



Knowledge grows

Yara N-Sensor[®] ALS-2

User manual - english



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1) Product summary



optional
↔



(2 x) Brackets
part no. 21-1361



(8 x) Bolts
M6x8

Delivery contains:



(2 x) N-Sensor Head ALS-2
(left and right)
part no. 21-6500



N-Sensor Head, rear side (two
equivalent connectors for
connecting the terminal and
other Heads)



(1 x) Y-cable (2m)
N-Sensor Head to power/
LAN
part no. 21-6583
or 21-6586



(1 x) Connection cable (3m)
N-Sensor Head to N-Sensor
Head
part no. 21-6581



(1 x) Elongation cable (4m)
N-Sensor Head to elongation
part no. 21-6582

1.1) Required and optional components

Required:

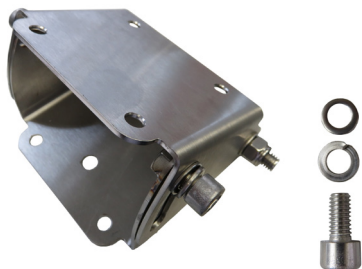


Terminal
(with LAN (RJ 45))

Optional equipment for tractor roof mounting of the N-Sensors ALS-2:



(1 x) Traverse
Housing for roof mounting
part no. 21-1360

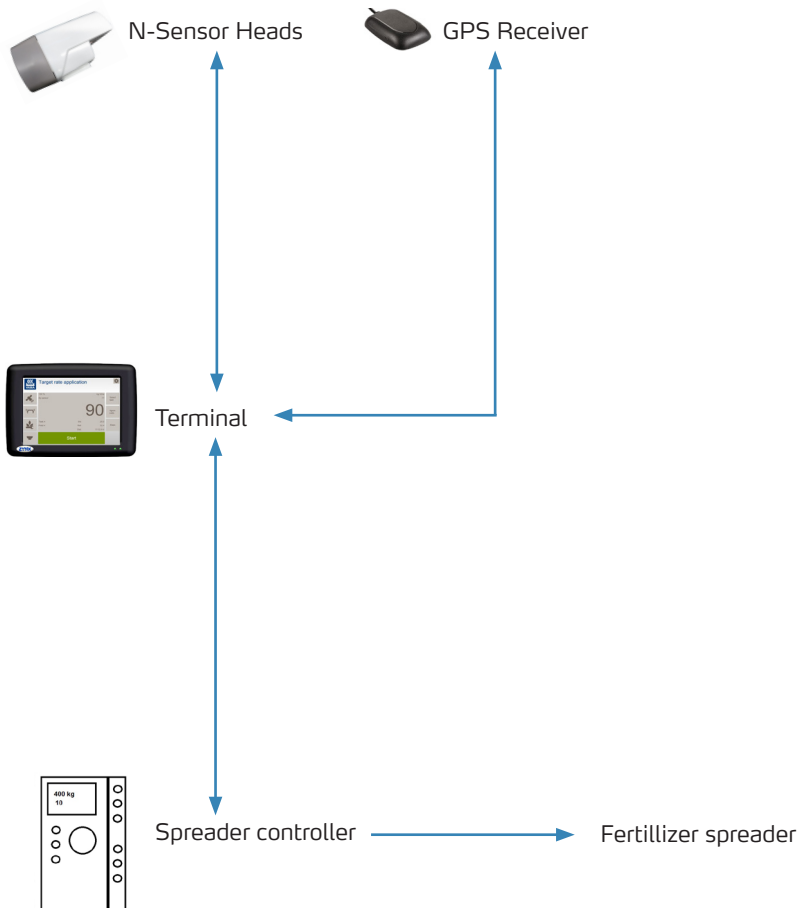


(2 x) Steel brackets with screws
Direct mounting of the N-Sensor Heads without additional housing
part no. 21-1361

1.2) Installation and components

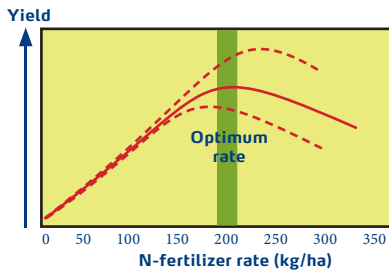
Please Note:

The installation of the Yara N-Sensor ® should only be done by your local N-Sensor distributor or service company. Yara N-Sensor Head, terminal and spreader controller need to be configured properly. The installation is described in the Installation guide for technicians.

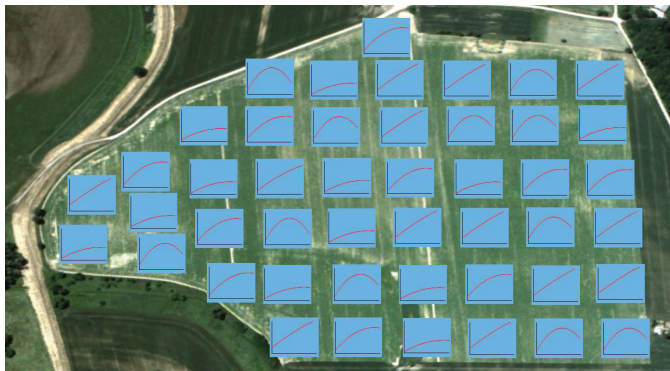


2) Introduction

Nutrient supply within a field can be highly variable. Uniform application of nitrogen fertilizer results in over- and under-fertilization. The challenge is to measure the current local nitrogen supply and adapt the fertilizer rate accordingly.



The target is to find the optimum nitrogen rate in order to maximize the farmer's profit and to protect the environment as much as possible.

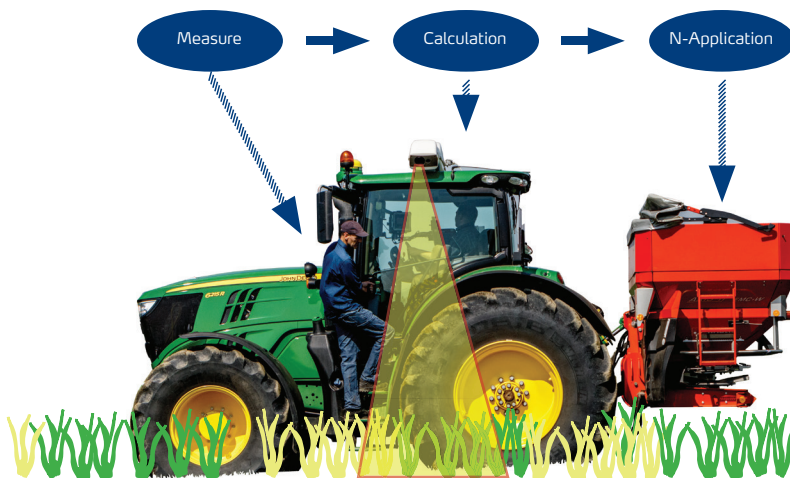


On heterogeneous fields, the optimum nitrogen rate can be different on every spot in the field.

Heterogeneous fields are the rule.

Site-specific crop management is a logical consequence.

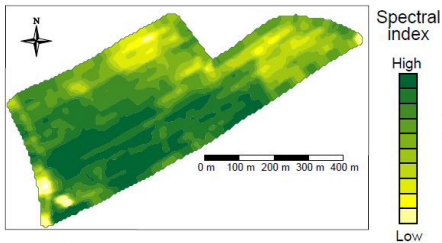
We use remote-sensing technology with tractor mounted sensors. The concept is:



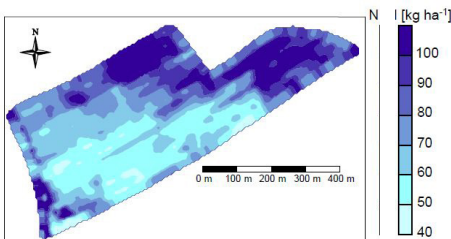
2.1) N-recommendation



The Yara N-Sensor measures light interaction with leaves. It emits light in the red and near-infrared range and measures the amount of reflected light. From the measured reflection of the leaves the N-uptake is calculated. The N-Sensor is typically mounted on an agricultural machine.



The Yara N-Sensor records the collected data. Areas which need more or less N will be identified automatically by the N-Sensor.



The Yara N-Sensor is connected to the spreader, which applies different N-rates during the scanning process. The minimum and maximum rates can be set in the terminal.

Benefits of using a N-Sensor:

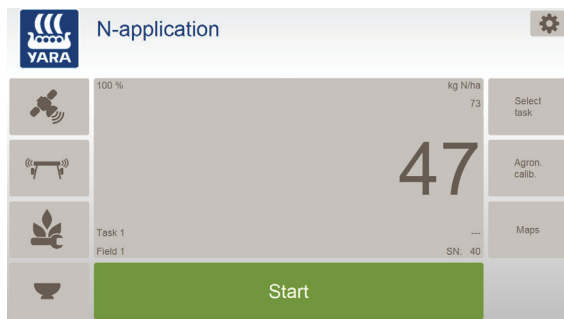
- Yield increase
- N savings
- Improved N balance
- Reduced risk of crop lodging
- Improved combine performance
- Enhanced and more even protein content

3) N-Sensor software

1) Starting the N-Sensor software

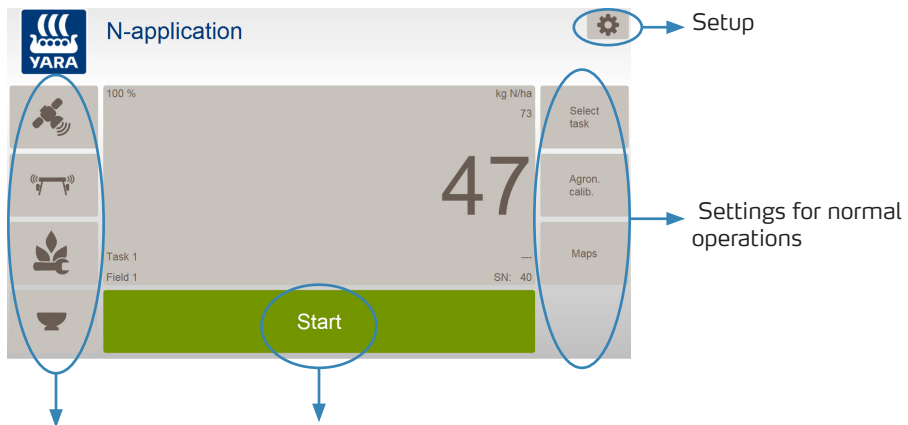


2) Accept Disclaimer



3) N-Sensor software

3) Menu overview

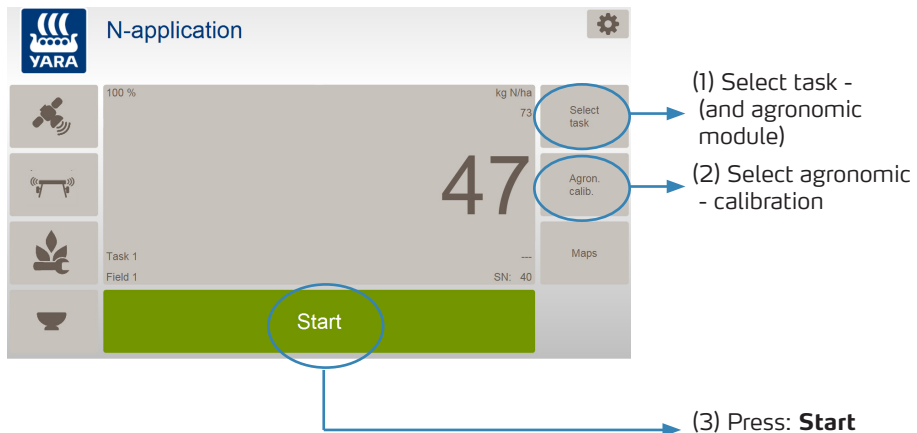


Status icons:

Start/Stop button

- grey = Ok
- yellow = Warning
- red = Critical warning or malfunction

4) General steps to start N-Sensor software modules



3.1) Target rate application module

General information: Target rate application

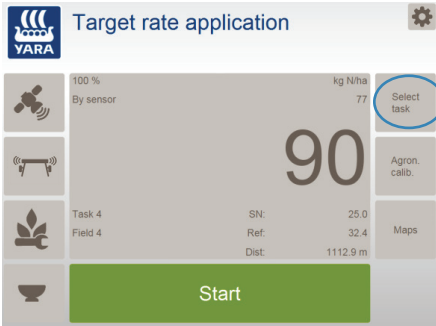
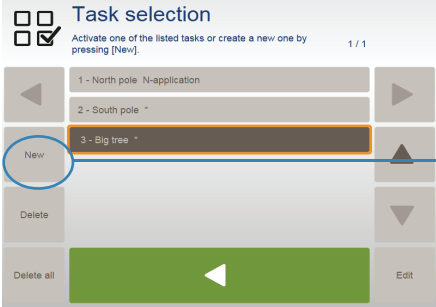
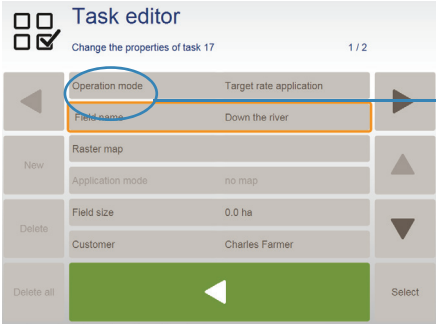
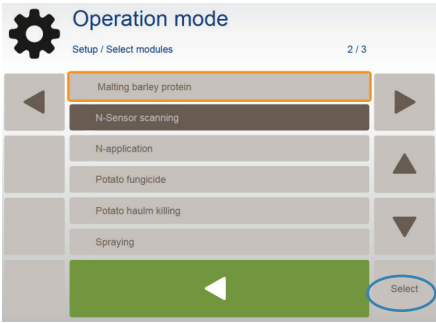
- The module *Target rate application* uses a “self-learning” calibration, which applies a pre-selectable average rate on a field.
- No in-field calibration is required, because the reference N-uptake is calculated in the background. The N-Sensor needs some measurements to approach the mean value.

Reference SN (N-uptake) calculated in the background



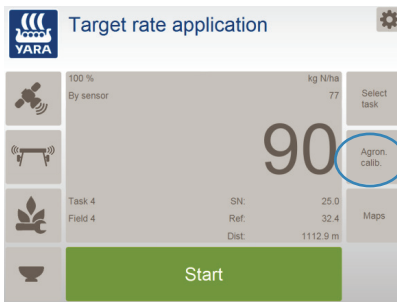
(Example - The average value and the variance differ in your field)

3.1) Target rate application module

- 5)  **Target rate application** 
- Press: **Select task**
- 6)  **Task selection**
Activate one of the listed tasks or create a new one by pressing [New]. 1 / 1
- Press: **New**
Remember: 1 task = 1 field
- 7)  **Task editor**
Change the properties of task 17 1 / 2
- Press: **Operation mode**
Choose: **Target rate application**
- Use **arrows** to navigate to:
Target rate application
- Press: **Select**
- Select and fill in the task menu the following optional information:
- **Field name:** (File name in logfile)
 - **Raster map:** (Stored as information in the logfile - only available if a rastermap is preset in the data directory)
 - **Application mode:** (if map-file was selected.)
 - **Field size**
 - **Customer**
 - **Worker**
 - **Comment**
- 8)  **Operation mode**
Setup / Select modules 2 / 3

3.1) Target rate application module

9)



Press: **Agron. calib.**

10)



Choose and enter:

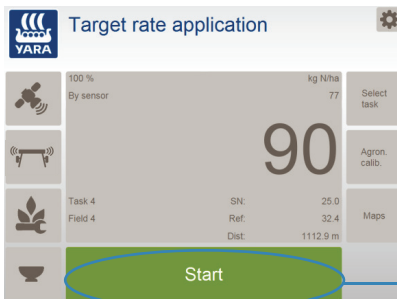
- **Crop**
- **Growth stage** (e.g. 37)
- **Application** (eg. booting)
- **N-content in fertilizer** in % (e.g. 25%)
- **Minimum rate** in kg/ha (e.g. 20 kg/ha)
- **Maximum rate** in kg/ha (e.g. 120 kg/ha)
- **Target rate** in kg/ha (e.g. 70 kg/ha)
- **Relative biomass cutoff** in % (e.g. 20%)

11)



Press: **Start calibration**

12)



Press: **Start**

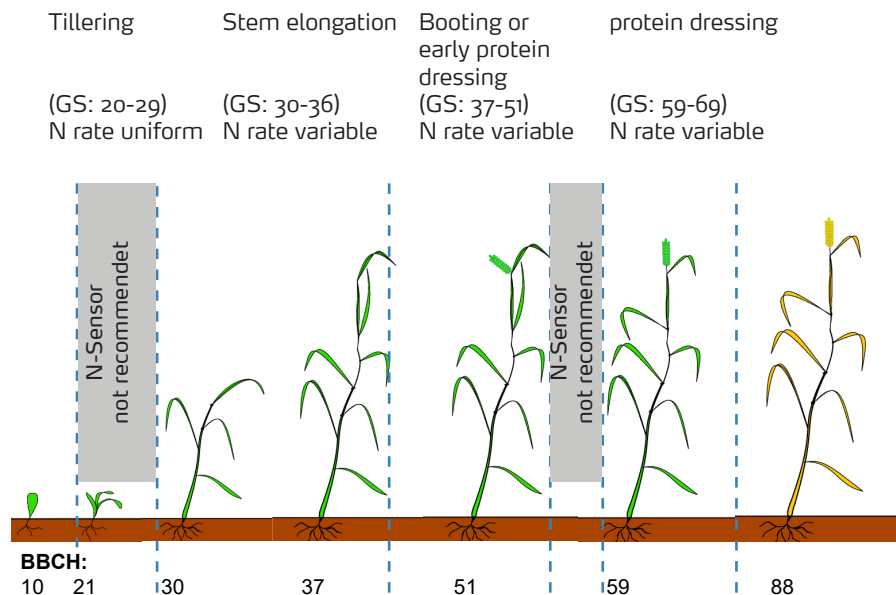
- Drive over the field.
- The calibration works in the background
- Press **"Stop"** if you have finished N-application.

3.2) N-application module

General Information: N-application

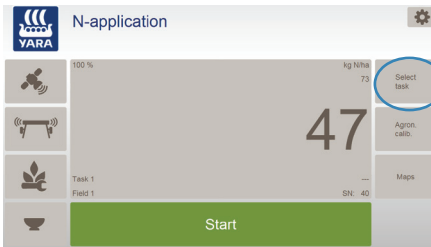
- The N-application operation mode is the standard mode to use the N-Sensor for many crops. (cereals, OSR, potatoes, sugar cane, cotton, maize,...)
- Reference plot calibration is required before N-application. (i. e. through N-Tester, if available in your specific country)
- Calibration curve (slope, biomass cutoff) depends on crop type and growth stage.
- For cereals in growth stage 37-51 you can choose between two calibration curves ("booting" and "protein dressing")
- You can set the general biomass cutoff factor.

Example cereals:



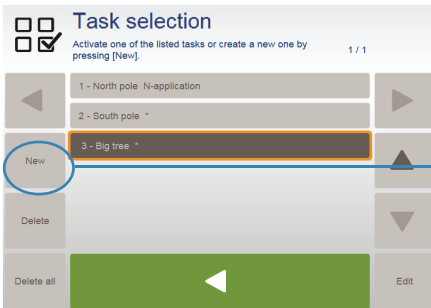
3.2) N-application module

13)



Press: **Select task**

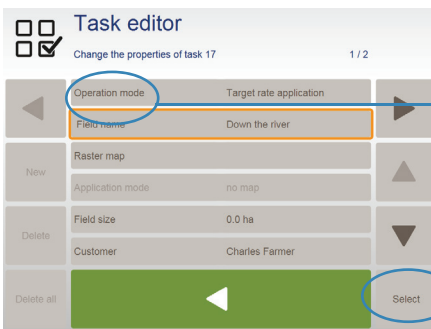
14)



Press: **New**

- Remember: 1 task = 1 field

15)



Press: **Operation mode**

- Choose: N-application

Use **arrows** to navigate to:
N-application

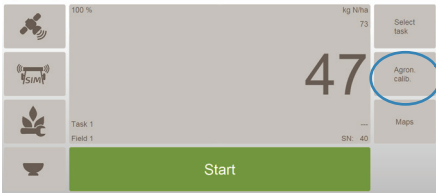
Press: **Select**

Select and enter in the Task Menu the following optional information:

- **Field name:** (File name in logfile)
- **Raster map:** (Assigned to task, stored in data directory)
- **Application mode:** (if map-file was selected.)
- **Field size**
- **Customer**
- **Worker**
- **Comment**
(Information stored in logfile)

3.2) N-application module

16)  N-application 



Press: **Agron. calib.**

17)  N-application 1 / 3

Agronomic calibration

Crop	Winter wheat	
Growth stage	37	
Application	Booting	
Minimum	0 kg N/ha	
Maximum	150 kg N/ha	
Konstant	80 kg N/ha	

Choose and enter:

- **Crop**
- **Growth stage** (e.g. 37)
- **Application** (eg. booting)
- **Minimum rate** in kg/ha (e.g. 20 kg/ha)
- **Maximum rate** in kg/ha (e.g. 120 kg/ha)
- **Uniform rate** in kg/ha (e.g. 60 kg/ha)

18)  N-application 2 / 3

Agronomic calibration

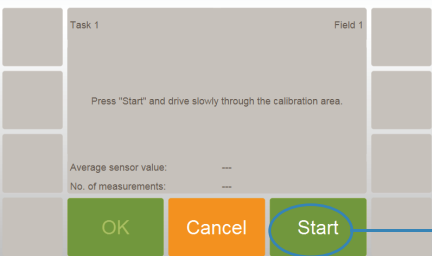
N-content in fertilizer	25.0 %
Reference rate	80 kg N/ha
Reference sensor value	100.0 (SN)
Biomass cutoff factor	100 %
Biomass cutoff	25.0 (SN)
Calibrate at reference plot	...

Press and choose: **N-content in fertilizer** in % (e.g 25%)

Press: **Calibrate at reference plot**

19)  Calibrate at reference plot

N-application / Agronomic calibration

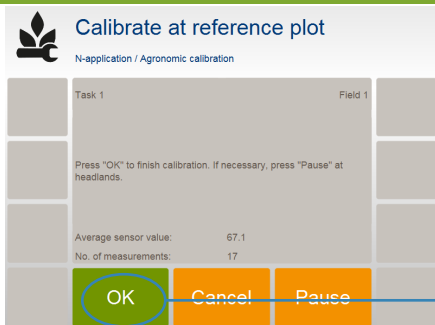


Press: **Start**

- Start at a normal-developed part of the field
- Drive slowly through reference area (15m)

3.2) N-application module

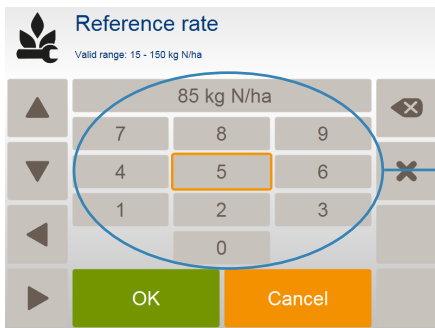
20)



Press: **Ok**

- To finish calibration

21)

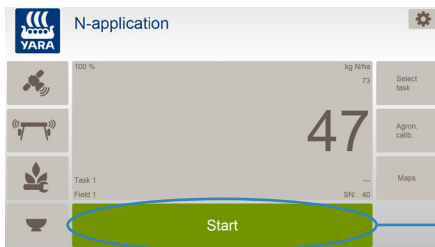


Please note:

The reference N-rate kg/ha is valid for the reference area of the calibration and not for the average of the whole field.

- Press: **OK**
- Press: **Green arrow** to go back to main screen

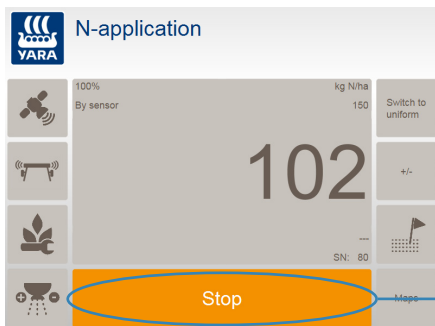
22)



Press: **Start**

- To start N-application during driving

23)

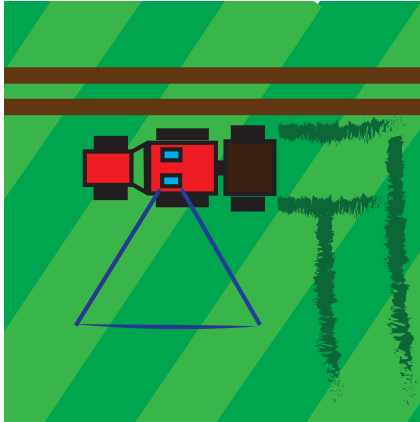


Press: **Stop**

- If you want to finish or pause your N-application

3.3) One-side N-Sensor usage

Background



- For extended field border measurements, deactivate the left or right sensor individually via button.
- This prevents inaccurate measurements and spraying results from faulty sensor readings.
- This is not necessary when covering the field in parallel passes and turning at the ends.

Preparation

1)



Activate mode:

Select: **Configure modules**

Press: **ALS-2**

2)

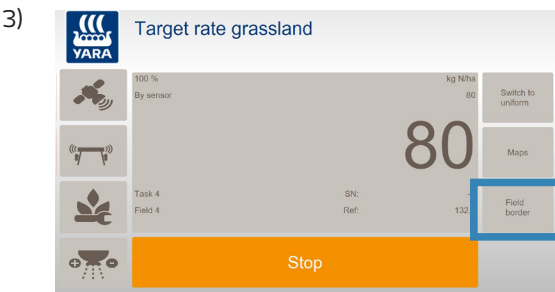


Press: **Field Border Switch**
Select: **On**

Press: back 2x to main menu

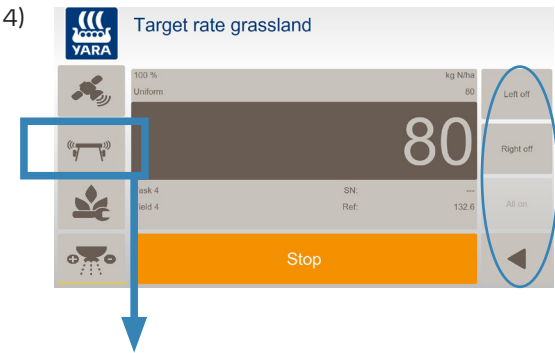
3.3) One-side N-Sensor usage

Usage



Select Option:
Field border

Note: You may need to deactivate certain auxiliary services to access this button.



Select Option:

Left off
Right off

All on (normal mode)
Back (main menu)



Left off



Right off



All on

3.4) Additional modules

1) Free calibration

- Two-point calibration
- Designed for crops and conditions where no other recommendation is available

Free calibration

Agronomic calibration 2 / 4

Reference rate 1	80 kg N/ha
Reference sensor value 1	100.0 (SN)
Reference rate 2	80 kg N/ha
Reference sensor value 2	100.0 (SN)
Biomass cutoff factor	100 %
Biomass cutoff	20.0 (SN)

Control: [Green bar with left arrow] Select

2) N-Sensor Scanning

- Scan fields with the N-Sensor (S₁, SN, GBI)
- Records data in standard log file format
- No on-line application
- No implement (spreader, sprayer) required
- Used for i. e. oilseed rape autumn scanning or grassland

N-Sensor scanning

Agronomic calibration 1 / 2

Crop	Spring wheat
Growth stage	37
Working width	24.0 m

Control: [Green bar with left arrow] Select

3) Malting Barley Protein

- Absolute calibration for malting barley topdressing
- Developed only for Swedish conditions
- Target: Achieve specific protein level at harvest

Malting barley protein

Agronomic calibration 1 / 3

Region	Norra Götaland
Seeding month	April
Seeding day	15
Growth stage	31
Variety	Tippel
Biomass cutoff	20 SN

Control: [Green bar with left arrow] Select

4) Absolute N-Application OSR

- Application of N in winter oilseed rape based on absolute N-Sensor readings
- Assumptions:
 - No autumn application
 - Two applications in early spring
 - Yield level between 3 and 6 t/ha
 - Sufficient water supply

Absolute N-application OSR

Agronomic calibration 1 / 3

Application	2nd dressing
Growth stage	30
Yield expectation	4 - 5 t/ha
Mineralisation potential	medium
N-content in fertilizer	27.0 %

Control: [Green bar with left arrow] Select

3.4) Additional modules

5) Spraying

- Application of farm chemicals
- User-defined calibration function (slope)
- Target rate approach

Spraying
Agronomic calibration 1 / 2

Crop	Winter wheat	▶
Growth stage	31	
Slope	1.0 %/SN	▲
Minimum rate	0 l/ha	
Maximum rate	150 l/ha	▼
Target	80 l/ha	
Start calibration Cancel		Select

6) Herbicide Application

- Spot spraying of (green) weeds in a (brown) canopy
- Simple threshold approach (user-defined)
- Apply higher rate on green spots

Herbicide zone application
Agronomic calibration 1 / 2

Crop	Winter wheat	▶
Growth stage	31	
Minimum rate	20 l/ha	▲
Uniform rate	80 l/ha	
Biomass cutoff	50 SN	▼
◀		Select

7) Base application

- Apply rates from a prescription map
- N-Sensor does not need to be present
- If present, N-Sensor readings are recorded, but not used for application
- Possible applications:
 - 1st Nitrogen dressing
 - Application of P and K
 - Liming

Base application
Agronomic calibration 1 / 3

Uniform rate	90 kg/ha	▶
Agent content	25.0 %	
Map factor	50.0 %	▲
Agent	P2O5	
Unit	kg/ha	▼
◀		Select

8) Absolute N-application cereals

- Application of N in winter cereals based on absolute N-Sensor readings
- Assumptions:
 - Crop: Winter wheat (winter barley under development)
 - Farming practice with 3 topdressings
 - No additional dressings (i. e. protein dressing)
 - Sufficient water supply
 - Final yield between 6-12 t/ha

Absolute N-application cereals
Agronomic calibration 1 / 3

Crop type	Winter wheat	▶
Application	3rd dressing	
Growth stage	39	▲
Yield expectation	10 t/ha	
Mineralisation potential	high	▼
N-content in fertilizer	27.0 %	
◀		Select

Please Note: Further modules are available from third party companies

3.4) Additional modules

9) Target rate grassland

- Designed for grassland
- The module *Target rate application* uses a “self-learning” calibration, which applies a pre-selectable average rate on a field.
- No in-field calibration is required.
- Reference N-uptake is calculated in the background.

10) N-application (zero plot)

- Sweden only
- Module works like the conventional N-application module, except that the reference N-rate is calculated including user inputs about
 - yield expectation
 - N-uptake at a none fertilized plot in the field
 - the total amount of N which has been applied until the date of the current N-application.

11) Target rate from scan

- Uses a map previously scanned with the N-Sensor (in log file format) as a basis
- N-Sensor is not used during process
- No in-field calibration is required
- Reference N-Uptake is the field average N-uptake from the pre-scanned map

Target rate grassland

Agronomic calibration 1 / 3

◀	Crop	Standard grassland	▶
	Application	Cut 1	
New	N-content in fertilizer	25.0 %	▲
	Minimum rate	0 kg N/ha	
	Maximum rate	150 kg N/ha	
Delete	Target rate	100 kg N/ha	▼
Delete all	Start calibration Cancel		Select

N-application (zero plot)

Agronomic calibration 1 / 4

◀	Crop	Winter wheat	▶
	Production target	Milling	
New	Growth stage	37	▲
	Minimum rate	0 kg N/ha	
	Maximum rate	150 kg N/ha	
Delete	Uniform rate	80 kg N/ha	▼
Delete all	Start calibration Cancel		Select

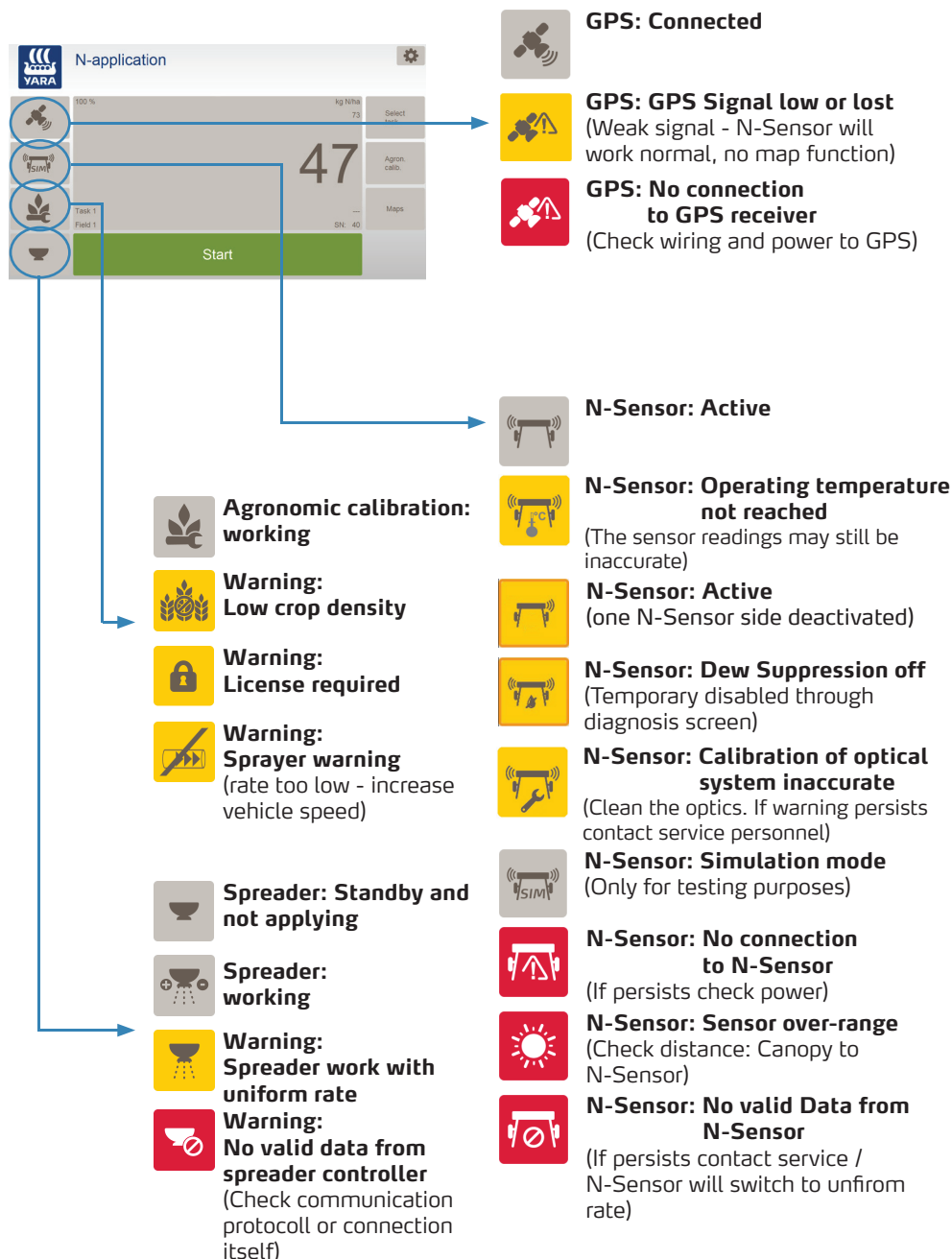
Target rate (from scan)

Agronomic calibration 1 / 4

◀	Crop	Winter wheat	▶
	Growth stage	37	
New	Application	Milling	▲
	Minimum rate	0 kg N/ha	
	Maximum rate	150 kg N/ha	
Delete	Target rate	80 kg N/ha	▼
Delete all	Start calibration Cancel		Select

Please Note: Further modules are available from third party companies

3.5) Status icons



4) Technical data, conformity and safety instructions

Optical parameters	
Number of wavebands per head	4
Covered wavelengths (standard system)	670, 730, 740 and 770 nm
Spectral bandwidth (FWHM)	10 nm
Flash frequency	10 Hz
Field of view	28°
Average viewing direction	50° from nadir

Parameters per head	Min.	Typ.	Max.	Unit
DC input voltage	11.5	12.0	28.0	V
DC current consumption @ 12V input voltage	-	0.85	1.6	A
Size, L x W x H	-	22.5 x 18.5 x 13.5	-	cm
Weight	-	1.8	-	kg
Operating temperature range	-20.0	-	70	°C
Storage temperature range	-40.0	-	85	°C
Measurement temperature range	0.0	-	50	°C
Humidity (25 °C)	10.0	-	100	%
Mounting height (above ground)	2	-	4	m
Area scanned (depending on mounting height and speed)	20	-	60	m²/s
Data acquisition interval	-	1	-	s
System connectors (power supply and LAN)	-	2	-	-

Parameters including Traverse	
Size complete system (L x W x H):	approx. 208 x 21 x 321.5 cm
Weight complete system:	approx. 15.3 kg (incl. 2 sensing heads + central frame, without wiring)
Weight central frame:	approx. 11.2 kg

4) Technical data, conformity and safety instructions

Other operating conditions	
Max. operating altitude	4000 m
Operating location	Outdoor use
Pollution level	4 (as defined in IEC 61010-1)
Protection against foreign objects and touch	Dust-tight, complete protection against contact (if connectors are in use or closed with protective cap)
Protection against water	Protection against water jets from any angle (if connectors are in use or closed with protective cap)

Cleaning:

	Clean the N-Sensor ALS-2 with a damp cloth. Use only a little water and soap and no chemical detergents. Do not hold the N-Sensor under running water. Clean the red front glass carefully.
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Recycling:

	The symbol of the crossed-out dustbin means that this electronic equipment must not be disposed of with household waste at the end of its life. It must be taken by the end user to a collection point for waste electrical equipment for recycling.
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Manufacturer:

	YARA GmbH & Co. KG Hanninghof 35 48249 Dülmen Germany
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Conformity:

	This product complies to all applicable EU directives. The EU Declaration of Conformity can be obtained from the distributor.
	This product complies to all applicable directives. The UKCA Declaration of Conformity can be obtained from the distributor. Importer for UK: Yara UK Limited Harvest House, Europarc, Grimsby North East Lincolnshire, DN37 9TZ

4) Technical data, conformity and safety instructions

Conformity:

 New Zealand	This product complies to all applicable standards. The Supplier's Declaration of Conformity can be obtained from the distributor. Importer for New Zealand: Yara Fertilizers (NZ) Ltd 4/211 Heretaunga St East Hastings 4130
 Australia	This product complies to all applicable standards. The Supplier's Declaration of Conformity can be obtained from the distributor. Importer for Australia: Yara Australia Pty Ltd Level 2, 200 Mary Street 4000 Brisbane
 Ukraine	This product complies to all applicable standards. The Certificate of Type Approval can be obtained from the distributor. Importer for Ukraine: ТОВ "Яра Україна" пр. В. Лобановського, 6а, офіс 142 м. Київ, 03037

Safety instructions:

- Seal unused connectors with the protection cap supplied.
- Only use the cables supplied.
- The cable fuses must not be bridged and must only be replaced by fuses for the automotive sector and with the same value (4A or 1A).
- The installation of the N-Sensor and, if necessary, the traverse may increase the overall height of the vehicle. Observe the changed height for all operations.
- Assembly and installation must only be carried out by qualified personnel in compliance with the applicable laws, regulations and standards.
- The red frontpanel of the N-Sensor is made of glass. Damage to the panel may result in sharp-edged glass splinters.
- Do not look into the light source of the N-Sensor.
- Flashes of light (strobe effects) can cause epileptic seizures. Sensitive people should avoid looking at the flashing light of the N-Sensor.

Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Notes

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

5) Disclaimer

Please Note:

Because of the multitude of crops, grown in different production systems, on various soils, and under countless climatic conditions, Yara disclaims all warranties, express or implied, as to the accuracy of the information gathered by the tool and takes no liability for management decisions based on this information.

When using the Yara N-Sensor and its related software modules the user accepts that he will take full responsibility for all agronomic decisions.