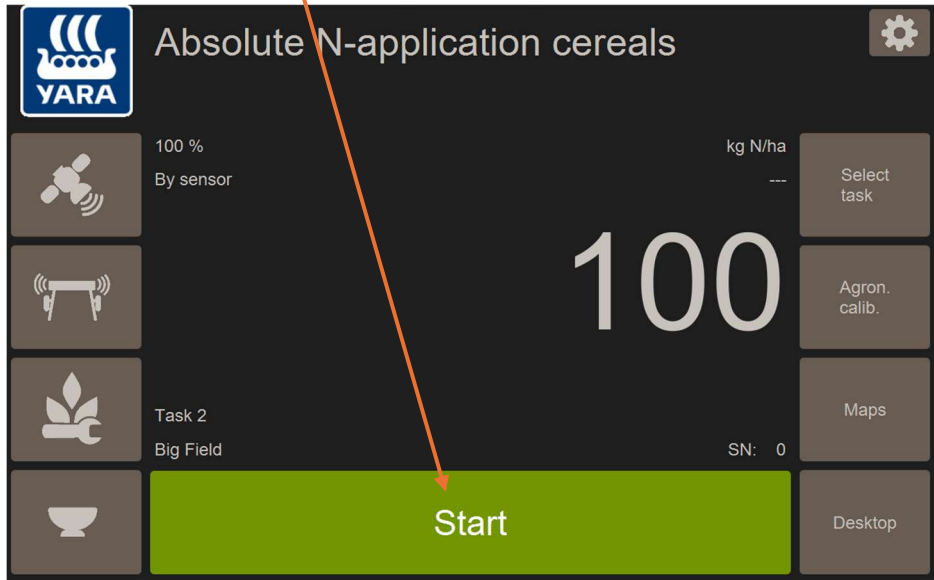
Biomass cutoff factor 75 %

New Delete Delete all

Select

If you are happy with the selected values on both pages press the “Select and return” button.

When ready press “Start” to activate and use the N-Sensor,



If you have not finished the field and need to refill, press “Stop”, Refill and then go back to the same position you were in where you pressed “Stop” and press “Start” again to continue operation.

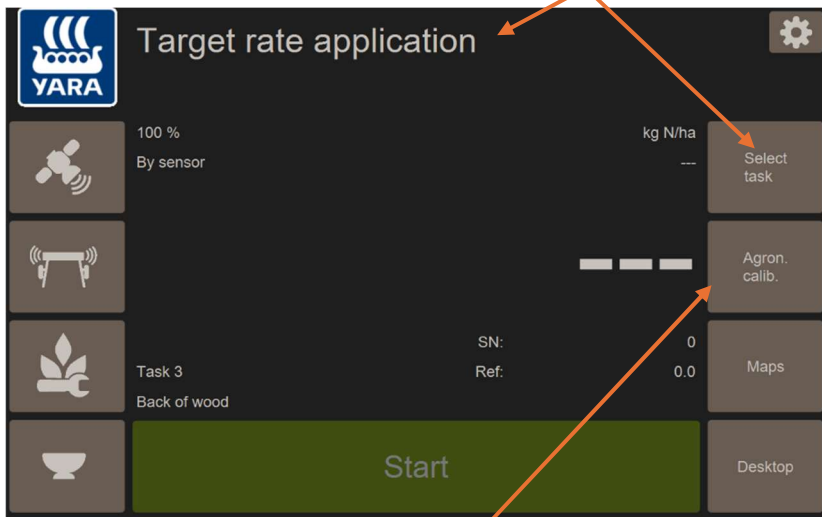
It is important to press “Stop” when not in operation, not pressing “Stop” will cause the recording of improper data and manipulated calibrations.

Once you have finished applying to the Task/Field, press “Stop” to complete.

When moving to the next Field, Remember to change “Task” and check the “Agronomic Calibration” before proceeding.

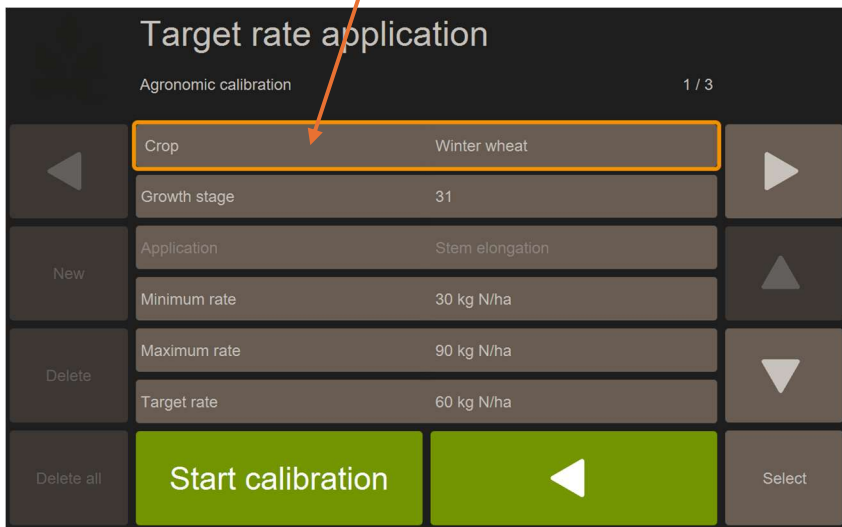
Target Rate Application

To start you must first create a new task in the task Selection, in Operational Modes make sure to select “Target Rate Application” for further details on how to do this see the “Creating a New Task” section.



Now select the “Agronomic Calibration”

Firstly, we need to choose a “Crop”



Choose the required crop. There are more choices on the next page.

The screenshot shows a 'Crop' selection interface with three pages of options. The interface is dark-themed with a list of crops on the left and navigation buttons on the right. The crops are grouped into three sections, each with a header 'Target rate application / Agronomic calibration' and a page indicator.

Page 1 / 3:

- Maize
- Potato
- Oilseed rape
- Winter wheat** (highlighted with an orange border)
- Winter barley
- Winter rye

Page 2 / 3:

- Triticale** (highlighted with an orange border)
- Spring barley
- Oats
- Sugar cane
- Spring wheat
- Cotton

Page 3 / 3:

- Durum wheat** (highlighted with an orange border)
- Standard grassland
- Spelt

At the bottom of the interface is a large green button with a white left-pointing arrow and the word 'Select' to its right. An orange arrow points from the instruction text to this button.

Once the required crop is chosen, press “OK”

Now choose a the correct “Growth Stage” for the crop

Target rate application

Agronomic calibration 1 / 3

◀	Crop	Winter wheat	▶
	Growth stage	37	
New	Application	Booting	▲
	Minimum rate	30 kg N/ha	
Delete	Maximum rate	90 kg N/ha	▼
	Target rate	60 kg N/ha	
Delete all	Start calibration	◀	Select

Type in the growth stage and press “OK”

Growth stage

Valid range: 0 - 99 BBCH

37 BBCH

▲	7	8	9	✕
▼	4	5	6	✕
◀	1	2	3	
▶		0		
	OK	Cancel		Select

In cereal and brassica crops you get additional settings. The “Application” description will appear below the growth stage, between GS20 - GS36 this value is locked, between GS37 – GS49 this value can be changed between “Booting” & “Protein dressing”

The screenshot shows a mobile application interface titled "Target rate application" with a subtitle "Agronomic calibration" and a page indicator "1 / 3". The interface is a list of settings for crop calibration. An orange arrow points from the text above to the "Application" field, which is set to "Booting".

Field	Value
Crop	Winter wheat
Growth stage	37
Application	Booting
Minimum rate	30 kg N/ha
Maximum rate	90 kg N/ha
Target rate	60 kg N/ha

At the bottom, there is a green "Start calibration" button and a "Select" button.

“OSR” will also allow you to change between 1st and 2nd dressing.

Cereals crop’s that have additional applications like, Tillering, Steam elongation, Booting & Protein dressing:-

- Winter Wheat
- Winter Wheat
- Winter Rye
- Triticale
- Spring Wheat
- Spelt
- Durum Wheat

The “Protein Dressing” mode will invert what the N-Sensor would do normally, so higher biomass and N-uptake areas will get a higher rate and lower Biomass and N-uptake areas will receive less.

When selecting between GS37 - GS49, the "Application" "Booting" can be pressed and changed to a "Protein Dressing" mode

Target rate application

Agronomic calibration 1 / 3

◀	Crop	Winter wheat	▶
	Growth stage	37	
New	Application	Protein dressing	▲
	Minimum rate	30 kg N/ha	
Delete	Maximum rate	90 kg N/ha	▼
	Target rate	60 kg N/ha	
Delete all	Start calibration		Select

Next select the "Minimum rate" "Maximum rate" & "Target Rate" to set the target rate (Kg N/Ha) & change the upper and lower limits.

Target rate application

Agronomic calibration 1 / 3

◀	Crop	Winter wheat	▶
	Growth stage	32	
New	Application	Stem elongation	▲
	Minimum rate	30 kg N/ha	
Delete	Maximum rate	90 kg N/ha	▼
	Target rate	60 kg N/ha	
Delete all	Start calibration		Select

- The minimum & maximum range is 0-999 Kg N/Ha

Minimum rate

Valid range: 0 - 999 kg N/ha

▲	10 kg N/ha			⬅️ X
▼	7	8	9	X
◀️	4	5	6	
	1	2	3	
▶️	0			
	OK		Cancel	Select

Chose the quantity required then select “OK”,

Target rate application

Agronomic calibration 1 / 3

◀️	Crop	Winter wheat	▶️
	Growth stage	32	
New	Application	Stem elongation	▲
	Minimum rate	0 kg N/ha	
Delete	Maximum rate	999 kg N/ha	▼
	Target rate	80 kg N/ha	
Delete all	Start calibration		Select

Switch to the next page,

You can also go back and check previous setting by hitting the back arrow.

The screenshot shows the 'Target rate application' screen with the subtitle 'Agronomic calibration' and a page indicator '2 / 3'. It features a list of settings: 'N-content in fertilizer' (25.0 %), 'Relative biomass cutoff' (20 %), and 'Reset calibration for new tasks' (No). On the left, there are buttons for 'New', 'Delete', and 'Delete all'. On the right, there are navigation arrows (back, forward, up, down). At the bottom, there is a large green 'Start calibration' button, a green button with a back arrow, and a 'Select' button. An orange arrow points from the text above to the back arrow button on the left. Another orange arrow points from the 'N-content in fertilizer' setting to the 'Start calibration' button.

Select “N-content in fertilizer” to change the N%

N% valid range from 0.1% to 100%, remember this is N% (**Weight by Volume**), Liquid (Weight by Weight) manufacturers need to be converted, see Rate Calculator for more information.

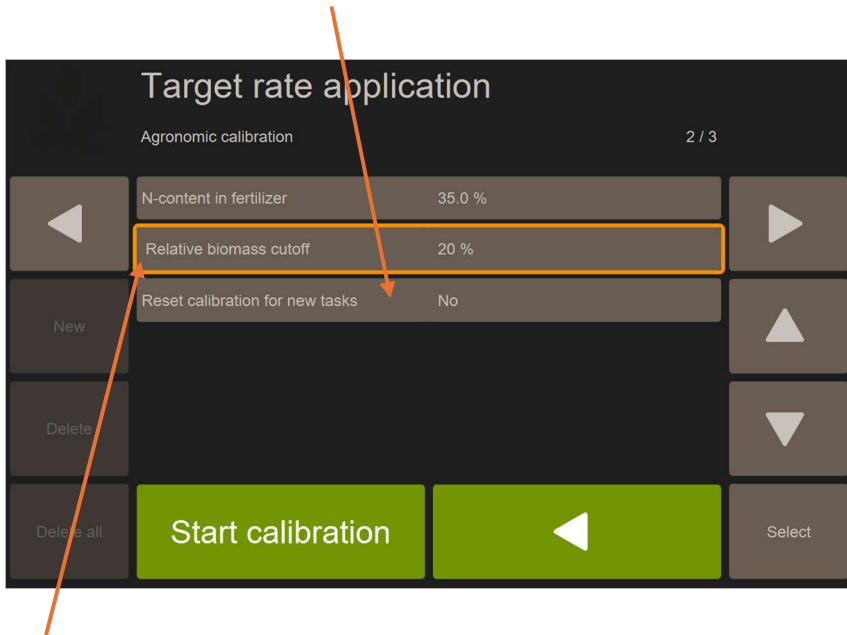
The screenshot shows the 'N-content in fertilizer' input screen with the subtitle 'Valid range: 0.1 - 100.0 %'. It displays a numeric keypad with the value '35 %' entered. The number '5' is highlighted in the keypad. On the left, there are navigation arrows (back, forward, up, down). On the right, there are buttons for 'Cancel' (with a back arrow and 'X') and 'OK' (with an 'X'). At the bottom, there is a large green 'OK' button, an orange 'Cancel' button, and a 'Select' button. An orange arrow points from the text below to the 'OK' button.

Select the correct N% and press “OK”

“Reset calibration for new task”, Once you have completed a task and are looking to move onto the next task, this feature allows you to either keep or delete the calibration when moving to the next task.

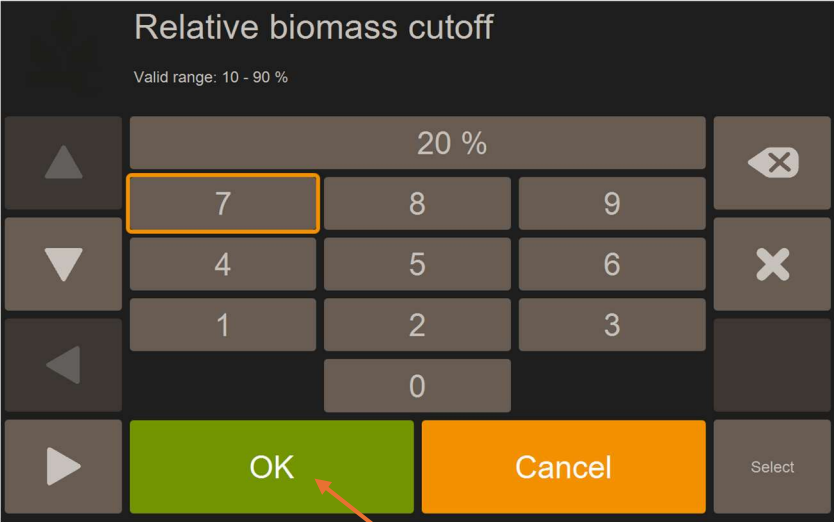
The options :-

- No – This will keep the calibration value when moving to the next task
- Yes – This will delete the calibration value when moving to the next task
- Always Ask – Once a new task is created a pop-up option will ask If you wish to keep the calibration value or delete it.

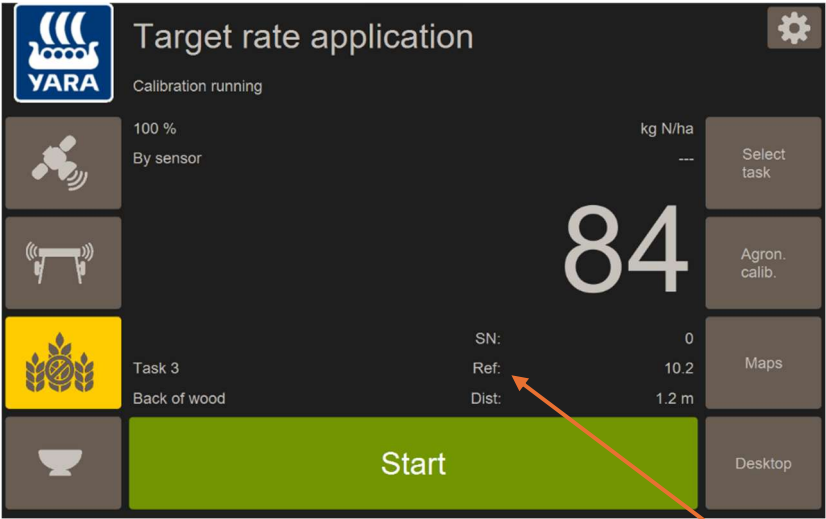


“Biomass cutoff factor”, To stop over application on poor areas the N-Sensor includes a biomass cutoff feature, you can tell the N-Sensor when it should cut to the minimum rate to stop the over application. Increasing this figure will make the system cut in sooner, decreasing this figure will make the system cut off to the minimum rate later.

In “Target Rate Application” the biomass cutoff is determined by a percentage (10%-90%) of the “Ref” value.



Select the desired value and press “OK”

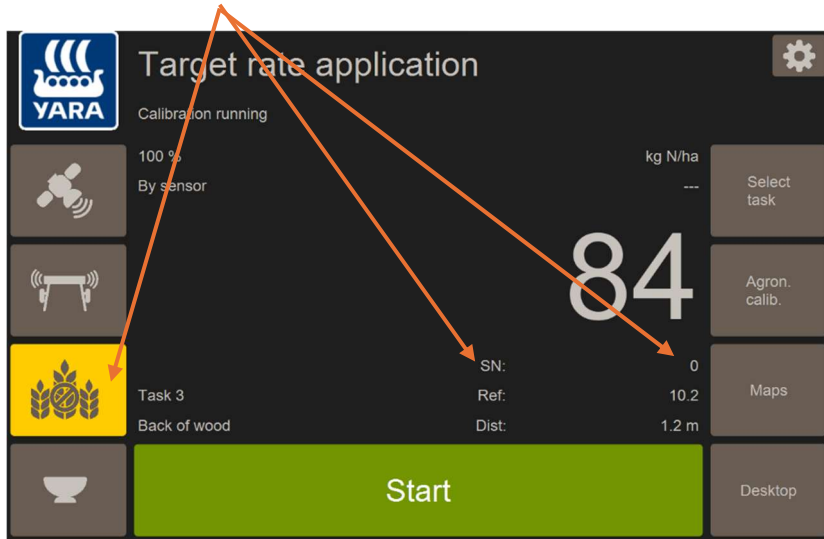


In the example above & below, the N-Sensor has seen and average (Ref) N-Uptake (SN) of 10.2.

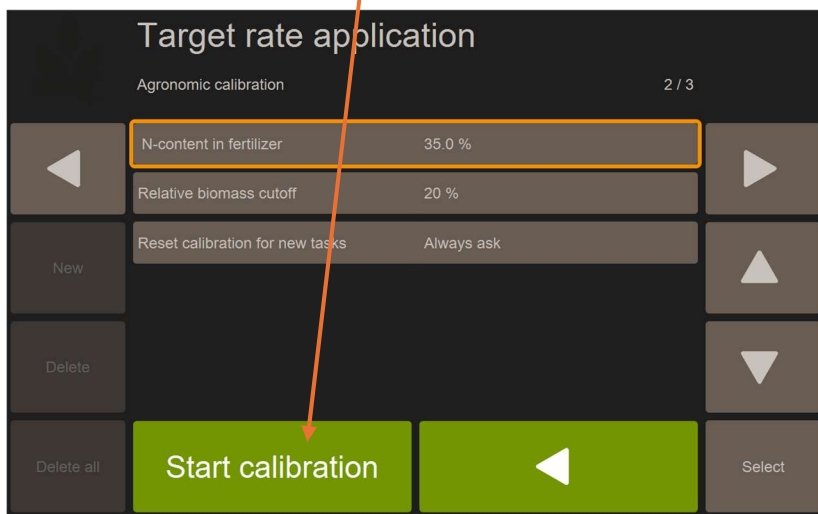
With the biomass cutoff set at 20% this means below 20% of the Average (10.2 SN) the rate will start to reduce to the minimum.

$$10.2(\text{SN}) \div 20\% = 2.04 \text{ or } 2 \text{ SN.}$$

SN values under 2 SN will cause the biomass cutoff factor to kick in



You are now ready to start the calibration process, Press “Start Calibration” to continue



There are 2 ways in which to use “Target Rate Application”, Calibration Running & Calibration Stopped.

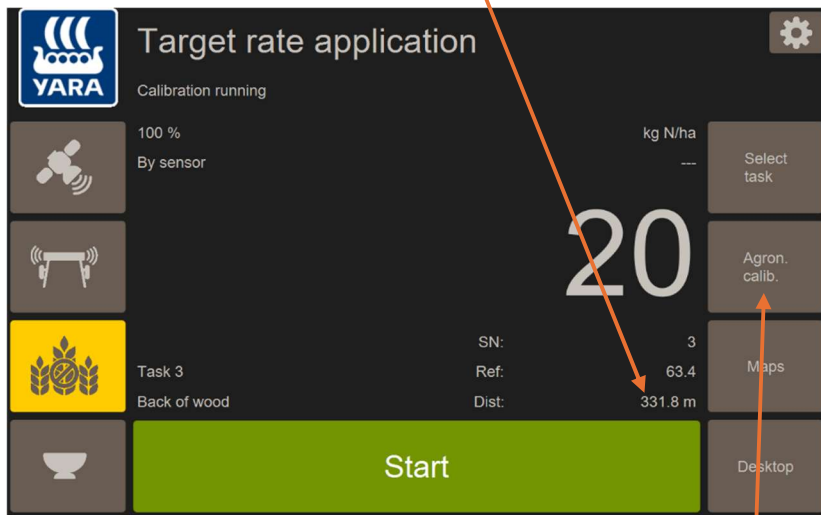
Calibration Running

Once you press “Start” the calibration and application will start, this will continue to run until reset! This means you can keep the calibration continuously through different task’s.

Leaving the Calibration running can mean the “Ref” or average SN value will continuously keep changing and moving, once an application is complete you will see that the average overall rate will be closer to the “Target Rate”.

Calibration Stopped

When “Start” is pressed a distance or “Dist” will start to increase and calculate the “Ref”



After 100M of “Dist” you now have the ability to stop or lock in the calibration which is altering the “Ref” or average value.

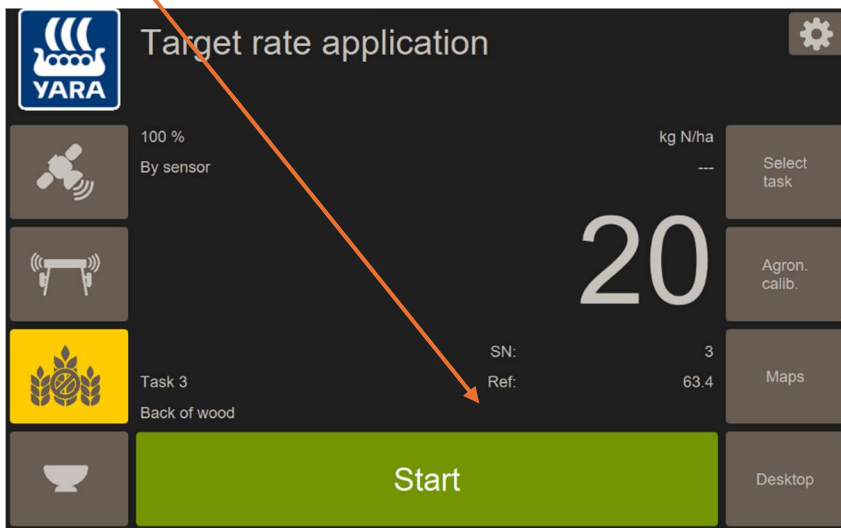
To do so first press “Stop” and then hit “Agronomic Calibration”

You will notice, no agronomy options are available.

You can either “Stop Calibration” or “Return”

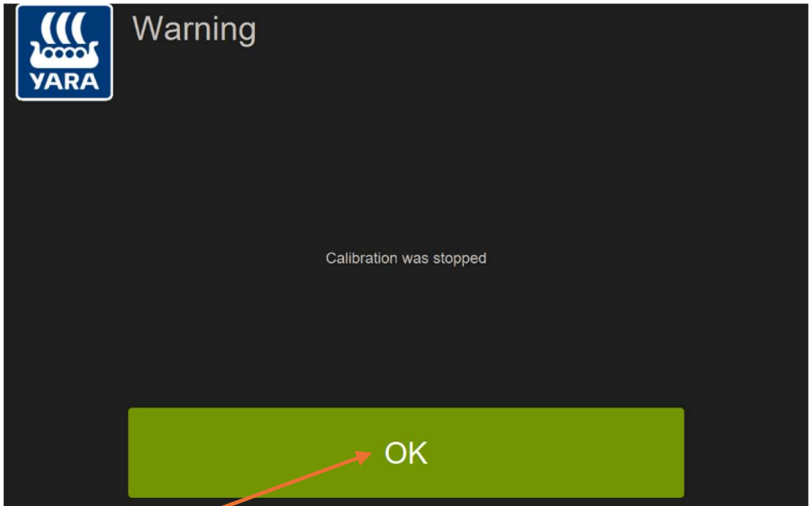


Return will take you back to the main working page, “Stop Calibration” will also return you to the main working page, however will notice “Dist” is now gone.

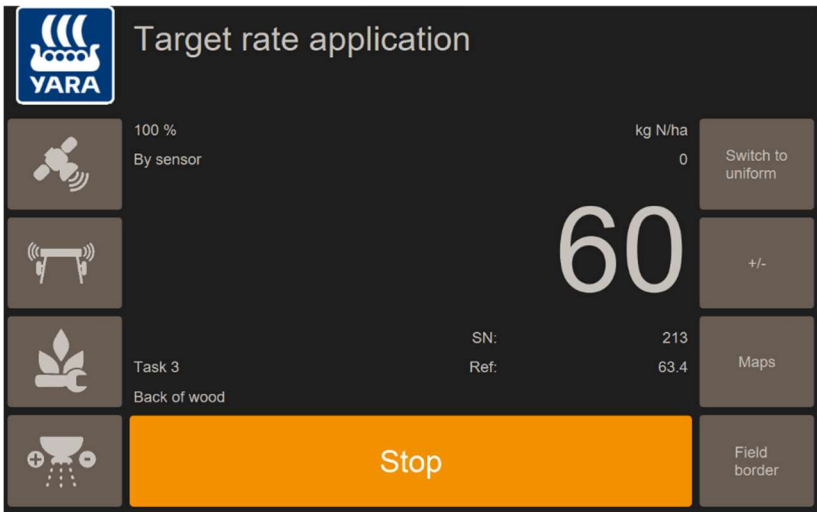


This means the calibration and “Ref” or Average is now locked. This will make the Sensor more accurate across the field/task. It can however cause the Average N-Applied to move away from the intended “Target Rate”

When you next press “Start”, a warning will appear to say the calibration was stopped.

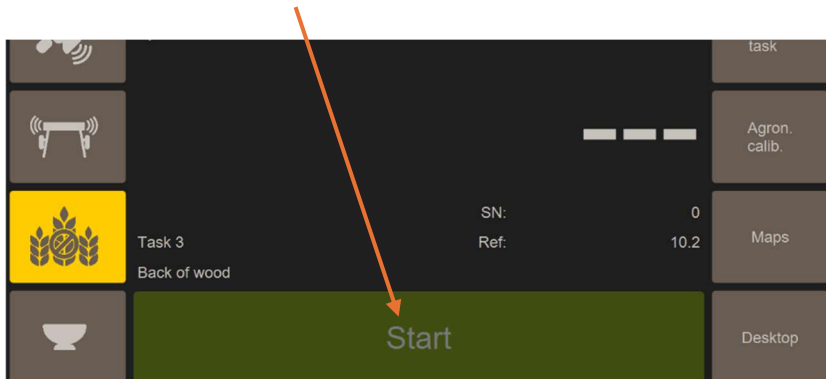


Select “OK” and continue.



You are now ready to press “Start” and use the “Target Rate Application Mode”

You may notice the start bar is a bright colour in the previous images, If the “Start” bar is faded out like below, you must go back into “Agronomic Calibration” and Press “Start Calibration”



In “Target Rate Application” you have the ability reset the calibration throughout the field/task.

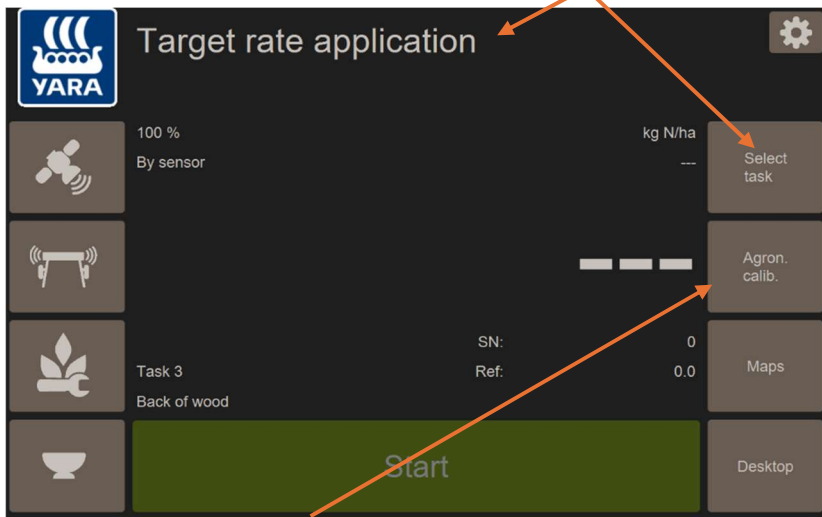
To do so follow the below.

1. Press “Stop”
2. Press “Agronomic Calibration”
3. Press “Stop Calibration”
4. Press “Agronomic Calibration”
5. Press “Start Calibration”

This process will reset the “Ref” and “Dist” back to 0 ready for a new calibration without distorting previous data captured.

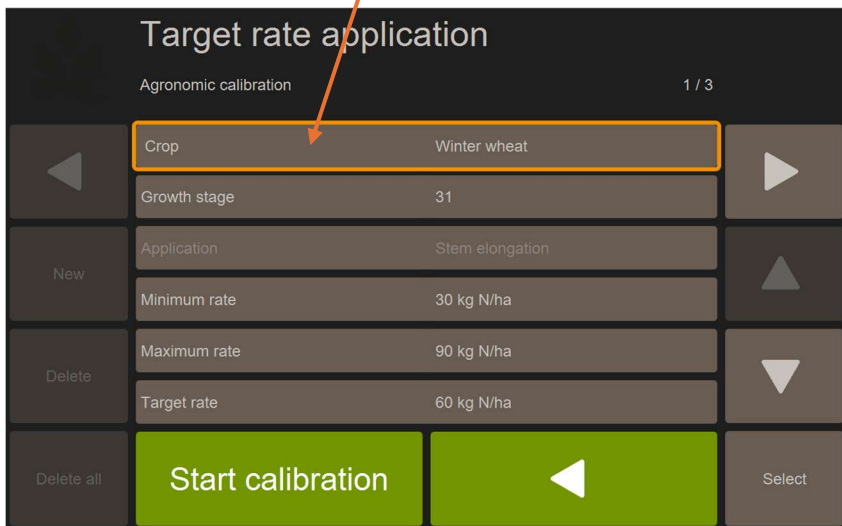
Target Rate Application (Grassland)

To start you must first create a new task in the task Selection, in Operational Modes make sure to select “Target Rate Application” for further details on how to do this see the “Creating a New Task” section.

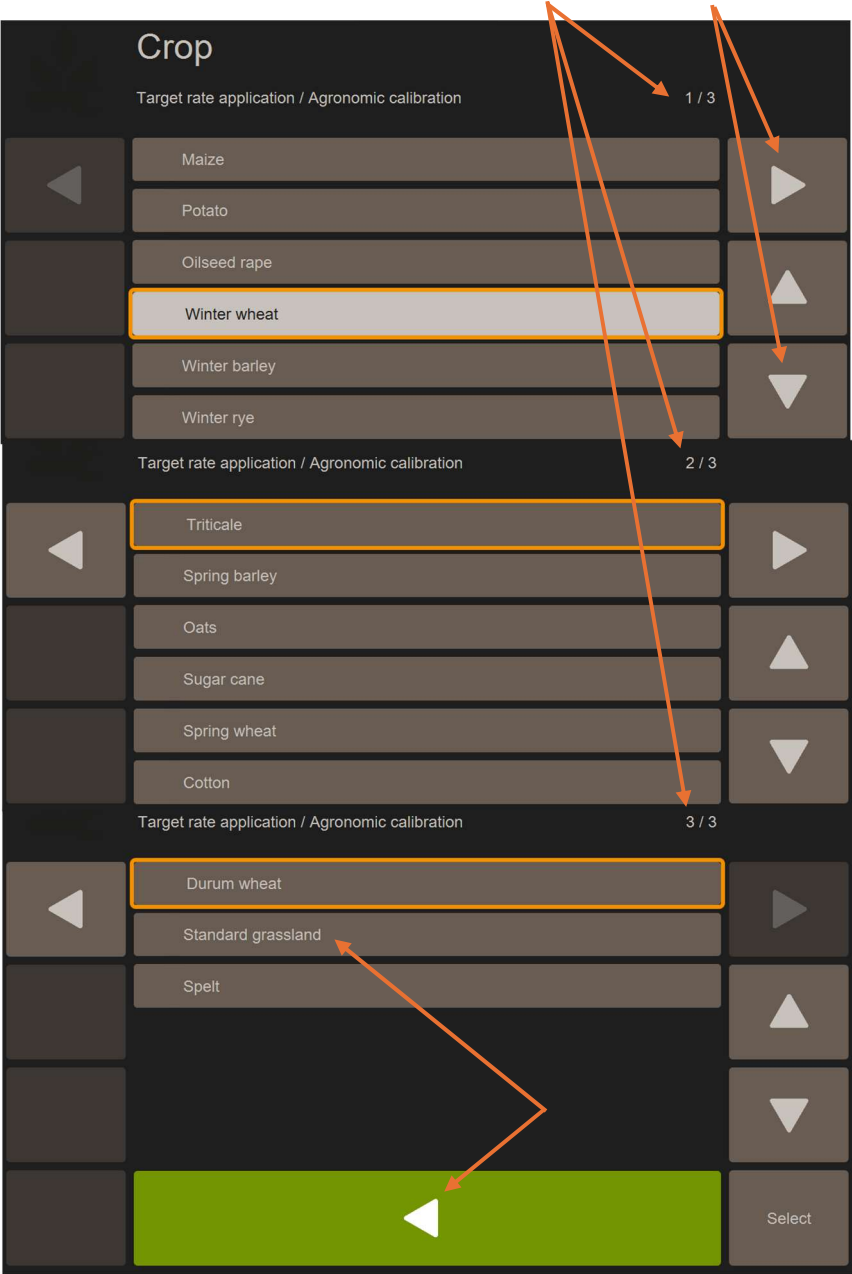


Now select the “Agronomic Calibration”

Firstly we need to change the “Crop” to “Standard Grassland”



Use the “Down” button or “Next Page” button to move across pages and find “Standard Grassland”, once found select and press “OK”



The Grassland module in “Target Rate Application” works under the same principles however instead of growth stages we have changes in “Cuts”

“Cut 1 Top Dressing”, “Cut 2 Top Dressing” – Applications 10+ Days prior to Mowing (Recommended). “Cut 1”, “Cut 2”, “Cut 3-6” – Applications within 2 Days prior to mowing date.

Target rate application

Agronomic calibration 1 / 3

◀	Crop	Standard grassland	▶
	Application	Cut 1	
New	Minimum rate	20 kg N/ha	▲
	Maximum rate	60 kg N/ha	
Delete	Target rate	40 kg N/ha	▼
Delete all	Start calibration		Select

To Change between cuts, Select “Application”

Application

Agronomic calibration / Target rate application 1 / 1

◀	Cut 1 topdressing	▶
	Cut 1	
	Cut 2 topdressing	▲
	Cut 2	
	Cut 3-6	▼
	Select	

Select the appropriate cut and press “Select & Return”

Change the “Minimum rate”, Maximum rate” & “Target rate” to the correct rates. To do so, tap the rate button

Target rate application

Agronomic calibration 1 / 3

◀	Crop	Standard grassland	▶
	Application	Cut 1 topdressing	
New →	Minimum rate	50 kg N/ha	▲
→	Maximum rate	150 kg N/ha	
Delete →	Target rate	100 kg N/ha	▼

Delete all Start calibration ◀ Select

Minimum rate

Valid range: 0 - 150 kg N/ha

50 kg N/ha

▲	7	8	9	⬅️ X
▼	4	5	6	✖️
◀	1	2	3	
		0		

▶ OK Cancel Select

Once selected, Press “OK”

Move to the next Page

Target rate application

Agronomic calibration 2 / 3

◀	N-content in fertilizer 35.0 %	▶
	Relative biomass cutoff 20 %	
New	Reset calibration for new tasks Always ask	▲
Delete		▼
Delete all	Start calibration	Select

You can also go back and check previous setting by hitting the back arrow.

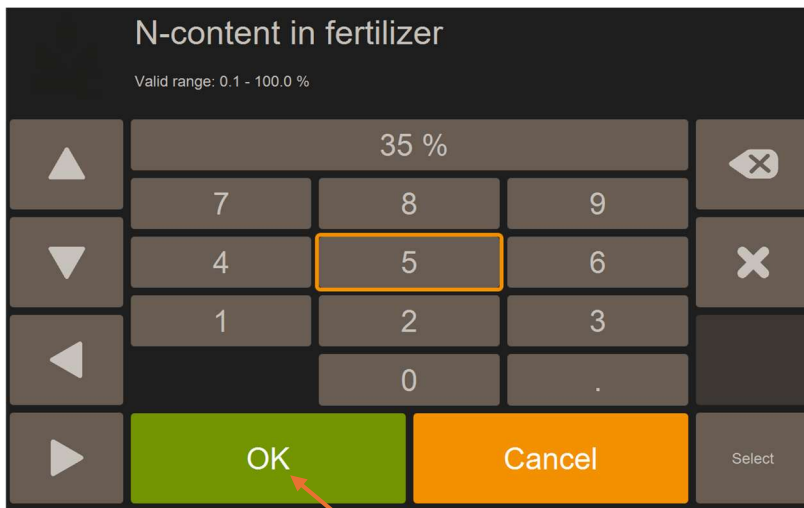
Target rate application

Agronomic calibration 2 / 3

◀	N-content in fertilizer 25.0 %	▶
	Relative biomass cutoff 20 %	
New	Reset calibration for new tasks No	▲
Delete		▼
Delete all	Start calibration	Select

Select “N-content in fertilizer” to change the N%

N% valid range from 0.1% to 100%, remember this is N% (**Weight by Volume**), Liquid (Weight by Weight) manufacturers need to be converted, see Rate Calculator for more information.



N-content in fertilizer

Valid range: 0.1 - 100.0 %

35 %

7 8 9

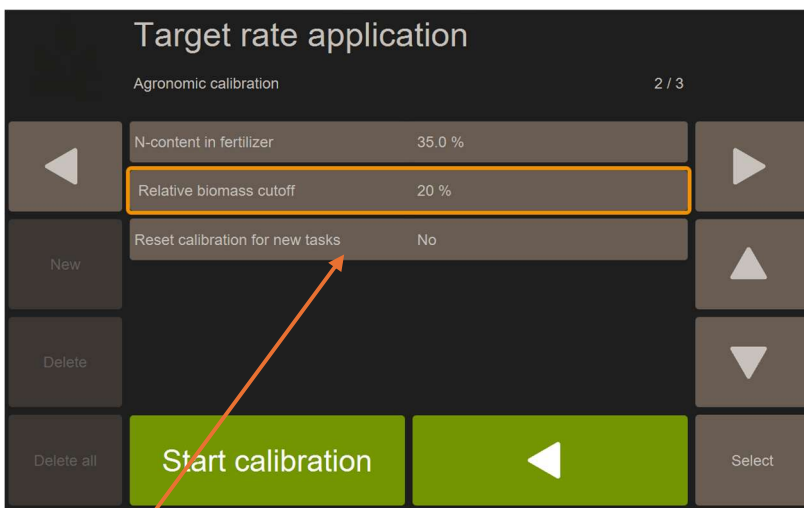
4 5 6

1 2 3

0 .

OK Cancel Select

Select the correct N% and press “OK”



Target rate application

Agronomic calibration 2 / 3

N-content in fertilizer 35.0 %

Relative biomass cutoff 20 %

Reset calibration for new tasks No

New

Delete

Delete all

Start calibration Select

“Reset calibration for new task”, Once you have completed a task and are looking to move onto the next task,

this feature allows you to either keep or delete the calibration when moving to the next task.

The options :-

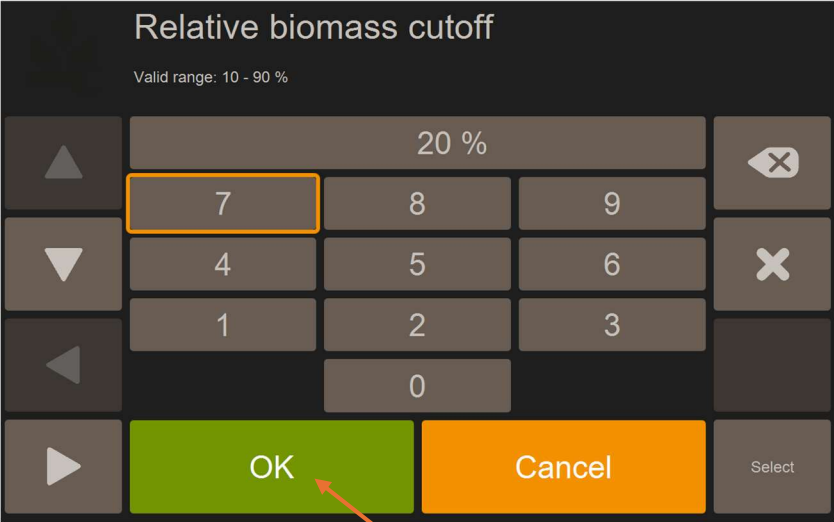
- No – This will keep the calibration value when moving to the next task
- Yes – This will delete the calibration value when moving to the next task
- Always Ask – Once a new task is created a pop-up option will ask If you wish to keep the calibration value or delete it.

The screenshot shows a mobile application interface titled "Target rate application". Below the title, it says "Agronomic calibration" and "2 / 3". The interface has a dark background with light-colored text and buttons. There are three rows of settings, each with a left arrow, a text input field, and a right arrow. The first row is "N-content in fertilizer" with a value of "35.0 %". The second row is "Relative biomass cutoff" with a value of "20 %", and this row is highlighted with an orange border. The third row is "Reset calibration for new tasks" with a value of "No". On the left side, there are three buttons: "New", "Delete", and "Delete all". On the right side, there are three buttons: "Up", "Down", and "Select". At the bottom, there are two large green buttons: "Start calibration" and a back arrow button.

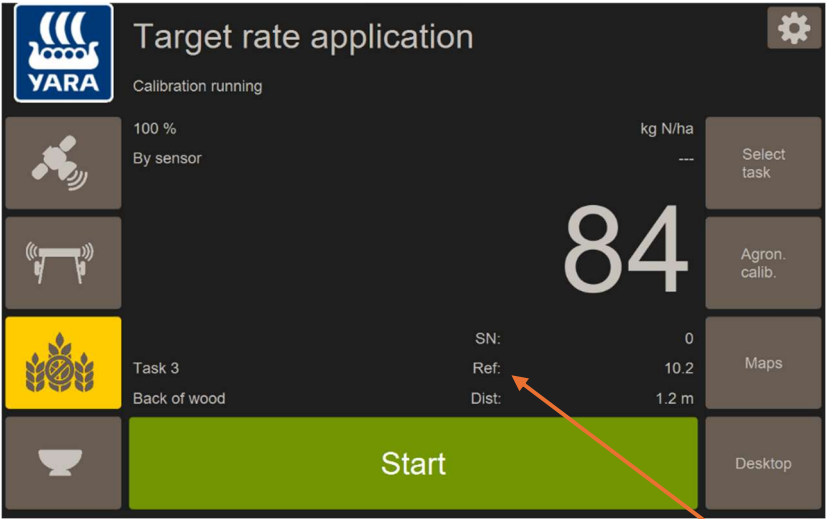
Setting	Value
N-content in fertilizer	35.0 %
Relative biomass cutoff	20 %
Reset calibration for new tasks	No

"Biomass cutoff factor", To stop over application on poor areas the N-Sensor includes a biomass cutoff feature, you can tell the N-Sensor when it should cut to the minimum rate to stop the over application. Increasing this figure will make the system cut in sooner, decreasing this figure will make the system cut off to the minimum rate later.

In “Target Rate Application” the biomass cutoff is determined by a percentage (10%-90%) of the “Ref” value.



Select the desired value and press “OK”

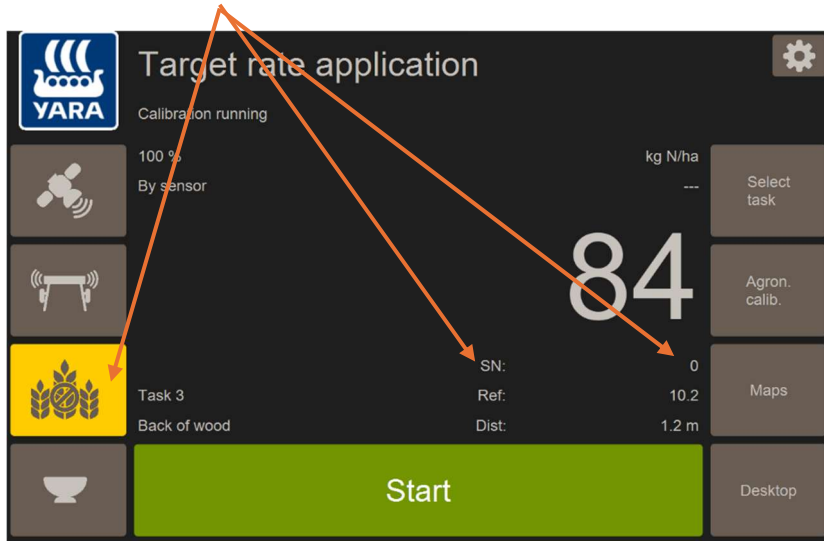


In the example above & below, the N-Sensor has seen and average (Ref) N-Uptake (SN) of 10.2.

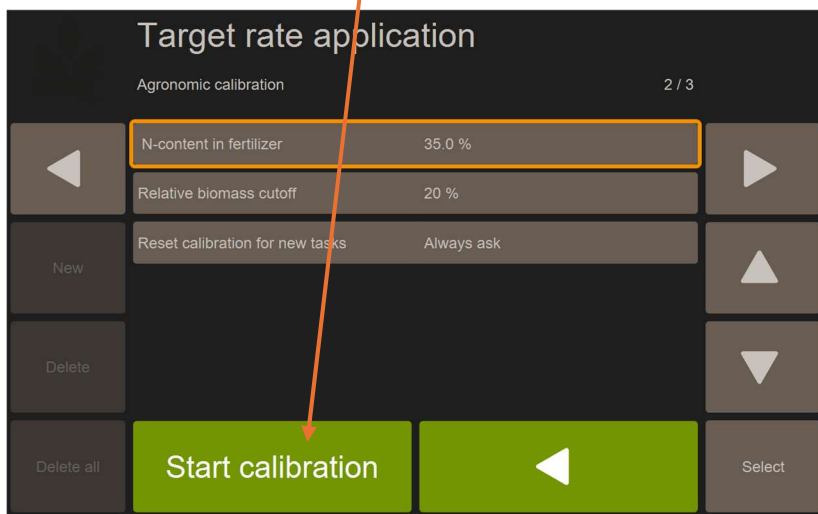
With the biomass cutoff set at 20% this means below 20% of the Average (10.2 SN) the rate will start to reduce to the minimum.

$$10.2(\text{SN}) \div 20\% = 2.04 \text{ or } 2 \text{ SN.}$$

SN values under 2 SN will cause the biomass cutoff factor to kick in



You are now ready to start the calibration process, Press “Start Calibration” to continue



There are 2 ways in which to use “Target Rate Application”, Calibration Running & Calibration Stopped.

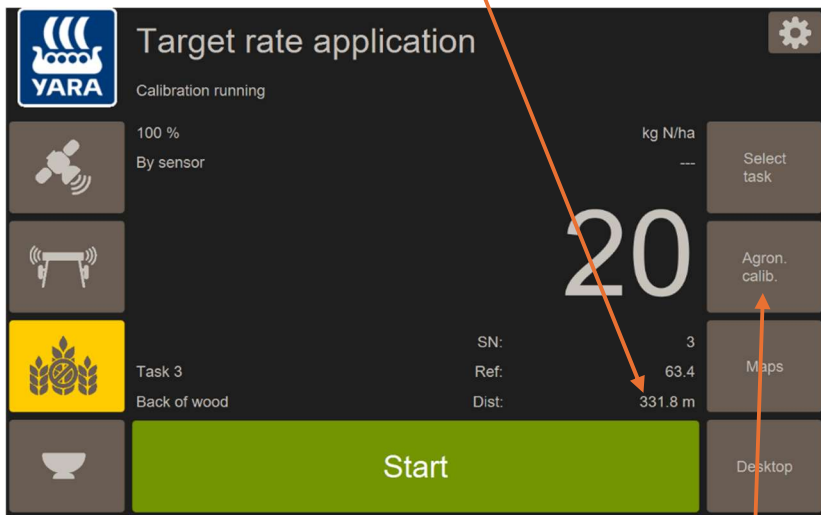
Calibration Running

Once you press “Start” the calibration and application will start, this will continue to run until reset! This means you can keep the calibration continuously through different “Task”.

Leaving the Calibration running can mean the “Ref” or average SN value will continuously keep changing and moving, once an application is complete you will see that the average overall rate will be closer to the “Target Rate”.

Calibration Stopped

When “Start” is pressed a distance or “Dist” will start to increase and calculate the “Ref”

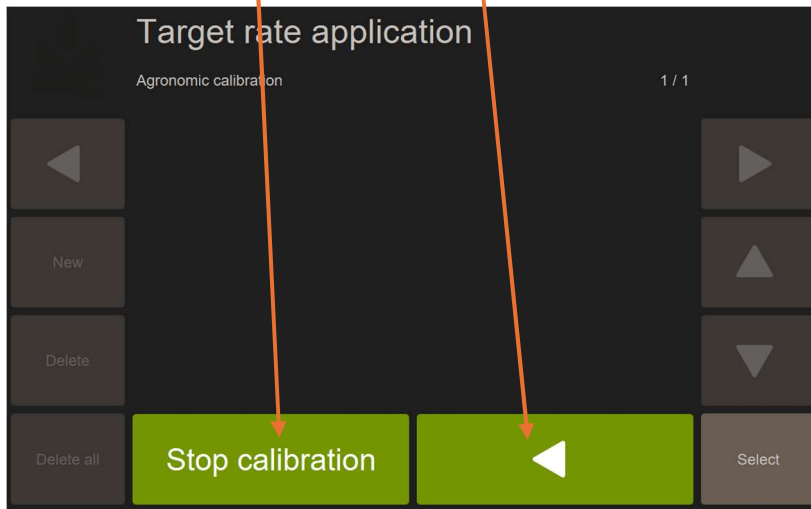


After 100M of “Dist” you now have the ability to stop or lock in the calibration which is altering the “Ref” or average value.

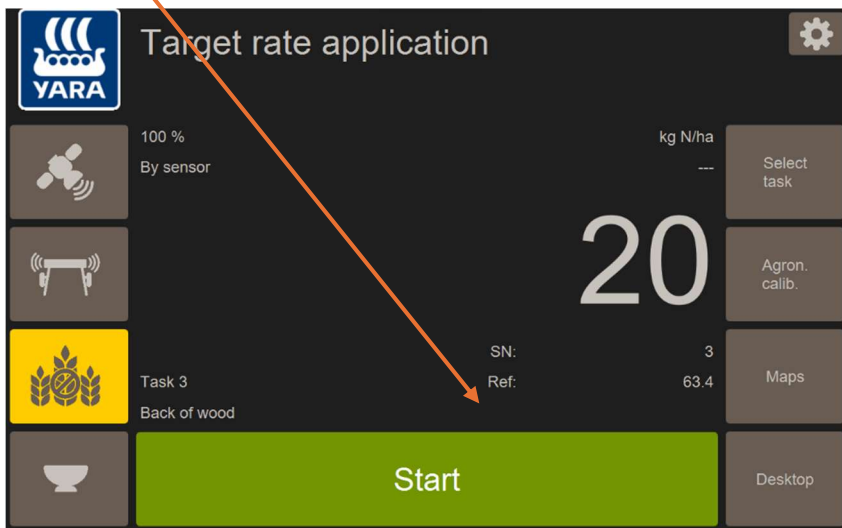
To do so first press “Stop” and then hit “Agronomic Calibration”

You will notice, no agronomy options are available.

You can either “Stop Calibration” or “Return”

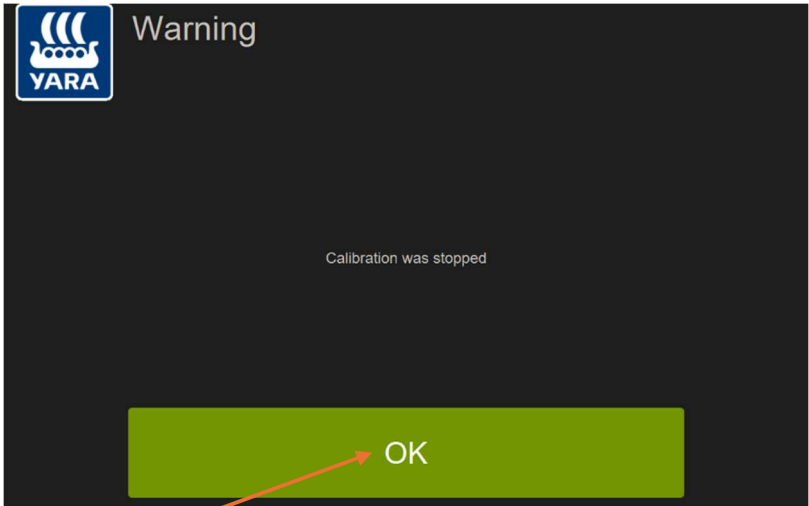


Return will take you back to the main working page, “Stop Calibration” will also return you to the main working page, however will notice “Dist” is now gone.

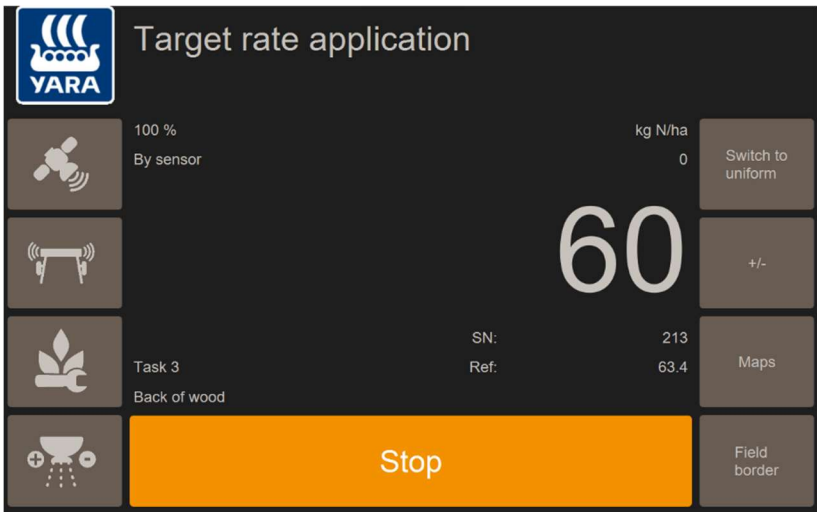


This means the calibration and “Ref” or Average SN is now locked.
This will make the Sensor more accurate across the field/task. It can however cause the Average N-Applied to move away from the intended “Target Rate”

When you next press “Start”, a warning will appear to say the calibration was stopped.

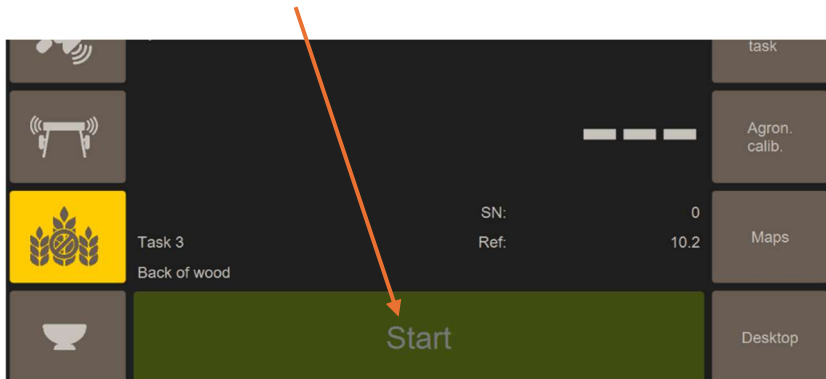


Select “OK” and continue.



You are now ready to press “Start” and use the “Target Rate Application Mode”

You may notice the start bar is a bright colour in the previous images, If the “Start” bar is faded out like below, you must go back into “Agronomic Calibration” and Press “Start Calibration”



In “Target Rate Application” you have the ability reset the calibration throughout the field/task.

To do so follow the below.

6. Press “Stop”
7. Press “Agronomic Calibration”
8. Press “Stop Calibration”
9. Press “Agronomic Calibration”
10. Press “Start Calibration”

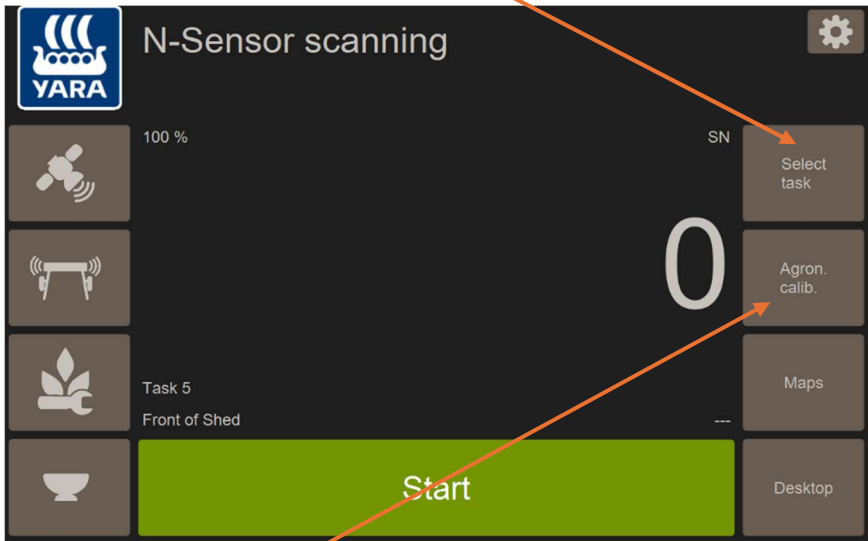
This process will reset the “Ref” and “Dist” back to 0 ready for a new calibration without distorting previous data captured.

Notes

Scanning

The Scanning mode allows you to scan a crop and take a biomass reading without application. Simply tell the N-Sensor the Crop and the implement width on the vehicle and record.

To start you must first create a new task in the task Selection, in Operational Modes make sure to select “Scanning” for further details on how to do this see the “Creating a New Task” section



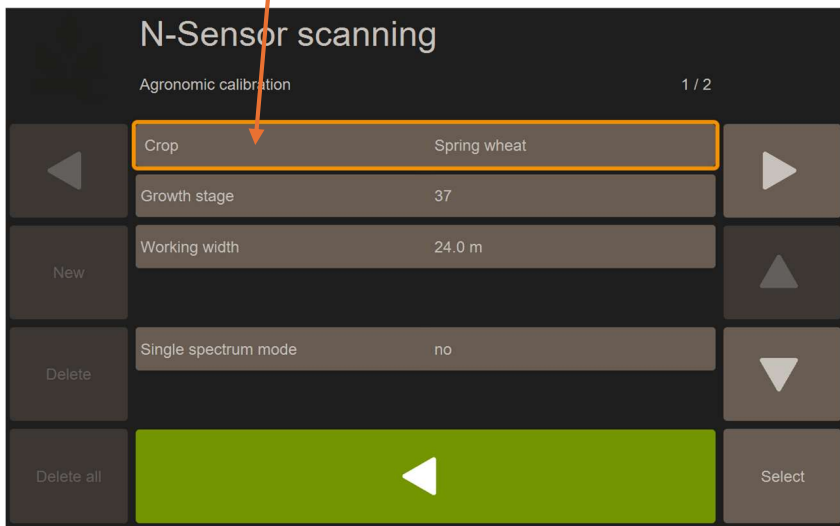
Now select “Agronomic calibration”

There are only 4 Options to choose from when scanning,

- Crops
- Growth stage or Cut (Grassland Only)
- Working width
- Single Spectrum mode

First choose the correct “Crop” to scan, “Crops” available to scan are:

- Maize
- Potato's
- Oilseed Rape
- Winter Wheat
- Winter Barley
- Winter Rye
- Triticale
- Spring Barley
- Oats
- Sugar Cane
- Spring Wheat
- Cotton
- Durum wheat
- Standard Grassland
- Spelt



The screenshot shows the 'N-Sensor scanning' interface. At the top, it says 'Agronomic calibration' and '1 / 2'. Below this is a list of fields: 'Crop' (with 'Spring wheat' selected), 'Growth stage' (with '37'), 'Working width' (with '24.0 m'), and 'Single spectrum mode' (with 'no'). There are navigation buttons: a left arrow, a right arrow, a 'New' button, a 'Delete' button, and a 'Delete all' button. A large green button with a white left arrow is at the bottom, and a 'Select' button is on the right.

Field	Value
Crop	Spring wheat
Growth stage	37
Working width	24.0 m
Single spectrum mode	no

When the correct crop is selected, press “Select & Return”

Crop

N-Sensor scanning / Agronomic calibration 2 / 3

◀	Triticale	▶
	Spring barley	
	Oats	▲
	Sugar cane	
	Spring wheat	▼
	Cotton	

◀ Select

Next enter the “Growth stage” or “Cut” (Grassland Only)

N-Sensor scanning

Agronomic calibration 1 / 2

◀	Crop	Spring barley	▶
	Growth stage	32	
New	Working width	24.0 m	▲
Delete	Single spectrum mode	no	▼

Delete all

◀ Select

Either enter the growth stage, and press “OK”

Growth stage

Valid range: 0 - 99 BBCH

32 BBCH

7 8 9

4 5 6

1 2 3

0

OK Cancel Select

Or enter Application / Cut, and press “Select & Return” (Grassland Only)

Application

Agronomic calibration / N-Sensor scanning 1 / 1

Cut 1 topdressing

Cut 1

Cut 2 topdressing

Cut 2

Cut 3-6

Select & Return Select

Next type in the correct “Working width”

N-Sensor scanning

Agronomic calibration 1 / 2

◀	Crop	Spring barley	▶
	Growth stage	32	
New	Working width	24.0 m	▲
Delete	Single spectrum mode	no	▼
Delete all			Select

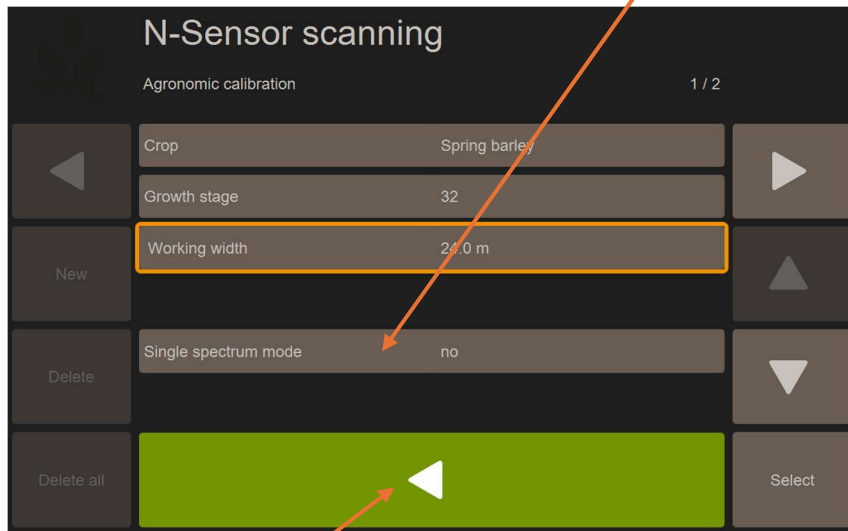
Once the correct working width has been set, press “OK”

Working width

Valid range: 0.0 - 100.0 m

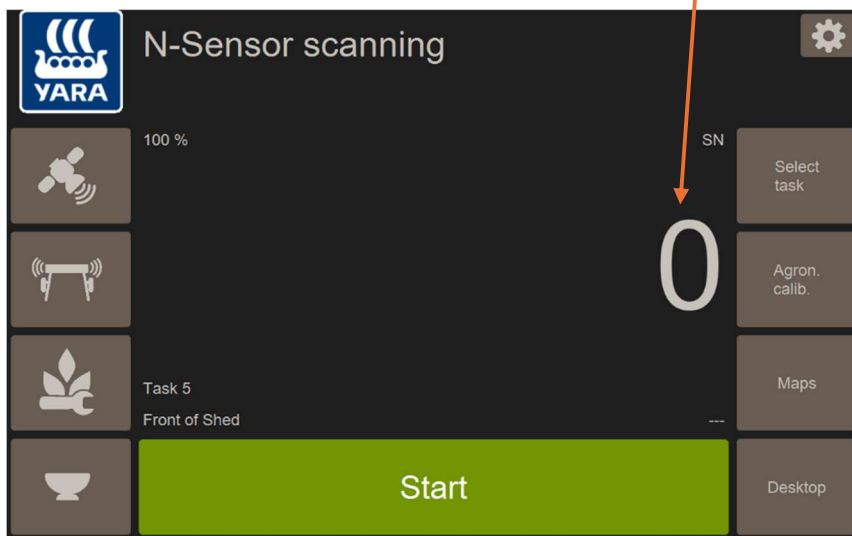
▲	24.0 m			✕
▼	7	8	9	✕
	4	5	6	
◀	1	2	3	
▶		0		
	OK	Cancel	Select	

“Single spectrum mode” should always remain as “no”



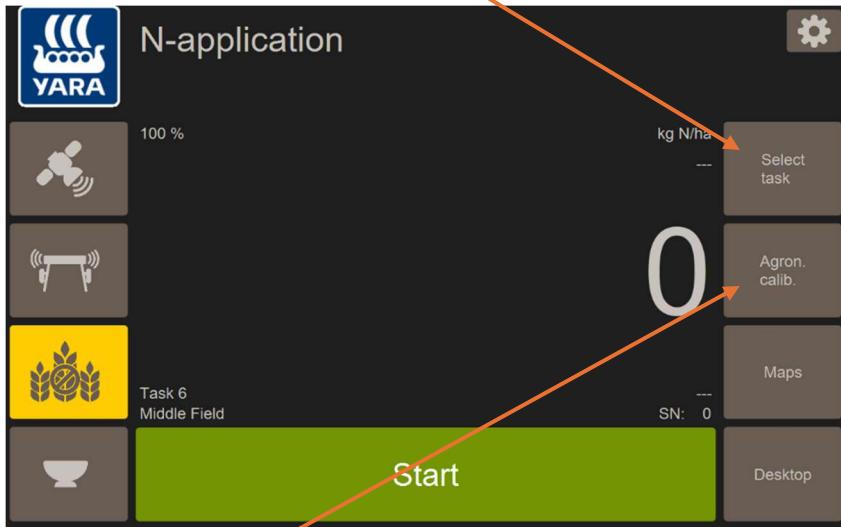
Press “Select & Return”,

You are now ready to press “Start”, the only difference between the “Scanning Mode” and other modes is that no rate is provided, which means the large figure in the middle, usually Kg N/Ha is now SN (Nitrogen Uptake) instead.



N-Application

To start you must first create a new task in the task Selection, in Operational Modes make sure to select "N-Application" for further details on how to do this see the "Creating a New Task" section



Now Select "Agronomic calibration"

Firstly select a "Crop", Available crops include

- Cotton
- Durum wheat
- Maize
- Oats
- Oilseed Rape
- Potatoes
- Spelt
- Spring wheat
- Spring barley
- Standard grassland
- Sugar cane
- Triticale
- Winter Barley
- Winter Rye
- Winter Wheat

N-application

Agronomic calibration 1 / 3

◀	Crop	Winter barley	▶
	Growth stage	37	
New	Application	Booting	▲
	Minimum rate	0 kg N/ha	
Delete	Maximum rate	150 kg N/ha	▼
	Uniform rate	80 kg N/ha	
Delete all	◀		Select

Select "Crop" to change crop type

Next Select the "Growth stage" or "Cut" (Grassland Only)

Either enter the growth stage, and press "OK"

Growth stage

Valid range: 0 - 99 BBCH

32 BBCH

7 8 9

4 5 6

1 2 3

0

OK Cancel Select

Or enter Application / Cut, and press "Select & Return" (Grassland Only)

Application

Agronomic calibration / N-Sensor scanning 1 / 1

Cut 1 topdressing

Cut 1

Cut 2 topdressing

Cut 2

Cut 3-6

Select & Return Select

In cereal and brassica crops you get additional settings. The “Application” description will appear below the growth stage, between

N-application		Agronomic calibration	1 / 3
◀	Crop	Winter barley	▶
	Growth stage	37	
New	Application	Booting	▲
	Minimum rate	0 kg N/ha	
Delete	Maximum rate	150 kg N/ha	▼
	Uniform rate	80 kg N/ha	
Delete all	◀		Select

GS20 - GS36 this value is locked, between GS37 – GS49 this value can be changed between “Booting” & “Protein dressing”

“OSR” will also allow you to change between 1st and 2nd dressing.

Cereals crop’s that have additional applications like, Tillering, Steam elongation, Booting & Protein dressing:-

- Winter Wheat
- Winter Wheat
- Winter Rye
- Triticale
- Spring Wheat
- Spelt
- Durum Wheat

The “Protein Dressing” mode will invert what the N-Sensor would do normally, so higher biomass and N-uptake areas will get a higher rate and lower Biomass and N-uptake areas will receive less.

When selecting between GS37 - GS49, the "Application" "Booting" can be pressed and changed to a "Protein Dressing" mode

The screenshot shows the 'N-application' screen with the title 'Agronomic calibration' and a page indicator '1 / 3'. The 'Application' field is highlighted with an orange box and an arrow pointing to it from the text above. The 'Application' field is set to 'Protein dressing'. Other fields include 'Crop' (Winter barley), 'Growth stage' (37), 'Minimum rate' (0 kg N/ha), 'Maximum rate' (150 kg N/ha), and 'Uniform rate' (80 kg N/ha). There are navigation buttons (left arrow, right arrow, up arrow, down arrow) and a 'Select' button at the bottom right. A green bar with a white left arrow is at the bottom.

Field	Value
Crop	Winter barley
Growth stage	37
Application	Protein dressing
Minimum rate	0 kg N/ha
Maximum rate	150 kg N/ha
Uniform rate	80 kg N/ha

Next select the "Minimum rate" "Maximum rate" & "Uniform rate"" to set the upper & lower rate limits. (Kg N/Ha)

The screenshot shows the 'N-application' screen with the title 'Agronomic calibration' and a page indicator '1 / 3'. The 'Application' field is set to 'Booting'. The 'Minimum rate', 'Maximum rate', and 'Uniform rate' fields are highlighted with orange boxes and arrows pointing to them from the text above. The 'Minimum rate' is 0 kg N/ha, the 'Maximum rate' is 150 kg N/ha, and the 'Uniform rate' is 80 kg N/ha. Other fields include 'Crop' (Winter barley) and 'Growth stage' (37). There are navigation buttons (left arrow, right arrow, up arrow, down arrow) and a 'Select' button at the bottom right. A green bar with a white left arrow is at the bottom.

Field	Value
Crop	Winter barley
Growth stage	37
Application	Booting
Minimum rate	0 kg N/ha
Maximum rate	150 kg N/ha
Uniform rate	80 kg N/ha

If the system fails or has a hardware failure "Uniform rate" is the flat rate then applied as a fail-safe.

Minimum rate

Valid range: 0 - 150 kg N/ha

25 kg N/ha

▲	7	8	9	⬅️✕
▼	4	5	6	✕
◀️	1	2	3	
▶️		0		
	OK	Cancel		Select

Select the limitations and uniform rate then, Press "OK"

Move to the next Page

N-application

Agronomic calibration 2 / 3

◀️	N-content in fertilizer	25.0 %	▶️
	Reference rate	80 kg N/ha	
New	Reference sensor value	100.0 (SN)	▲
	Biomass cutoff factor	100 %	
Delete	Biomass cutoff	43.0 (SN)	▼
	Calibrate at reference plot	...	
Delete all	◀️		Select

You can also go back and check previous setting by hitting the back arrow.

N-application		2 / 3
Agronomic calibration		
	N-content in fertilizer 25.0 %	
	Reference rate 80 kg N/ha	
New	Reference sensor value 100.0 (SN)	
	Biomass cutoff factor 100 %	
Delete	Biomass cutoff 43.0 (SN)	
	Calibrate at reference plot ...	
Delete all		Select

Select "N-content in fertilizer" to change the N% choose a valid range from 0.1% to 100%, remember this is N% (**Weight by Volume**, Liquid Weight by Weight) manufacturers need to be converted, see Rate Calculator for more information.

N-content in fertilizer			
Valid range: 0.1 - 100.0 %			
	35 %		
	7	8	9
	4	5	6
	1	2	3
		0	.
	OK	Cancel	Select

Select the correct N% and press "OK"

N-Application works upon an adjustable reference rate either set by the user or by a “Calibration at reference plot” (N-Sensor self-calibration).

That then sets the “Reference sensor value”, whatever SN (Nitrogen Uptake) value then N-Sensor collects or the user chooses the N-Sensor then works with this value for the “Reference rate”

In the example below, every time the N-Sensor see’s 100 SN (Nitrogen Uptake) in the crop it will apply the “Reference rate” 80 Kg N/Ha.

The screenshot shows a mobile application interface for N-application. At the top, it says 'N-application' and 'Agronomic calibration' with a version number '2.3'. Below this is a table of settings. The 'Reference rate' is set to '80 kg N/ha' and the 'Reference sensor value' is set to '100.0 (SN)'. Two orange arrows point from the text above to these two fields. The interface also includes buttons for 'New', 'Delete', 'Delete all', and 'Select'.

	Setting	Value
	N-content in fertilizer	35.0 %
	Reference rate	80 kg N/ha
New	Reference sensor value	100.0 (SN)
	Biomass cutoff factor	100 %
Delete	Biomass cutoff	43.0 (SN)
	Calibrate at reference plot	...
Delete all		

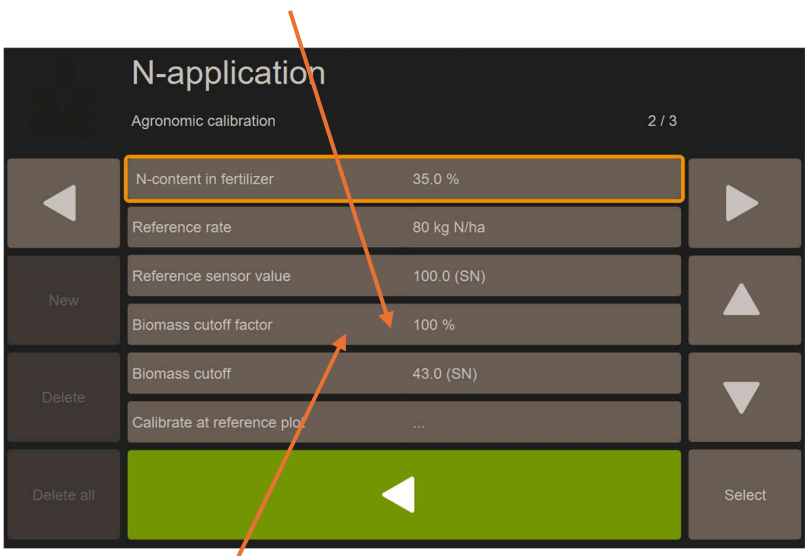
With individual crop algorithm’s, the SN values increasing and decreasing this will then adjust the application rate depending on severity of difference to the “Reference Sensor Value”.

“Biomass cutoff” is now applied in 2 factors

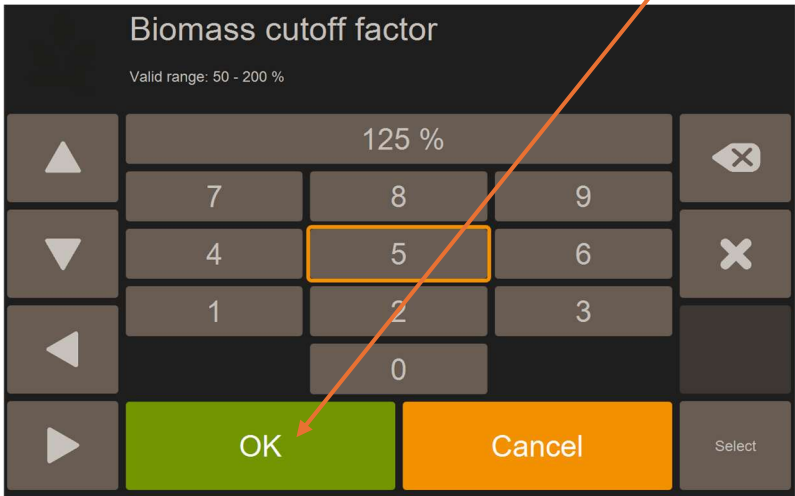
- When to engage and start decreasing N rates,
- How quickly & strongly the “Biomass cutoff” engages to decrease the rate.

The “Biomass cutoff factor” can be adjusted from 50% - 200%, 100% is standard.

If the system isn’t cutting off quick enough increasing the 100% to 200% will make the system drop or respond the SN value below the “Biomass Cutoff” twice as fast. Decreasing this value to 50% will slow the system down in its response to values below the “Biomass cutoff”.



Select the “Biomass cutoff value” to adjust, then press “OK”



Now press “Biomass cutoff”

For “Biomass cutoff” select the SN (Nitrogen Uptake) value in which you wish the N-Sensor to start cutting back the N application.

N-application
Agronomic calibration 2 / 3

◀	N-content in fertilizer	35.0 %	▶
	Reference rate	80 kg N/ha	
New	Reference sensor value	100.0 (SN)	▲
	Biomass cutoff factor	125 %	
Delete	Biomass cutoff	43.0 (SN)	▼
	Calibrate at reference plot	...	
Delete all	◀		Select

Select the SN cutoff value and press “OK”,

Biomass cutoff
Valid range: 0.0 - 999.0 (SN)

46.0 (SN)

▲	7	8	9	⬅️ X
▼	4	5	6	✖️
◀	1	2	3	
▶		0		
	OK	Cancel	Select	

The Agronomy is now set up, however as previously mentioned, the “Reference sensor rate” can either be set manually or set by scanning an area of crop to create an average SN value.

To do this self-calibration process press “Calibrate at reference plot”

N-application		2 / 3	
Agronomic calibration			
◀	N-content in fertilizer	35.0 %	▶
	Reference rate	80 kg N/ha	
New	Reference sensor value	100.0 (SN)	▲
	Biomass cutoff factor	125 %	
Delete	Biomass cutoff	46.0 (SN)	▼
	Calibrate at reference plot	...	
Delete all	◀		Select

Calibrate at reference plot

N-application / Agronomic calibration

Task 6 Middle Field

Press "Start" and drive slowly through the calibration area.

Current sensor value: ---

Average sensor value: ---

No. of measurements: ---

OK Cancel Start

This will now need to create over 1 measurement an “Average Sensor Value” in order to use as a “Reference Sensor value”

Press “Start”, to start creating an average value for the “Reference sensor value”

Calibrate at reference plot

N-application / Agronomic calibration

Task 6 Middle Field

Press "Start" and drive slowly through the calibration area.

Current sensor value: ---
Average sensor value: ---
No. of measurements: ---

OK Cancel Start

When your happy with the amount of measurements have been collected press “Pause”

Calibrate at reference plot

N-application / Agronomic calibration

Task 6 Middle Field

Press "OK" to finish calibration. If necessary, press "Pause" at headlands.

Current sensor value: 107.7
Average sensor value: 58.9
No. of measurements: 4

OK Cancel Pause

Note the “Average sensor value”, Then Press “OK”,

(You have to go back into “Agronomic calibration” to check) The “Average sensor value” (58.9 SN) has now come through.

N-application
Agronomic calibration 2 / 3

◀	N-content in fertilizer	35.0 %	▶
	Reference rate	80 kg N/ha	
New	Reference sensor value	58.9 (SN)	▲
	Biomass cutoff factor	125 %	
Delete	Biomass cutoff	46.0 (SN)	▼
	Calibrate at reference plot	...	
Delete all	▶		Select

After pressing “OK” in the “Calibrate at reference plot” page, the application will then present the “Reference rate” to Check.

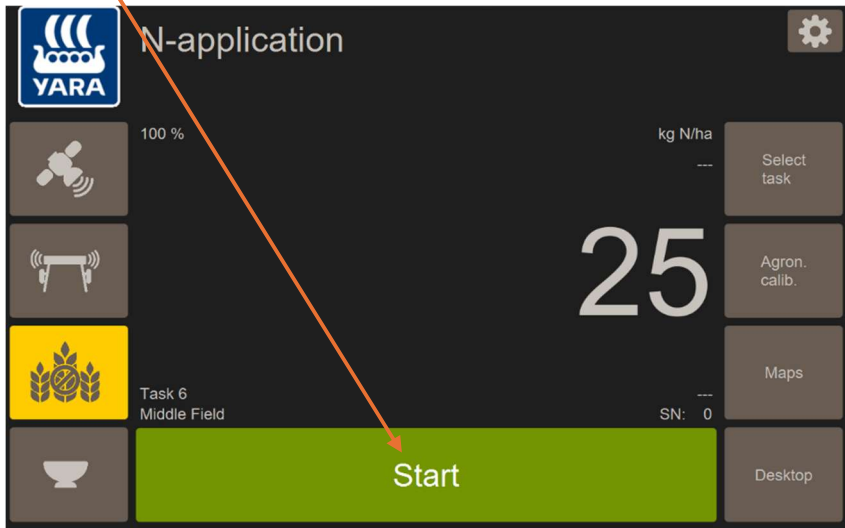
Reference rate
Valid range: 0 - 999 kg N/ha

80 kg N/ha

▲	7	8	9	✕
▼	4	5	6	✕
◀	1	2	3	
▶		0		
	OK	Cancel	Select	

After selecting “OK” you will automatically complete the “Agronomic calibration” and go through to the main working page.

Press “Start” to start the application



Base Application

Base Application can be used with the following prescription maps

- .rst - Raster Maps
- .grd – Grid File
- .shp – Shape File (file must include .shp + .dbf + .shx)

.rst & .grd files also have the ability to be interpolated,

Interpolated uses data points nearby to mix data to increase accuracy.

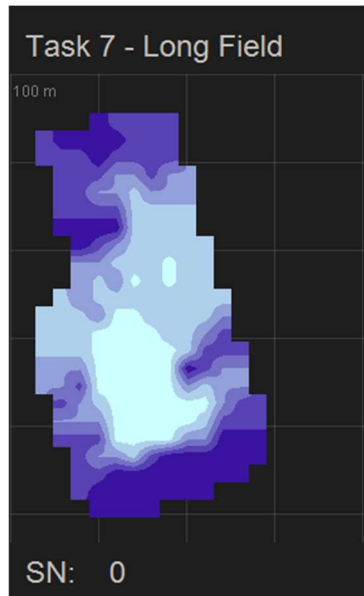
.rst not Interpolated

(Example)



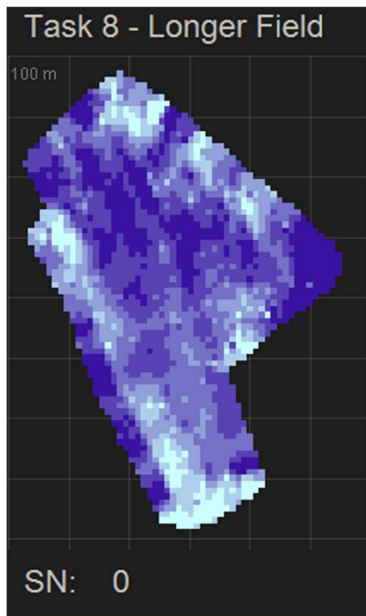
.rst Interpolated

(Example)



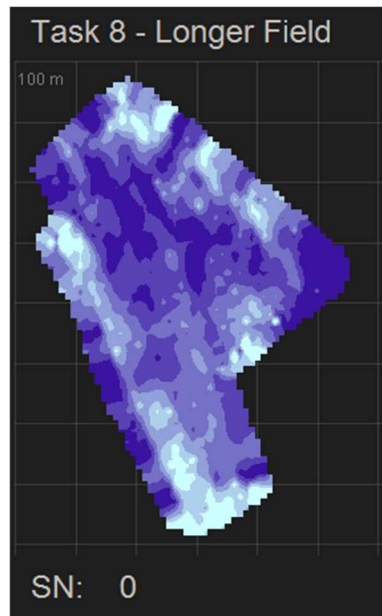
.grd not interpolated

(Example)

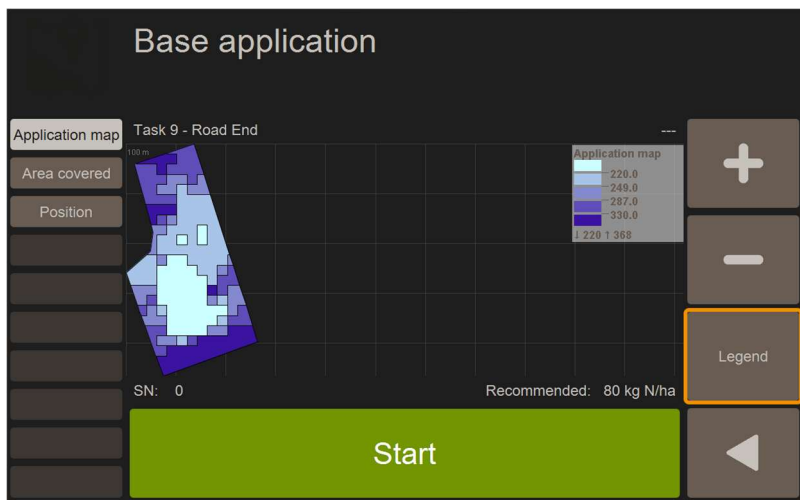


.grd interpolated

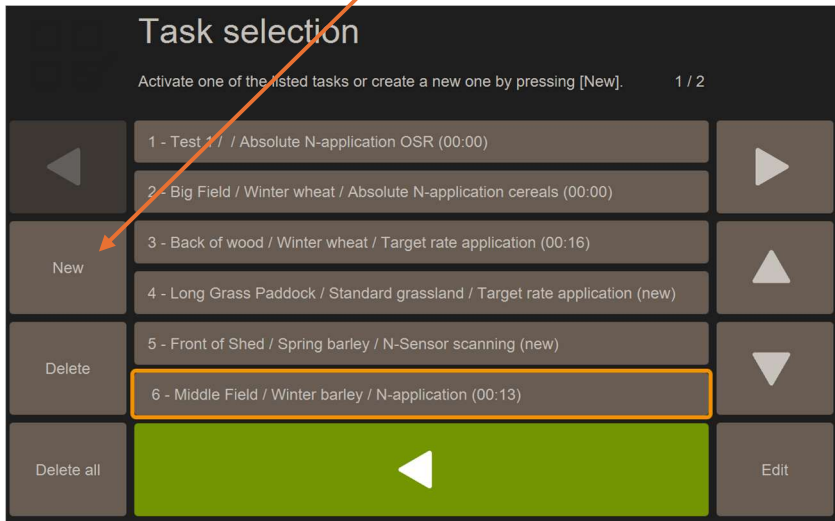
(Example)



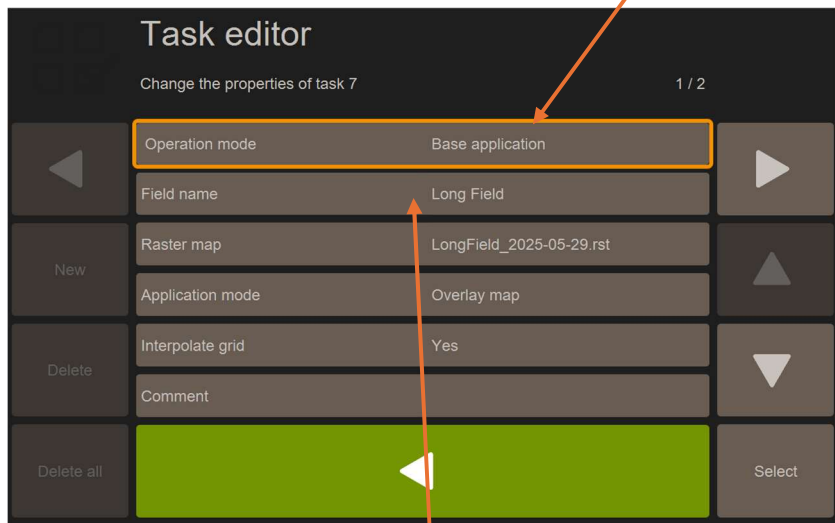
.shp (Example)



To start you must first create a “New” task in the task selection,



in “Operational Modes” make sure to select “Base application”.



For recording purposes add a “Field name”

You must now select the correct prescription map, to do so select "Raster map"

The screenshot shows the 'Task editor' interface with the title 'Change the properties of task 7' and a progress indicator '1 / 2'. The interface is divided into several sections. The top section contains 'Operation mode' and 'Base application'. Below this is a highlighted section with 'Field name' and 'Long Field'. The next section is labeled 'Raster map' and is highlighted with an orange box. Below this is 'Application mode' and 'Overlay map'. The next section is labeled 'Interpolate grid' and 'No'. Below this is 'Comment'. The bottom section contains a large green button with a white left-pointing triangle and a 'Select' button. On the left side, there are buttons for 'New', 'Delete', and 'Delete all'. On the right side, there are navigation buttons: a right-pointing triangle, an up-pointing triangle, a down-pointing triangle, and a 'Select' button. An orange arrow points from the text 'You must now select the correct prescription map, to do so select "Raster map"' to the 'Raster map' section.

With the correct data format in the correct directory, you should see the prescription maps.

The screenshot shows the 'Raster map' selection interface with the title 'Select the raster map for task Task' and a progress indicator '1 / 1'. The interface is divided into several sections. The top section contains 'Flage_NMap.grd', 'LongField_2025-05-29.rst', and 'LongerField_2025-05-29.shp'. Below this is a large green button with a white left-pointing triangle and a 'Select' button. On the left side, there are buttons for 'New', 'Delete', and 'Delete all'. On the right side, there are navigation buttons: a right-pointing triangle, an up-pointing triangle, a down-pointing triangle, and a 'Select' button. Three orange arrows point from the text 'With the correct data format in the correct directory, you should see the prescription maps.' to the list of prescription maps.

Once you select the correct prescription map, press "Select & return"
Next Select, "Application Mode"

The screenshot shows the 'Task editor' interface for task 7. The 'Application mode' field is highlighted with a yellow border and an orange arrow pointing to it. The field currently displays 'Overlay map'. Other fields include 'Operation mode' (Base application), 'Field name' (Long Field), 'Raster map' (LongField_2025-05-29.rst), 'Interpolate grid' (No), and 'Comment'. Navigation buttons like 'New', 'Delete', 'Delete all', and 'Select' are visible.

"Overlay map" is chosen as standard, other options Include :

- No map - Prescription maps are not used at all. The application rate is solely based on the N-Sensor reading.
- Overlay map - The final application rate is determined solely by the prescription map. (Recommended)
- Offset map - The final application rate is calculated as the sum of the N-Sensor recommendation and the rate from the offset map. Note that in this case the offset map may contain positive as well as negative rates.
- Factor map - The final application rate is the N-Sensor recommendation multiplied by the value from the prescription map. i.e. 1.2 (+20%) or 0.6 (-40%)

Select the appropriate mode, then press "Select & Return"

Application mode

Enter the application mode the raster map is to be used in for task Task 1 / 1

no map	
Offset map	
Overlay map	
Factor map	

Select

"Interpolate grid" can either be pressed and changed from "Yes" or "No"

Task editor

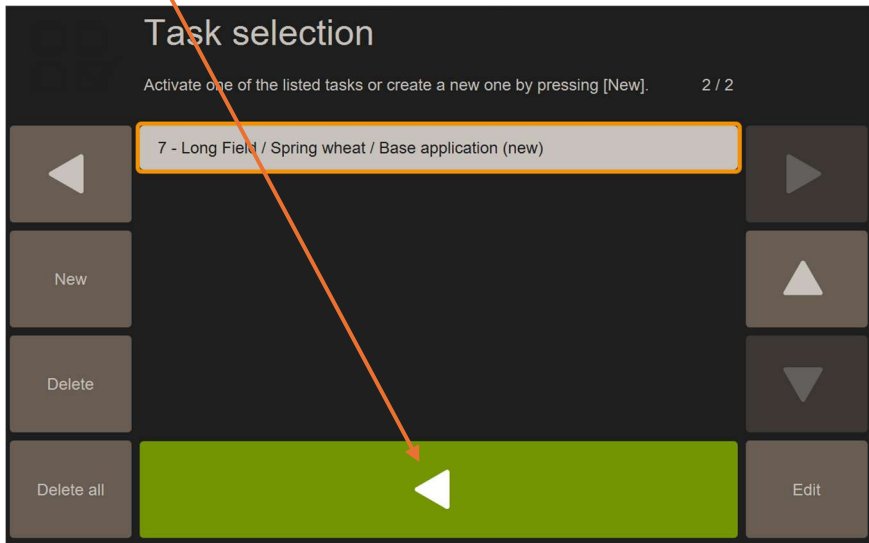
Change the properties of task 7 1 / 2

Operation mode	Base application
Field name	Long Field
Raster map	LongField_2025-05-29.rst
Application mode	Offset map
Interpolate grid	Yes
Comment	

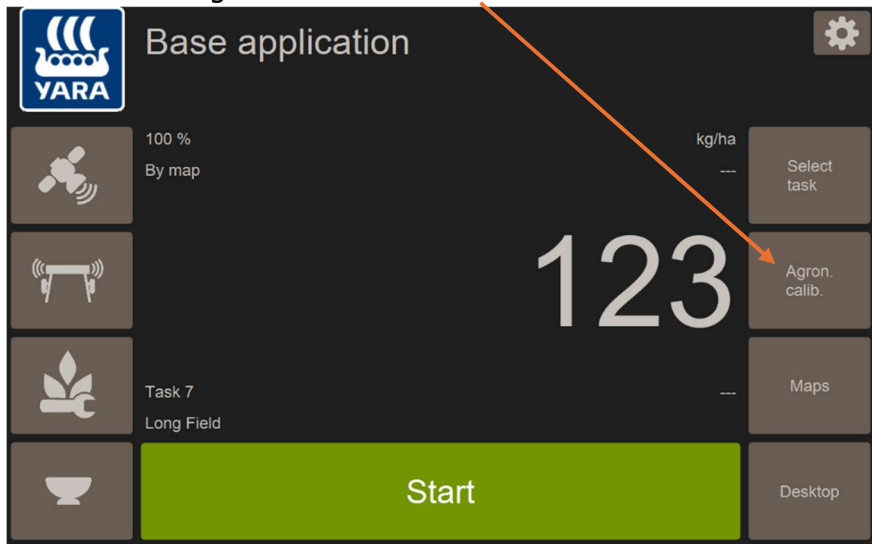
Select

Once selected press "Select & Return"

Press "Select & Return" with the new task selected,



Next check the "Agronomic Calibration"



In "Base Application" the N-Sensor will use the prescription map from the application map to supply the rate (Kg/Ha).

However, outside the grid file, shape file or raster map the system will apply the uniform rate, to stop applications outside these maps change the uniform rate to 0 kg/ha unless part of the map is missing, then set the uniform rate the standard application rate to apply this when out the zoned area.

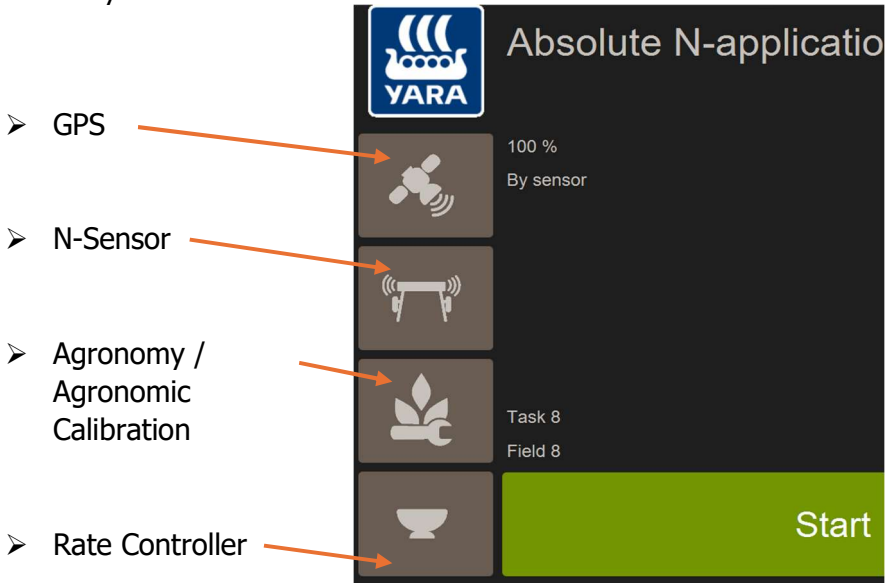
Base application
Agronomic calibration 1 / 3

←	Uniform rate	123 kg/ha	→
(1) →	Agent content	100.0 %	↑
(2) →	Map factor	100.0 %	
(3) →	Agent	N	↓
(4) →	Unit	kg/ha	
Delete			
Delete all	←		Select

- When applying a prescription map that has been given in the full Product Application or Total Kg/Ha, "Agent content" (1) should be set to 100% and Unit set to "Kg/ha" (4) (Recommended)
- If the Prescription map has been sent as a total nutrient application i.e. (Kg N/Ha or Kg SO₃/Ha), "Agent content" (1) must be set to the nutrient content percentage and "Units" (4) must be set to Kg N/Ha and the "Agent" (3) must be changed to the correct nutrient. Remember to check
- "Map Factor" (2) will multiply the total prescription by the % chosen, i.e. if the prescription total 100 Kg/Ha, "Map factor" (2) set at 50% will reduce the total Applied to 50Kg/Ha. (100% is Recommended)

Warning Symbols

You can press the symbols on the right to give you more information about the symbol.



For the operation of the N-Sensor to work in the best manner all 4 boxes should be Grey. The only exception is for the Agronomy to go "Yellow" which is warning you of low biomass/N-Uptake (SN).

- Grey Is Good,
- Yellow Indicates an issue, rather than a communication issue.
- Red indicates a Fault or communication issue.

GPS



- The GPS has communication and good signal/quality



- GPS Has Communication but not good enough signal/quality



- No GPS data

N-Sensor



- The N-Sensor is ready/active



- SVC Mode (ALS-2 Only), The N-Sensor has detected a fault or the lense could be dirty.



- Not enough daylight (Passive Sensor Only)



- Data received from N-Sensor is invalid



- Not enough light (Passive Sensor Only)



- Too much Reflectance



- No Data is being received from the N-Sensor



- N-Sensor Simulation mode is Active



- Working below Solar Elevation, (25 °, Passive Sensor Only)

Agronomy / Agronomic Calibration



- Agronomy is valid and working



- No Crop / Biomass Cutoff threshold met



- N-Sensor module locked, (contact Taylored-Agri)

Rate Controller



- VRA to the rate controller ready



- Active rate and variably applying



- VRA / N-Sensor is in Uniform rate mode



- No communication to the rate controller

Windows Tablet

There are 3 different tablets distributed with the N-Sensor since 2017. Some feature displayed below may not be a true representation, however most features are in the exact position or laid out slightly differently.

The locking collar prevents the tablet from slipping out the cradle, to remove the tablet from the cradle lift the locking collar up and slide the tablet forward.



(1) Function button (not used)

(2) Windows Menu

(3) Volume Up

(4) Volume Down

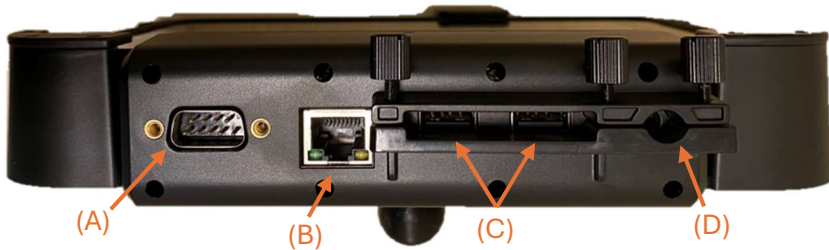
(5) Power

(6) Power to the Cradle

(7) "Blue" Tablet tuned on

(8) "Green" – Tablet Charged
"Red" – Tablet Charging

At the bottom of the cradle you will find the connections



(A) – RS232

(B) – RJ45

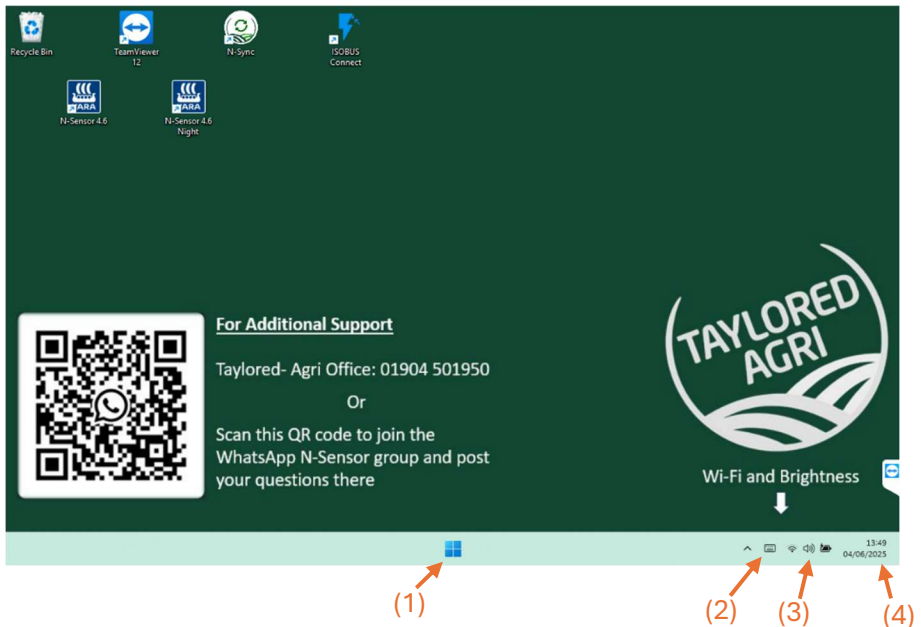
(C) – 2x USB

(D) – Power

Windows Terminal Page

On the windows terminal page you will find shortcuts to programs,
These programs include:

- N-Sensor 4.6
- N-Sensor 4.6 Night
- TeamViewer
- N-Sync
- ISOBUS Connect (If Applicable)



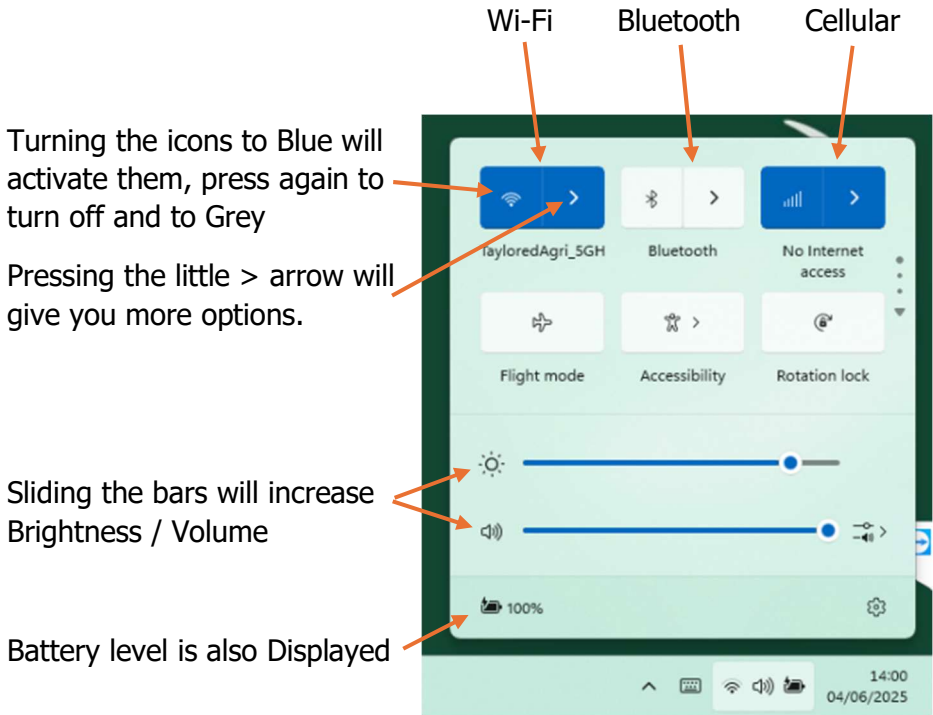
(1) Windows Menu

(3) Wi-Fi, Cellular,
Brightness, Volume

(2) Keyboard

(4) Time / Date

By pressing the Wi-Fi, Cellular, Brightness, Volume (3) button, a further menu will appear.



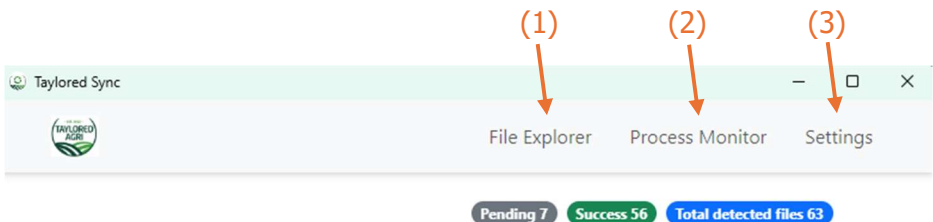
N-Sync

N-Sync is a program designed to automatically upload N-Sensor data to the Taylored-Agri server, it sync's your data every 2 minutes with an internet connection.

If you wish to opt out, please make a member of Taylored-Agri aware.

N-Sync should automatically open with the tablet. There are 3 tabs to consider when using the program.

- File explorer – (1) Lets you view all the folders and files that the program can see, it also allows you to see individually if the file has been uploaded or not. It will also allow you force an upload of the individual file.
- Process Monitor – (2) This allows you to see the most recent uploads/updates, the last time the program uploaded and how many tasks have been found, how many have been uploaded & how many task are waiting to be uploaded. (first screen shown)
- Settings – (3) Taylored-Agri Use only

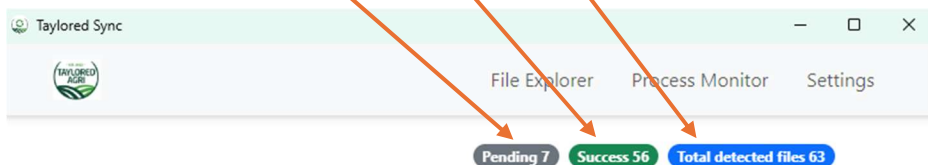


Process Monitor

Total Files detected on the system

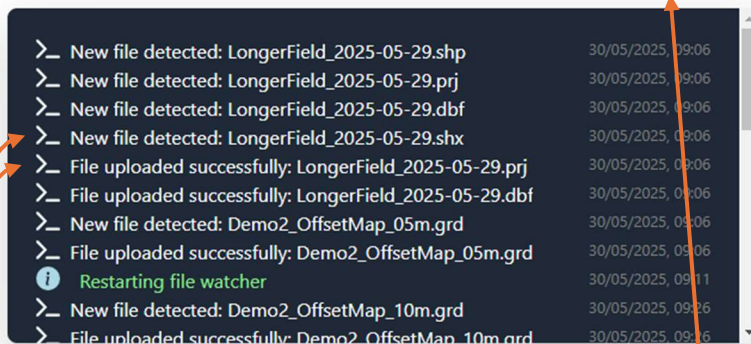
Files successfully uploaded

Files pending upload



Process Monitor

Last Uploaded: 04/06/2025, 10:44



Last upload file

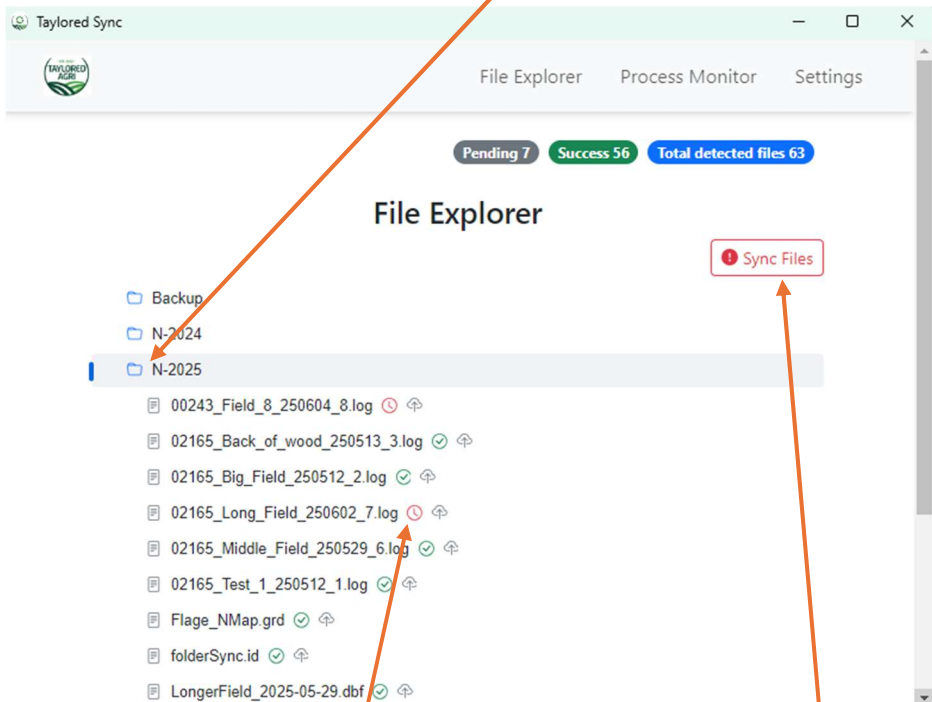
The system will also inform you what the last file found was, and if it was successfully uploaded.

If multiple files are pending, check your internet connection and then move to the "File explorer" page

File Explorer

View file's and check if file's have or haven't been uploaded, you can also request the file to be uploaded again.

Selecting the folder icon will open the folder.



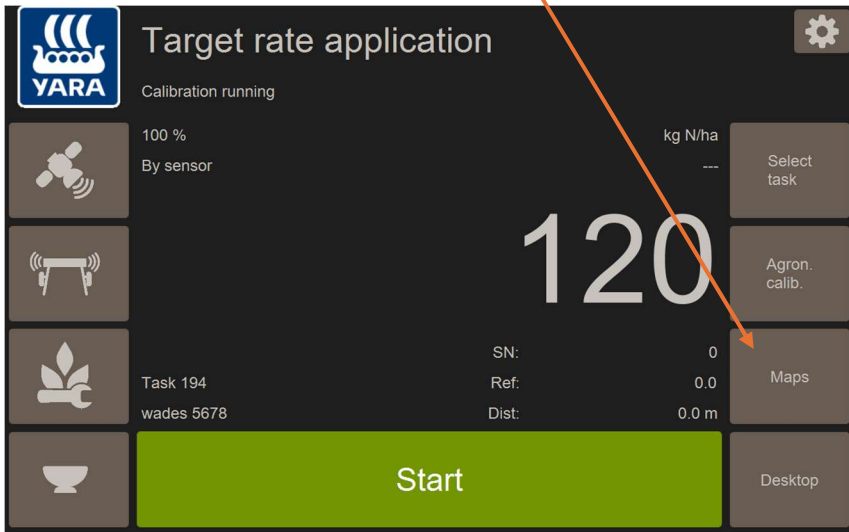
- Files that haven't uploaded are marked with
- Files with a have been successfully uploaded.
- Pressing the button, to upload individual files.
- Press the button, and the whole system will be checked again.

Notes

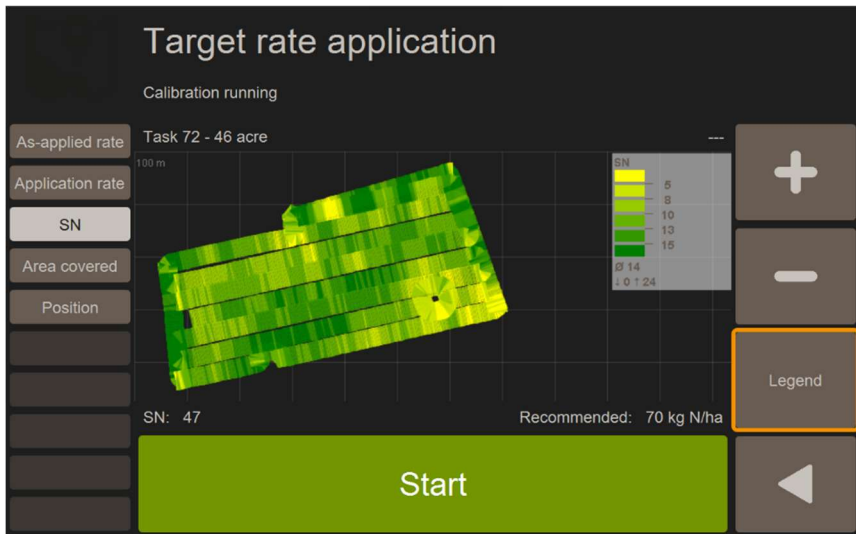
Maps

Maps on N-Sensor

Once a task is completed, selecting the "Maps" icon will take you to a map preview page.



On the left you have multiple options / maps to view.



Only have 1 map selected at a time as maps can't overlay on top of each other. You can however have "Position" selected, this will show your position in relation to the map.



- As-Applied Map – These will give you the actual rate applied by the spreader or sprayer
- Application Rate – This is the rate that was recommended by the N-Sensor Program
- SN – (Nitrogen Uptake) this is a biomass map
- Area covered – This shows the area in which the N-Sensor program was active

Selecting Legend, will also bring out more information about the figures captured by the N-Sensor, including Average, Minimum and Maximum.

Growth Stages

Cereals (BBCH)

(Too small for use
with the N-Sensor)

Seeding Growth GS 11-19

GS 11 – First leaf unfolded

GS13 – 3 leaves unfolded

GS15 – 5 leaves unfolded

GS 19 – 9+ leaves unfolded

Tillering GS 21 - 29

GS 21 – Main shoot + 1 Tiller

GS 23 – Main shoot + 3 Tillers

GS 25 – Main shoot + 5 Tillers

GS 29 – Main shoot + 9 Tillers

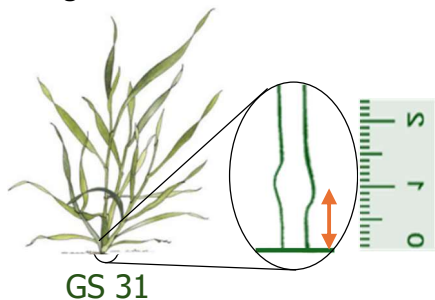
Stem Extension GS 30

GS 30 – Ear at 1 cm, Node at base



Cereals (BBCH)

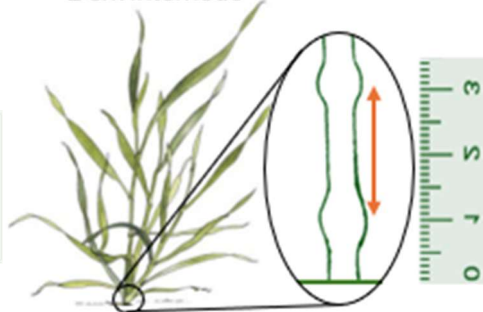
GS 31 – First node detectable
1+ cm height



GS 31

Booting + Ear Emergence
GS 40 - 59

GS 32 – 2nd node detected +
2 cm internode



GS 32



GS 39

GS 41 – Flag leaf sheath extending

GS 47 – Flag leaf Sheaf opening

GS 49 – First awns visible

GS 51 – Ear visible above flag leaf
ligule

GS 55 – Ear half-way emerged

GS 59 – Ear emerged



GS 49

GS 59

GS 33 – 3rd node detected

GS37 – Flag Leaf just visible

GS39 – Flag Leaf blade fully
visible



Oilseed Rape (BBCH)

Leaf Development

GS 10 - 19

GS 10 – Cotyledons unfolded

GS 11 – First leaf unfolded

GS 12 – Second leaf unfolded

GS 19 – Nine+ leaves unfolded



GS 10



GS 12



GS 13



GS 16

Stem Elongation

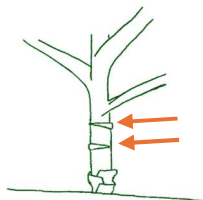
GS 30 - 39

GS 30 – Rosette, No internode

GS 31 – First internode

GS 32 – Second internode

GS 39 – Nine+ internodes



GS 32

Side-shoot formation

GS 21 - 29



GS 21



GS 23



GS 25

GS 21 – First side-shoot detectable

GS 22 – Second side shoot detectable

GS 29 – Nine+ side-shoots detectable

Inflorescence / Flower-bud emergence

GS 50 - 59

GS 51 – Green buds visible in canopy from above

GS 53 – Green buds raised above leaves

GS 59 – First petals visible



GS 51



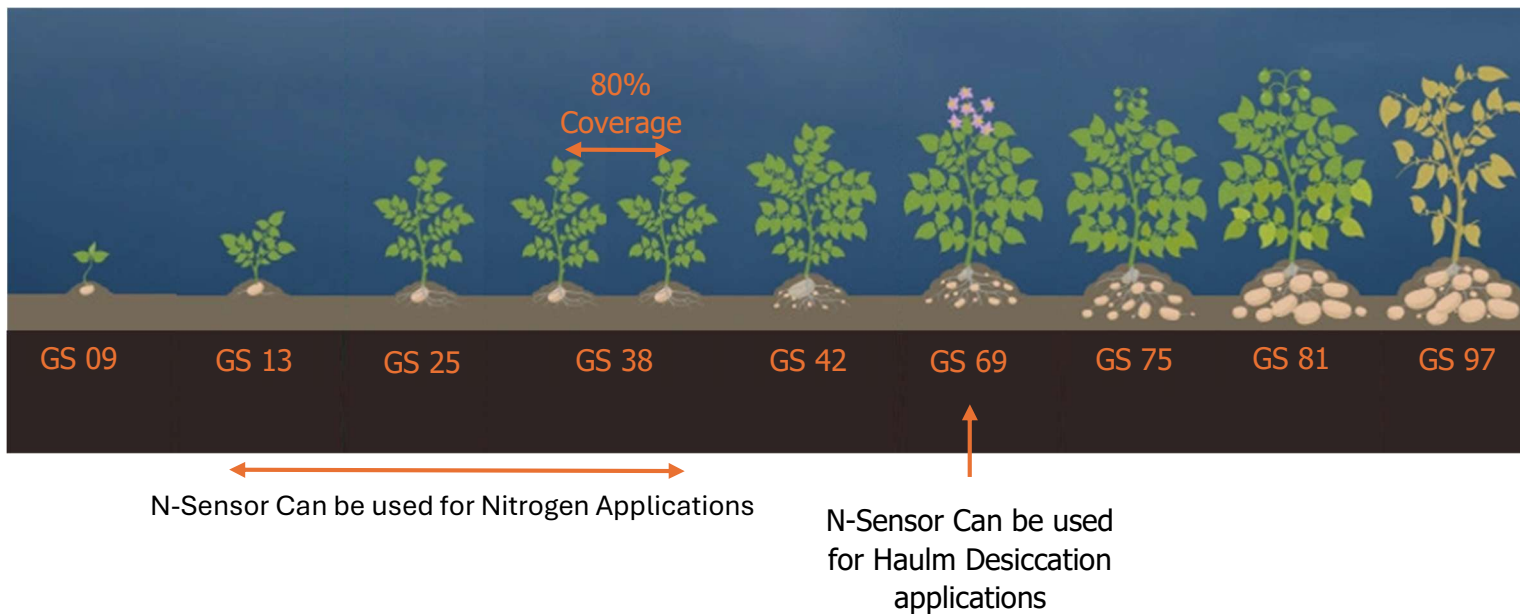
GS 53



GS 59

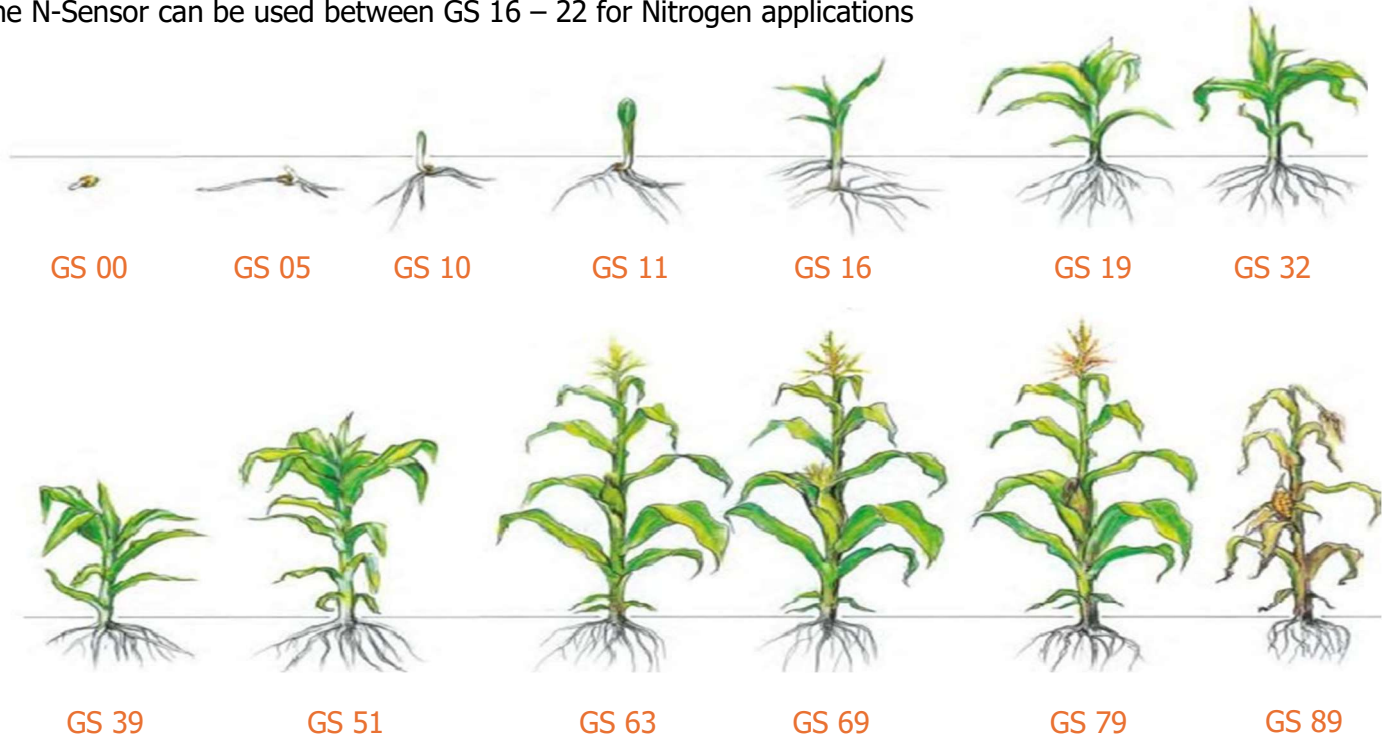
Potatoes (BBCH)

The N-Sensor can be used between GS 10 – 39 for Nitrogen Applications
It can also be used at GS 69 for Haulm Desiccation



Maize (BBCH)

The N-Sensor can be used between GS 16 – 22 for Nitrogen applications



Rate Calculator

The Yara N-Sensor works in a “W/V” metric.

Weight by Weight (W/W) to Weight by Volume (W/V)

All solid fertiliser is supplied as “W/V” metric, Yara also supplies liquid fertiliser in a “W/V” metric.

Some manufacturers supply their Liquid Nitrogen in a W/W metric and so this needs to be converted.

To get to the right N% for a “W/V” metric, simply multiply the Nitrogen Content (N%) by the Specific Gravity (SG)

i.e. $28\% \text{ N (W/W)} \times 1.28 \text{ SG} = 35.84\% \text{ N}$

These recalculated figures should be rounded up or down to their nearest 0.1 decimal point i.e. $35.8\% \text{ N (W/V)}$

Manufacturer Examples:



Manufacturer N%	SG	N% (W/V)
30N	1.30	39%
26N + 5S	1.28	33.3%
24N + 7.5S	1.27	30.5%



Manufacturer N%	SG	N% (W/V)
30N	1.30	39%
28N + 2.5S	1.29	36.1%
26N + 5S	1.28	33.3%



Manufacturer N%	SG	N% (W/V)
30N	1.29	38.7%
30N +6s	1.315	39.5%
28N	1.28	35.8%

Fertiliser Conversion Chart

Units / Ac	KgN / Ha	N % in Fertiliser (Weight by Volume)								
		19	24	27	30	33.3	34.5	35	39	46
16	20	105	83	74	67	60	58	57	51	43
20	25	132	104	93	83	75	72	71	64	54
24	30	158	125	111	100	90	87	86	77	65
28	35	184	146	130	117	105	101	100	90	76
32	40	211	167	148	133	120	116	114	103	87
36	45	237	188	167	150	135	130	129	115	98
40	50	263	208	185	167	150	145	143	128	109
44	55	289	229	204	183	165	159	157	141	120
48	60	316	250	222	200	180	174	171	154	130
52	65	342	271	241	217	195	188	186	167	141
56	70	368	292	259	233	210	203	200	179	152
60	75	395	313	278	250	225	217	214	192	163
64	80	421	333	296	267	240	232	229	205	174
68	85	447	354	315	283	255	246	243	218	185
72	90	474	375	333	300	270	261	257	231	196
76	95	500	396	352	317	285	275	271	244	207
80	100	526	417	370	333	300	290	286	256	217
84	105	553	438	389	350	315	304	300	269	228
88	110	579	458	407	367	330	319	314	282	239
92	115	605	479	426	383	345	333	329	295	250
96	120	632	500	444	400	360	348	343	308	261
100	125	658	521	463	417	375	362	357	321	272
104	130	684	542	481	433	390	377	371	333	283
108	135	711	563	500	450	405	391	386	346	293
112	140	737	583	519	467	420	406	400	359	304
116	145	763	604	537	483	435	420	414	372	315
120	150	789	625	556	500	450	435	429	385	326

Unit conversions

