



N-Tester

Instruction manual



Issue: 03.2013

Software version: 2.00 (generic)

Manufacturer / distributor:

YARA GmbH & Co. KG
Hanninghof 35
48249 Dülmen
Germany

Contact data can be found on the back page of this manual.

Information:

The information included in this manual corresponds with our current state of knowledge and is no claim for completeness.

The application rates that are recommended using this device are non-binding and do not form a contractual relationship between the receiver and Yara.

Warranty or liability for correctness of the fertilizer recommendation is exempted in individual cases as the location and the cultivation conditions may be substantially different. The information provided does not replace any individual consultation.

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Information for correct use

Please read this instruction manual carefully before using the N-Tester. Incorrect use of the N-Tester can lead to excessive or insufficient fertilizing which may result in unnecessary costs.

Correct use

The chlorophyll concentration in leaves is measured as the mean of 30 individual measurements.

The following points must be observed in order to use the device in a correct manner:

- Requirements for reliable measurements from page 10
- Adherence to the service and maintenance instructions from page 188

The device can be used during light rain. The device must never be completely soaked or immersed in water.

Application errors

Observe the following points in order to avoid incorrect measurements:

- do not take measurements during incorrect development stages
- do not perform measurements on insufficiently developed leaves
- do not perform all measurements on the same plant
- do not perform all measurements on a small area of the field
- do not use the N-Tester on areas with sulphur deficiency
- do not use with visible drought stress (leaves rolled together)
- do not measure using an old software version

Exclusion of warranty

The manufacturer is not liable for the following damages to the device:

- damage to the device following impacts or vibration
- damage to the device resulting from penetrating moisture
- damage to the display resulting from pressure application and scratches
- malfunctions due to damage to the measuring head and scratches, etc. in the sample slot
- malfunctions from cleaning the sample slot with cleaning agents containing alcohol or other chemicals
- damage caused by heat or intensive solar radiation: The device must not be placed in the immediate vicinity of heat sources or be exposed to direct sunlight.
- incorrect disassembly of the device
- incorrect storage (see 'Transport and storage' on page 22)

Mode of function

The chlorophyll concentration in leaves is measured using the N-Tester. The mean of 30 individual measurements is displayed after successful application. The youngest fully developed leaf is illuminated in two wavelength ranges using light that is absorbed in different intensities by the chlorophyll. The remaining transmitted light is captured in a photodiode and converted to a measuring value.

A minimum of 30 individual measurements is required to provide a representative reading. Individual values that deviate considerably (faulty measurements) are not considered.

Scope of supply

- N-Tester
- Hand strap (for the eyelet on the N-Tester)
- Batteries
- Calibration disc
- Belt bag
- USB cable
- Transport box

Technical specifications

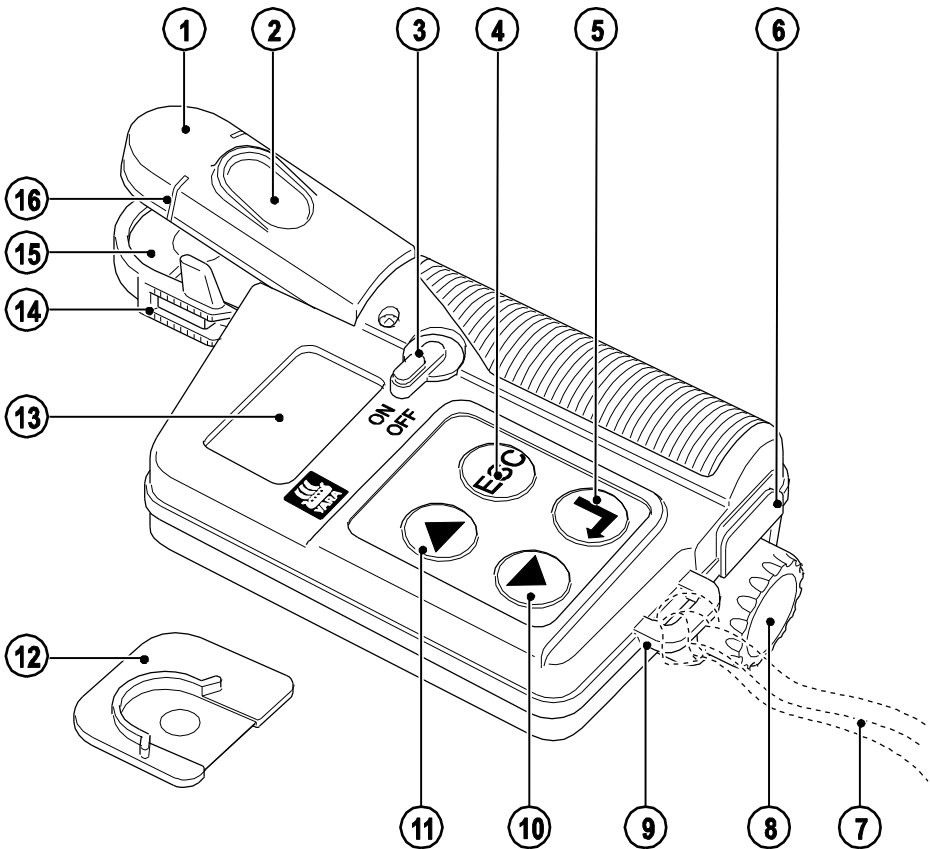
Size of the sample slot:	2 x 3 mm
Maximum leaf thickness:	1.2 mm
Maximum insertion depth (with depth stop):	12 mm
Light source:	2 LEDs
Receiver:	Silicon photo diode
Display:	LCD
Batteries:	2 x AA, 1.5 V (alkaline-manganese)
Service life of a battery:	approx. 20,000 measurements
Dimensions:	164 x 78 x 49 mm
Weight (without batteries):	200 g
Degree of protection against water (EN 60529):	Category 4 The device may be used when it is raining but must never be cleaned under running water.

Operating conditions

The N-Tester is suitable for the following operating conditions:

- 0 to +50 °C
- Relative humidity < 85% at up to 35°C without condensation

Overview of the device

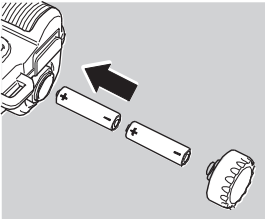


1. Measuring head
2. Finger rest
3. Power switch
4. ESC: Cancel / return to the previous display
5. Enter button: Confirm selection
6. USB connection cap
7. Hand strap
8. Battery chamber cover
9. Strap eyelet

10. DOWN: Moves the cursor / line marking down or to the right
11. UP: Moves the cursor / line marking up or to the left
12. Calibration disc
13. LCD panel:
Displays data and other information.
14. Sliding depth stop:
In order to allow the leaf to be measured with the same distance to the leaf edge each time. Can be adjusted or removed when required.
15. Sample slot
16. Center line:
Indicates the center of the measuring area

Operation and application

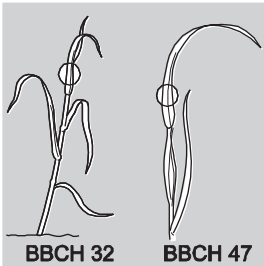
Starting up



- Insert the batteries.
The device is ready for use.

Requirements for reliable measurements

- The N-recommendations apply only for certain development stages.
- At least 30 measurements must be carried out on 30 different plants per field.
- In order to obtain a representative average reading, the measurements must be carried out randomly distributed across the field.
- When measuring, avoid any atypical areas of the field (e.g. areas with distinctly different soil properties, such as sand banks or similar)!
- Measuring point: The measurement must be carried out in the middle of the leaf blade of the youngest fully developed leaf. Measurements on not fully developed leaves may lead to increased recommendations.
Example, BBCH 32: Measuring point at stage 'Stem elongation (node 2 at least 2 cm above node 1)'
Example, BBCH 47: Measuring point at stage 'Booting' (flag leaf sheath opens)
- Variety: Differences in the varieties need to be considered, e.g. by correction factors.
- Sulphur deficiency: S deficiency such as N deficiency leads to the leaves being brighter. Therefore a sufficient S supply has to be ensured when using the N-Tester. Other nutrients do not have any significant influence.



- Weather: The N-Tester is not able to display future N soil supplies, e. g. from applied N that plants have not yet absorbed due to drought. Therefore, use your experience when evaluating the fertilizer recommendation.
- Drought: Intensive drought can lead to an increased chlorophyll concentration in the leaves and to wrong N-Tester readings. Therefore avoid measuring plants that suffer from visible drought stress (e.g. leaves rolled together).

The following factors do not have an effect on the N-Tester reading:

- Time of the day when measuring
- Pesticides
- Moisture on the leaf
- The use of strobilurins
- Yield level

Carry out measurements

Each measurement comprises the following steps:

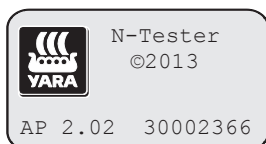
- Calibrate internally (after the device has been switched off)
- Measure 30 x
- Read off and evaluate the measuring result

Internal calibration

- Turn on the device.

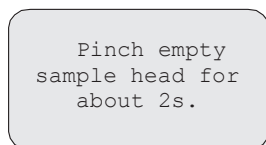
Note:

If foreign language text appears, please see page 177 to find out how to change the language.



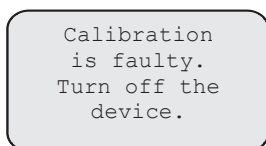
The following is shown in the display:

- ©2013: year of the validity of the software
- AP 2.02: Version of the software
- 3000 2366: Serial number of the device



An internal calibration is necessary each time the device is switched on. No leaf must be inserted.

The calibration was successful when a single beep can be heard.

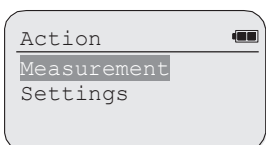



If three consecutive beeps can be heard, the calibration was not successful. You may have opened the measuring head too early or you have not pressed them together completely.

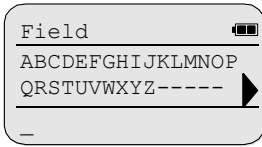
- Switch the device off and back on and repeat the internal calibration.

Action





After successful calibration you can choose the next action.




- Select Measurement.
- Press .



Field

- To select a field name, select a letter by using  or .
- Press .
- Select the next letters in the same way (max 16 letters).
- When the field name is completely selected:
- Press .

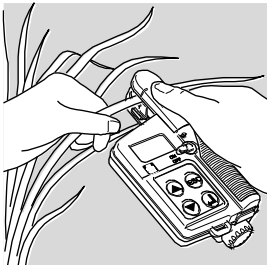
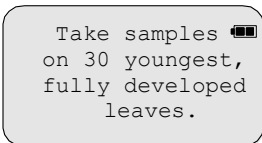
To return to the main program without selection:

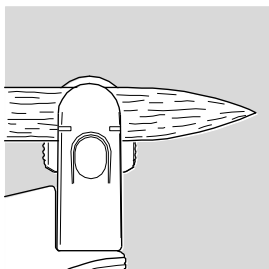
Press .

Measuring

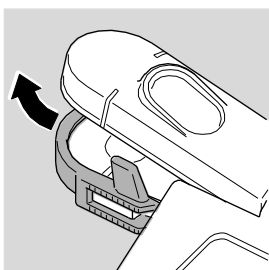
Please note:

- The sample slot (in the measuring head) must be kept clean during the whole series of measurements.
 - Intensive solar radiation can influence the result. Hold the N-Tester so that it is covered by the shadow of your body.
- A total of 30 leaves must be measured before the N-recommendation is displayed.
 - Avoid using grained or thick points on the leaf.
 - Hold the N-Tester on the first plant and place the leaf blade of the youngest fully developed leaf in the measuring head.







The sample slot (2 x 3 mm) must be covered completely. Both markings correspond to the center line of the measurement area.




If necessary, the depth stop can be moved a little to adapt to the width of the leaf.

1 of 30 
valid
measurements

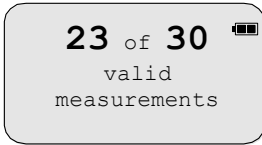
- Press the measuring head together until a beep can be heard.

23 of 30 
valid
measurements

- Measure more leaves distributed equally across the field. The current number of successful measurements is displayed.

Please 
repeat the
measurement.

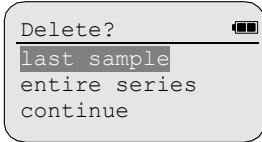
Unsuccessful measurements will be indicated by several consecutive beeps.



■ Delete the last value



If you have made an incorrect measurement this measurement can be deleted.

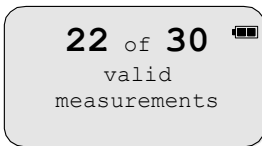
– Press .



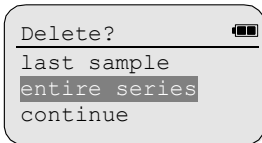
– Select last sample and press .

Note:

In order to cancel deletion, you can press  again or select 'continue' and confirm with .

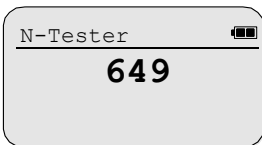


The last sample has been deleted.



■ Delete an entire series


If you delete the entire series, you will return to the start of the measurement and all readings taken so far will be dismissed.

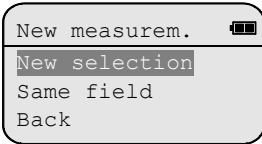








N-Tester reading


The average N-Tester reading from 30 measurements is displayed.

Start a new series of measurements

Start a new series of measurements using .

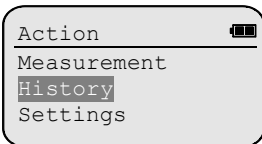





- To start a new measurement in a new field select `New selection` using  or  and press .
- Now you are back in the menu `Field`.
- To start a new measurement in the same field select `Same field` using  or  and press .
- Now you can take a new measurement.
- To go back select `Back`

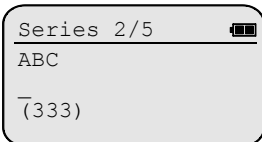
If you don't want to make a new measurement first select `New measurement`, then press .


When you are back in `Action` the display has changed.

History



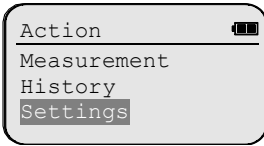
- You can select `History` (this point appears after you have done measurements) using  or  and press .



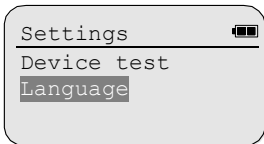
- Now you see how many series of measurements you have done (5), the field name (ABC) of the shown measurement, the number of the measurement (2) and the N tester value (333).
- To return to the action menu press .


System functions

Setting the language



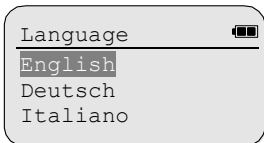
- From within the Action menu select Settings using  or  and press .




- Select Language.
- Press .

To return to the main program without selection:

- Press .



Select your preferred language by pressing  or ..

Press  to make your decision.

The language is changed immediately.

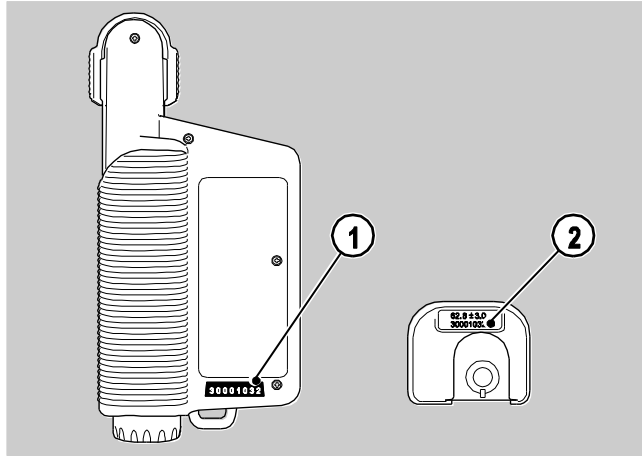
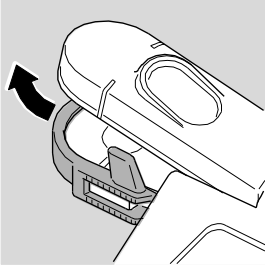
Once you have confirmed the selection, you will return to Settings.

Maintenance and servicing

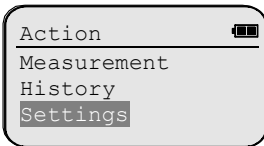
Calibration

If you have not used the N-Tester for longer periods (several weeks), the calibration should be checked using the calibration disc supplied.

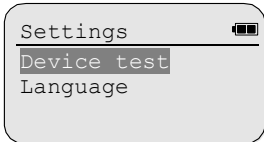
- Take out the calibration disc to the front.



A special calibration disc belongs to every device. The serial number of the device (1) and the serial number of the calibration disc (2) must correspond with each other.



- From within the Action menu select Settings using  or  and press .

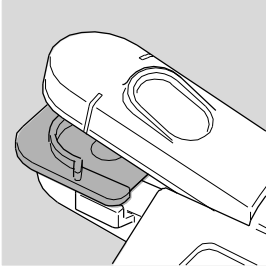


- Select Device test.
- Press .

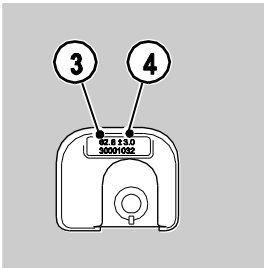
Return to the main program without selection:

- Press .

Insert the blue calibration disc and take a measurement.



- Press the measuring head together until a beep can be heard.



- Compare the value measured with the value (3) on the rear of the calibration disc.
The deviation must be no greater than the maximum deviation indicated on the disc (4).



Calib. value: 

63,4

Note:

If the value measured does not lie within the specified tolerance range, a reliable fertilizing recommendation is not possible. In such cases, please contact YARA directly (see the reverse of this manual).

Resetting the N-Tester to factory defaults

To reset the N-Tester to factory defaults switch the device off, hold down  and  together and power the device on again.

CLEAR PSA/PPA
Device settings
have been reset
to defaults.

- Now all settings have been reset to factory defaults.
- You must switch the device off to do a new measurement

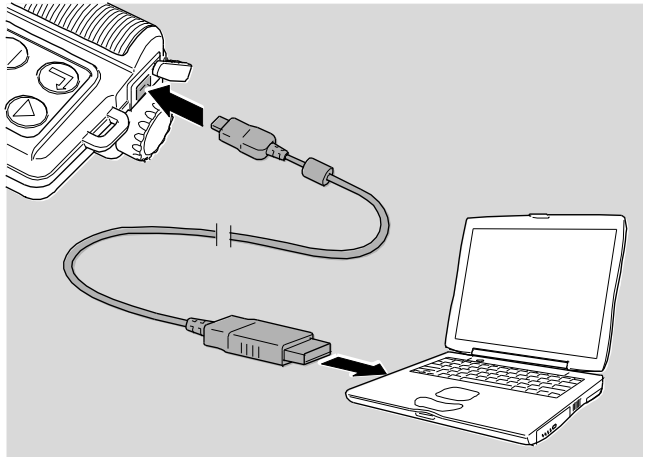
Settings have
been reset to
their default
values.

- When you start it again it informs you, that it was reset, then the normal program appears.
- You can now start new measurements and settings.

Updating the N-Tester software

The N-Tester software can be updated. (The year of validity is indicated below the Yara logo on the startup screen.)

You require a PC with internet access for updating.



- First switch on the N-Tester.
- Then connect the N-Tester to the PC with the USB cable.

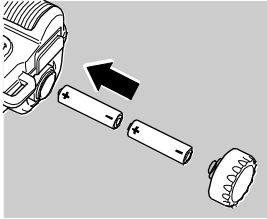
USB CONNECTED
Improper use may
damage device
permanently!

The following note appears:

'USB connected. Improper use may damage device permanently!'

- Download the software from your local Yara homepage and follow the steps described there.

Please replace
the batteries.



Replacing the batteries

The batteries must be replaced when the respective information is displayed.

- Turn off the device.
- Replace the old batteries with batteries of the same type: 2 x AA, 1.5V alkaline-manganese

Note:

The required voltage is not achieved from most rechargeable batteries. Please do not use rechargeable batteries for this purpose.

Cleaning

Caution!

Malfunction of the measuring function / damage to the measuring technology!

- Never use running water or chemical cleaning agents in the sample slot (e.g. domestic cleaner, alcohol or cleaning solvent).
- If required, clean the sample slot with a dry, clean and soft cloth.

If required, the housing can be cleaned using a dry or lightly moistened cloth.

Transport and storage

- When transporting the N-Tester, avoid knocking and scratching the display. Keep the N-Tester in the supplied belt bag or in the transport box.
- Take out the batteries when the device is not used for longer periods.
- Always keep the calibration disc protected from light in the corresponding box.

Storage conditions:



-20 to 55 °C, < 85% relative air humidity up to 35 °C without condensation, no direct solar radiation

Disposal

The device and batteries may not be disposed of in normal domestic rubbish.

Note the separate enclosed packing for the disposal of the device and batteries.

Troubleshooting

Fault	Possible cause	Remedy
Device is switched on (lever to ON), the display does not show anything.	Batteries have been inserted incorrectly.	Insert batteries correctly.
	Batteries are empty.	Replace batteries.
No beep when measuring or calibrating, display does not change to next page.	Batteries are very low.	Replace batteries.
Connection cannot be established with the PC although the USB cable is connected.	Incorrect sequence when connecting.	First switch in the N-Tester and then insert the USB cable in the PC.
<p>INTERRUPTED Device startup was cancelled by pushing CANCEL</p>	You have accidentally pressed  when switching on.	Switch the N-Tester off and then back on.
<p>INTERRUPTED Device info was sent to serial port.</p>	You have accidentally pressed  when switching on.	Switch the N-Tester off and then back on.

If the fault is not specified here or you are unable to remedy the fault, please contact YARA directly (see the reverse of this manual).



Contact

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