OPERATOR'S MANUAL

AgriNIR and AgriNIR W Analyzer

dinamica generale®

INTRODUCTION

Some images included in this manual may differ from the real ones due a recent product updates. The methods of use described are equally correct.

AgriNIR™ by **dinamica generale®** is a portable optical analyzer for fresh forages based on NIR technology in order to measure humidity (dry matter), crude protein, starch, ash, ADF and NDF of the analyzed materials. Thanks to AgriNIR™ the analysis of most relevant and variable ingredients (forages!) used in your ratios can be performed just in a few seconds on site, allowing to know in real time its actual nutritional values.

AgriNIR™ is based on NIR (Near Infra-Red) technology: it scans the sample with light and reads the spectra absorbed by the sample in the NIR region. Thanks to chemometrics techniques and mathematical algorithms based on multivariate analysis, the AgriNIR™ is able to provide predictions on actual nutrients of the sample in a real time.

This instrument structure is composed by :
- a microcomputer that manages the data, carries out mathematical operations applying complex algorithms, providing the final results and the user interface devices: screen, keyboard and printer;
- an optical group: the sample scanner and the NIR sensor, a transducer able to transform the optical signal in an electrical one.

During the process of analysis there are the following main steps:
1. the light source emits light investing the sample inserted into the sample cup;
2. the sample absorb part of the light accordingly to its actual nutritional values;
3. the thermo-controlled NIR sensor collects spectra and measures the absorbance transforming the optical in an electrical signal, then in numerical data;
4. the data are transferred to the microcomputer able to apply all mathematical algorithms in order to predict the actual nutritional values for the sample.

LICENCE AGREEMENT

IMPORTANT NOTICE: Acceptance and use of the enclosed NIR system (hereinafter referred to as "Purchased Product") constitutes your agreement to the following terms and conditions. Please carefully read the following terms and conditions before using or reselling the Purchased Product.

1. **Limited License**. Dinamica generale, an Italian company ("Owner") is the owner of the following Patents related to NIR solutions EP 2 377 392 / US 8 651 730 ("Patents"). Owner hereby grants to the customer("Customer") a non-exclusive, non-transferable, revocable, limited license to use the technology described in the Patents to use the Purchased Product in the process covered by the Patents ("Licensed Product"), and to sell and offer for sale other Licensed Product in accordance with the terms and conditions set forth herein. Alternatively, Customer may resell the Purchased Product to another entity for the purpose of that entity assembling the Licensed Product under a permitted sublicense from the Customer with the same terms as this Agreement.

2. **Acceptance of Terms and Conditions**. Customer warrants that it has the authority to enter into this binding agreement. If Customer does not accept the terms and conditions, Customer shall not use the Purchased Product. Customer understands and agrees that if it uses the Purchased Product as permitted herein, it will be deemed to have accepted these terms and conditions and they shall become a binding agreement.

3. **Limitations on Use**. Customer agrees that it will use the Licensed Product only as expressly authorized in this Agreement, and that any use not expressly authorized in this Agreement is prohibited. Customer agrees that it will not: (i) loan, rent, lease, assign, sublicense, distribute
or otherwise transfer its rights under this Agreement to a third party, other than to resell the Purchased Product to another entity for the purpose of that entity assembling the Licensed Product; (ii)
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use or copying of the Licensed Product and will notify Owner immediately upon learning of any such unauthorized use or copying.
Customer's obligations under this section shall survive any termination of this Agreement or the license granted hereunder. Any unauthorized use of the Licensed Product will result in, among other things, the immediate termination of this license.

4. **Ownership of Proprietary Rights**. Customer acknowledges that the Licensed Product is covered intellectual and/or proprietary rights, and that all such intellectual and proprietary rights are owned by Owner. Customer hereby acknowledges that it has no rights in the foregoing except as expressly granted herein.

5. **NO WARRANTY**. Customer agrees to fully test and evaluate the Purchased Product and Customer acknowledges and agrees that Owner will not assume any product liability or any other
liability for the Purchased Product or the Licensed Product. The Purchased Product is furnished to Customer "AS IS." Except as otherwise provided by separate documentation, OWNER
MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE PURCHASED

PRODUCT. Customer agrees that Owner shall have no liability resulting from Customer's use of the Purchased Product for any indirect damages including consequential, incidental or special
damages for loss of profit, good will or otherwise. Customer shall indemnify and hold Owner harmless from any and all losses, expenses, damages, costs or expenses of any kind,
including but not limited to reasonable attorneys' fees, incurred by Owner resulting from Customer's use of the Purchased Product. NO ORAL OR WRITTEN STATEMENTS MADE BY OWNER OR ITS EMPLOYEES INCLUDING BUT NOT LIMITED TO STATEMENTS REGARDING CAPACITY,
SUITABILITY FOR USE, OR PERFORMANCE OF THE PURCHASED PRODUCT SHALL BE DEEMED A WARRANTY OR REPRESENTATION BY OWNER FOR ANY PURPOSE NOR GIVE RISE TO ANY LIABILITY OR OBLIGATION OF OWNER.

6. **Remedies for Violations**. Owner reserves the right to seek all remedies available at law and in equity for violations of this Agreement, including but not limited to the right to recover the
Licensed Product.

7. **Fees**. In consideration for the rights granted under this Agreement, Customer has paid a license fee that was included in the amount invoiced to the Customer for the sale of the Purchased Product.

8. **Entire Agreement**. Except as expressly stated herein to the contrary, this Agreement constitutes the entire agreement between the parties regarding the subject matter hereof, and no verbal or written prior statements or representations of any sort made by any party shall be effective or valid for any purpose whatsoever. This Agreement may be amended only upon the mutual consent of all parties in writing.

9. **Severability**. If any provision of this Agreement shall be held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall not in any way be affected or impaired thereby. The failure of any party to enforce any provision of this Agreement shall not be considered a waiver thereof, nor shall such failure prevent the future enforcement of any such provision.

10. **Governing Law.** This Agreement and the relationship between the parties shall be governed in all respects by the laws of Italy. The parties consent to the jurisdiction and venue of the Italian court of Bologna for resolution of any dispute under to this Agreement.

Use or sale of the Licensed Product or of Purchased Product shall bind Customer to all terms and conditions herein without the necessity of signatures on this Agreement.

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BEFORE USING

1. For a correct functioning of the device, it will be necessary to put the AgriNIR™ on a horizontal surface allowing the user to move easily the fodder box containing the sample to analyze.

2. The AgriNIR™ device must be supplied with a tension between 9,5 – 32 VDC through the suitable connector put on the upper of the case. That can be done through:
- Power Supply (output at 12 VDC) provided with the device;
- Supply cable (optional) with plug for car lighter supply.

In case other supply sources were used, dinamica generale® *is not responsible for damages to people or the AgriNIR™ device.*

3. For a correct functioning verify:
- In case of supplying through a 12 VDC supplier, that the cable for the supplier is connected to a tension between 100-240 VAC;
- In case of supplying through the plug for car lighter, that the battery has a tension always higher then 9,5 Volts.

4. During delivery of the AgriNIR™ it is important:
- Not to put mobile and/or sharpened objects inside the case preventing the electronic/optoelectronic (graphical display, printer, communication cable, optical fiber protected by a black sheath put at the bottom of the case) device from being broken or wrongly hurt.
- To fasten the accessories (fodder box, accessories for the fodder box, power supplier, supply cable, supply cable with plug for car lighter, clearing accessories) to prevent them from moving inside the case or the electronic/optoelectronic device from being broken.

If it is not the case, dinamica generale® *is not responsible for damages to the AgriNIR™.*

5. DO NOT POWER the AgriNIR™ device (by supply power cable for car lighter) during transporting by car.

If it is not the case, dinamica generale® *is not responsible for damages to the AgriNIR™.*

6. Disconnect the supply cable from the device before servicing and/or clearing the AgriNIR™.

If it is not the case, dinamica generale® *is not responsible for damages to people or to the AgriNIR™.*

7. To clean the AgriNIR™ correctly:
- for the upper part (display, keyboard, printer, reading glass) use a soft and slightly wet cloth;
- For the bottom (metal chassis of the fodder box and reading window of the Read NIR) use pressurized air or a soft and slightly wet cloth.

DO NOT use neither alcohol nor other solvents!
DO NOT wet with water!

If it is not the case, dinamica generale® *is not responsible for damages to the AgriNIR™.*

8. For a correct functioning of the sampling fodder box, use a soft cloth or pressurized air or flowing water. DO use neither alcohol nor other solvents!

If it is not the case, dinamica generale® *is not responsible for damages to the device.*

NOTES FOR THE USER

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1. After switching ON the AgriNIR™, **dinamica generale®** recommends strongly to wait at least **15 minutes** before executing the analysis. That will allow the optimization of the exercise temperature of the optoelectronic device.

2. For a correct functioning of the optoelectronic device contained in the AgriNIR™, it's better to monitor the temperature of the place where it is used. While working the device mustn't exceed the temperature range between 0°C and +40°C.

   If it is not the case, **dinamica generale®** *is not responsible for damages to the AgriNIR™.*
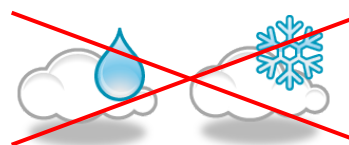
3. If ambient temperature is 35°C or upper, DO NOT keep the AgriNIR™ device turned on for more than 2 hours time (**IMPORTANT!** for machines HW rev. **B3** or previous).

   If it is not the case, **dinamica generale®** *is not responsible for damages to the AgriNIR™.*

4. In case of use of the device outside, it SHOULD NOT be exposed directly to climatic agents such as rain, snow, hail ...

   If it is not the case, **dinamica generale®** *is not responsible for damages to the AgriNIR™.*

5. In case AgriNIR™ were supplied through the suitable supply cable (optional) with plug for car lighter, disconnect this cable when the vehicle's battery is being charged.

   If it is not the case, **dinamica generale®** *is not responsible for damages to people or to the AgriNIR™.*

6. Disconnect the supply cable from the device before servicing and/or clearing the AgriNIR™.

   If it is not the case, **dinamica generale®** *is not responsible for damages to people or to the AgriNIR™.*

7. For a correct functioning verify:
   - In case of supplying through a 12 VDC supplier, that the cable for the supplier is connected to a tension between 100-240 VAC;
   - In case of supplying through the plug for car lighter, that the battery has a tension always higher then 9,5 Volts.

8. DO NOT use USB extension cables LONGER than 1 meter to connect the USB memory key to the USB connector available on the front unit of AgriNIR™ device.

9. **dinamica generale®** CANNOT be considered responsible for damages to people or things because of a misuse of the device.

10. **dinamica generale®** DOES NOT assume the responsibility for the result provided by AgriNIR™ in case there were not correspondence between the material analyzed and the one declared by the system.

11. This marking on the product or on its packaging illustrates that this product may not be disposed of with normal household waste. You are responsible for disposal of this equipment in a correct way and in according to local regulations.

1   CONTENTS

2   TECHNICAL DATA & CONFIGURATION

AgriNIR™ configurations		
Code	**Machine**	**Features**
999-0228	AgriNIR Analyzer	standard machine
999-0565	AgriNIR W Analyzer	Worldwide version
999-0347	AgriNIR Analyzer with GSM/GPRS	with GSM/GPRS Quad-Band internal modem

Accuracy [Note 2. at next page]	[see the tables at next page]
Working Temperature [Note 1. at next page]	**0° ÷ +40°C**
Power	**12 ÷ 18 VDC** **60W max**
Display	**LCD monochromatic** **¼ VGA**
Dimensions	**50 x 31 x 46 cm**
Weight	**20 Kg**
Box	**ABS plastic**
Protection Grade	**n. a.**
GMS / GPRS **internal modem** [only cod. 999-0347]	**Quad-Band GSM release 99** **850/900/1800/1900 MHz** **GPRS multi-slot class 12** Output power : • Class 4 (2 W) for EGSM850 • Class 4 (2 W) for EGSM900 • Class 1 (1 W) for GSM1800 • Class 1 (1 W) for GSM1900
Paper Type	**Thermal paper roll** **(thermal side outside of the roll)**
Paper width	**57 mm ±0.5 mm**
Paper Type suggested	**from 55 g/m² to 70 g/m²**
Roll diameter inner core	**13 mm**
Outer roll diameter	**max. Ø44mm**
Soul type	**Cardboard or plastic**

NOTES.

1. If AgriNIR™ machine has **Hardware revision B3 or previous** (the HW rev. is showed on yellow label together machine S/N), the maximum working temperature recommended is 35°C.

For **Hardware revision B4 or newer** the maximum working temperature is 40°C.

Please DO NOT exceed the limits of temperature, according to **NOTES FOR THE USER points N° 2 and 3** at page 3.

2. The percentage of Accuracy DOES NOT express the mathematical percentage of the error on analysis result, but it represents the maximum error in percentage points between the analysis result (just expressed in percentage points) provided by AgriNIR™ and the real analysis value, that you can obtain by chemical analysis on the material in question.

Please see below the specific AgriNIR™ Accuracy values for each NIR family / parameters :

AgriNIR™ accuracy for DG standard calibrations package		NIR Chemical Parameters						
		Moisture (Humidity)	Starch	Crude Protein	ADF	NDF	Ash	Crude Fat (Ether Extract)
NIR Families	CORN SILAGE	±2,0%	±2,0%	±1,0%	±1,0%	±1,5%	±0,5%	±0,5%
	HAY	±1,0%	n.a.	±1,0%	±2,0%	±2,5%	±1,5%	±0,5%
	HIGH MOISTURE CORN	±2,0%	±3,0%	±1,0%	±1,5%	±2,5%	±0,5%	±0,5%
	ALFALFA HAY	±1,0%	n.a.	±1,5%	±3,0%	±3,0%	±1,0%	±0,5%
	GRASS SILAGE	±2,0%	n.a.	±1,5%	±2,0%	±2,5%	±1,5%	±0,5%
	T.M.R.	±2,0%	±2,0%	±1,0%	±1,5%	±2,0%	±0,5%	±0,5%
	SOYBEAN FLOUR	±1,0%	n.a.	±1,5%	n.a.	±1,5%	±1,0%	±1,0%

AgriNIR™ accuracy for DG grains calibrations package [optional]		NIR Chemical Parameters						
		Moisture (Humidity)	Starch	Crude Protein	ADF	NDF	Ash	Crude Fat (Ether Extract)
NIR Families	CORN GRAIN	±1,0%	±1,0%	±1,0%	n.a.	±1,0%	±1,0%	±1,0%
	WHEAT GRAIN	±1,0%	±1,0%	±1,0%	n.a.	±1,0%	±1,0%	±1,0%

3   ACCESSORIES SUPPLIED

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Accessory	*Description*
	FODDER BOX Tray with glass for fodder samples and its pressure plate. Also it presents special housing for Check-Cell.
	PRESSOR The pressor with sponge is used for grains or dry and chopped matter. The pressor without sponge is used for forages of wet and voluminous type.

	CHECK CELL Special sample cell acetyl resin for the optics testing of the machine.
	POWER SUPPLY AC input : 100-240V~2A, 50-60Hz DC output : 12V, max 8A and AC power cable with SCHUKO plug IEC320 connector.
	Power cable for car lighter plug
	USB memory pen-drive
	Roll of thermal paper for printer
	AgriNIR™ User Manual

4   ELECTRIC CONNECTIONS

4.1   *Supplying AgriNIR™ with the provided power supply*

Power Supply
IN : 100-240VAC – 2A
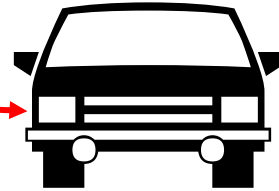**OUT : 12VDC – max 8A**

Power Connector

AgriNIR™ Analyzer

4.2 Supplying AgriNIR™ with the power cable for car lighter plug

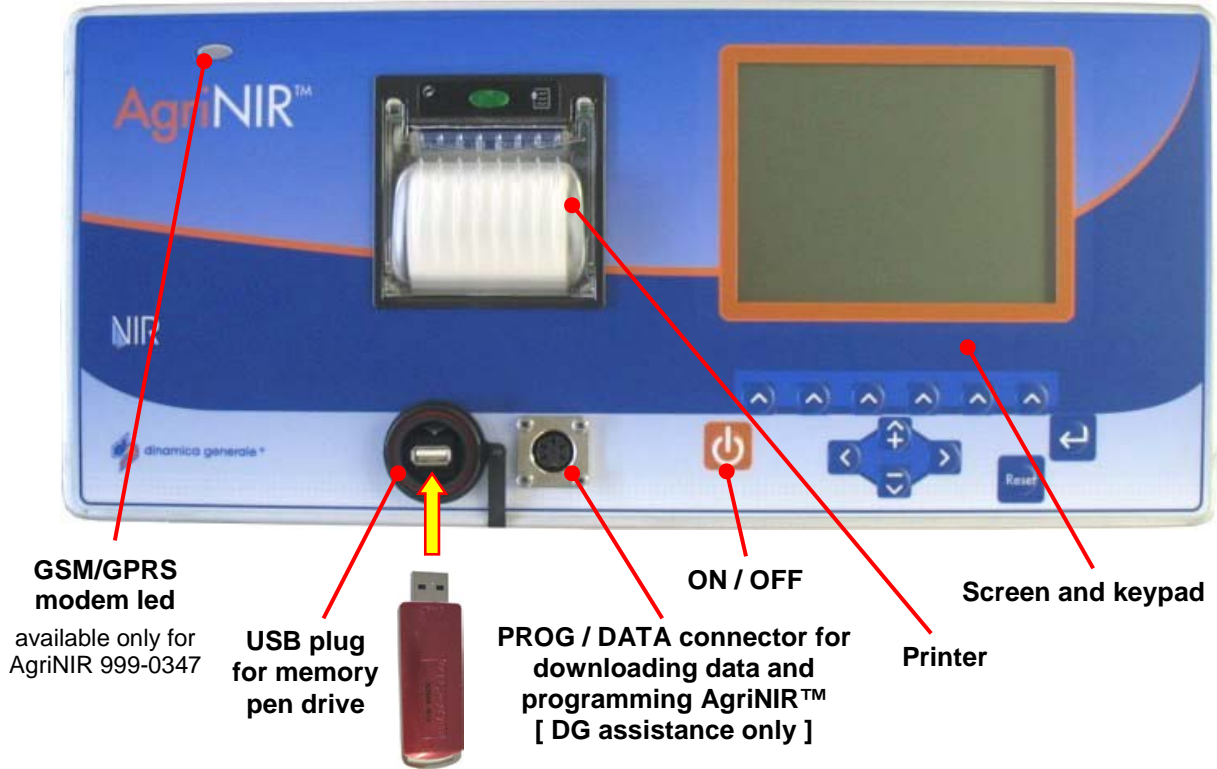**Power cable for car lighter plug**
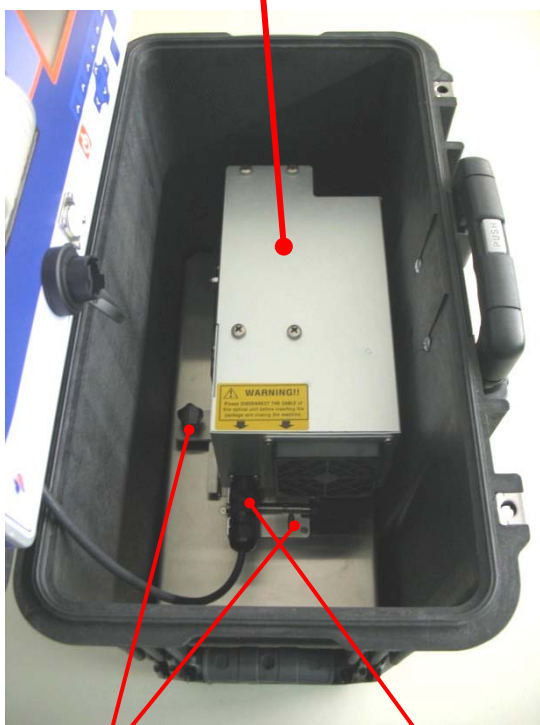

Power Connector

AgriNIR™ Analyzer

5   Description of the portable Analyzer AgriNIR™

In the following pictures it is explained how the system AgriNIR™ is composed:

ELECTRONIC UNIT

GSM/GPRS modem led

available only for AgriNIR 999-0347

USB plug for memory pen drive

PROG / DATA connector for downloading data and programming AgriNIR™ [DG assistance only]

ON / OFF

Printer

Screen and keypad

NIR OPTICAL UNIT

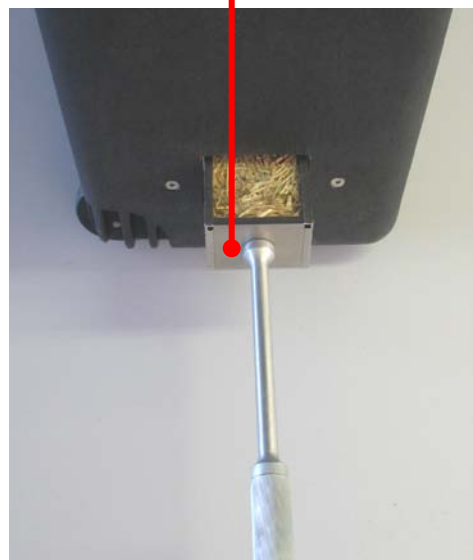**Knob and security hinge of NIR Unit**

Communication cable of NIR Unit

FODDER BOX
for inserting the sample to analyze

The portable Analyzer AgriNIR™ is composed by:

FODDER BOX → sampling box with screwed handles on presser, for the collection of the forage samples that has to be analyzed with AgriNIR™.

NIR OPTICAL UNIT → optical unit for acquisition of light produced by the sample to be analyzed.
This unit consists of:
- **Read NIR** → Optical reading head that senses the light spectra produced by the feed component present in the fodder box inside AgriNIR™ system.
- **Optical Fiber** → transmits the light sensed by Read NIR head to NIR optical sensor.
- **NIR sensor** → optoelectronic device that receives the light spectra sensed by Read NIR head on the feed component and transforms them in electrical signals.
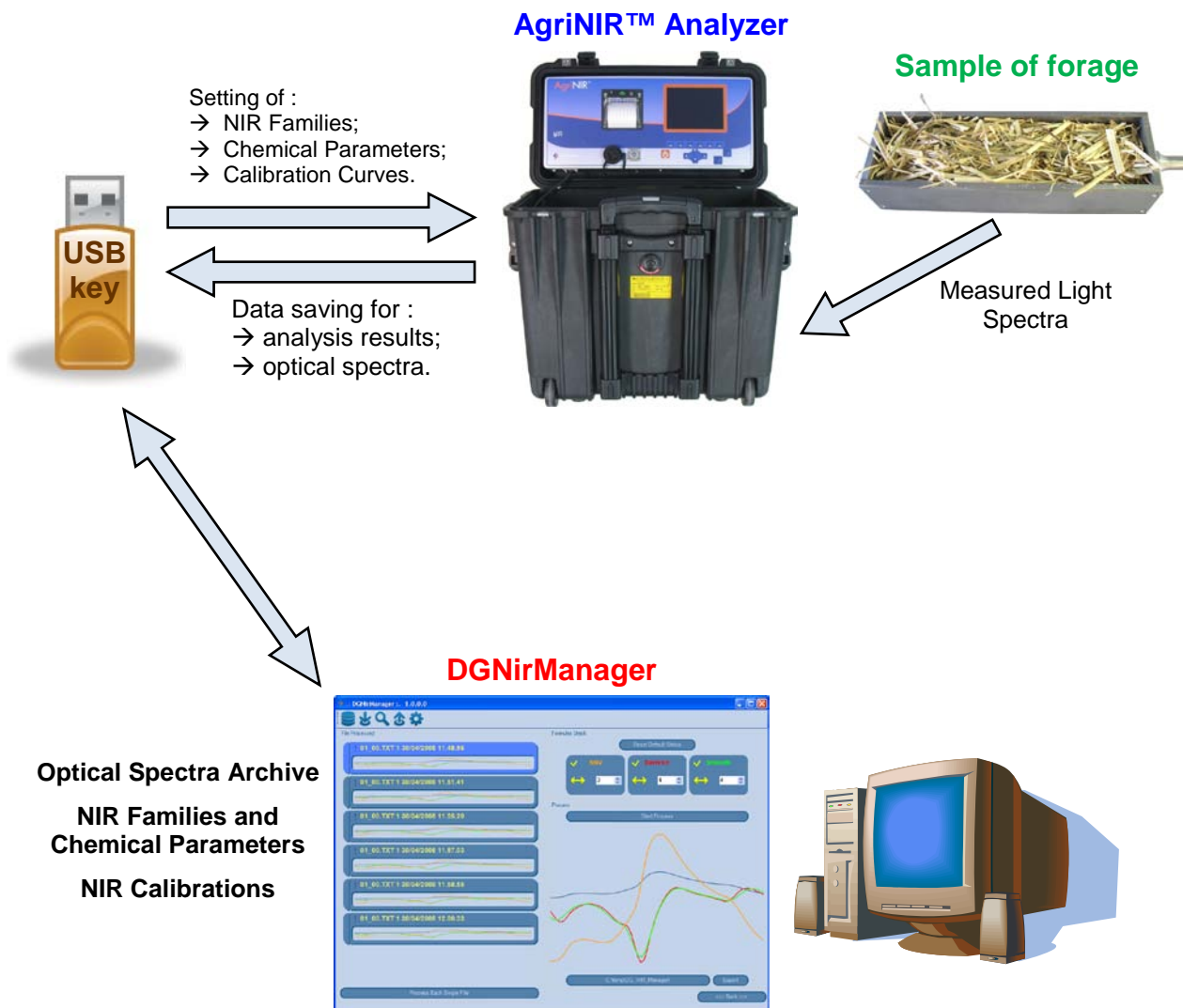
ELECTRONIC UNIT → processing and control unit of the AgriNIR™ system. With this unit the operator can start the analysis on the feed components put in the fodder box, and get the analysis results shown on display. These results can be printed on a paper or stored on a USB Pen Drive.

USB MEMORY PEN DRIVE → Memory unit that allows to store the results of the performed analysis and to transfer them to PC through the management software *DGNirManager.*

> ⚠ Please see **NOTES FOR THE USER point N° 8** at page 3.

The conceptual model that defines the functioning of the portable analysis system **AgriNIR™** is explained in the following scheme :

AgriNIR™ Analyzer

Sample of forage

Setting of :
→ NIR Families;
→ Chemical Parameters;
→ Calibration Curves.

USB key

Data saving for :
→ analysis results;
→ optical spectra.

Measured Light Spectra

DGNirManager

Optical Spectra Archive

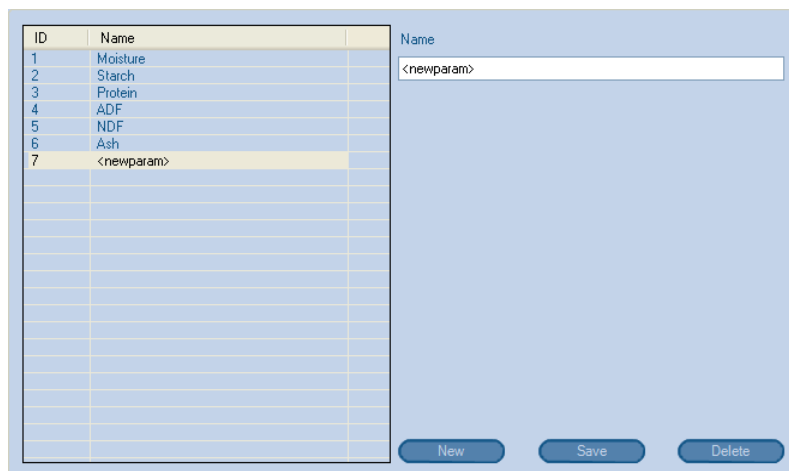NIR Families and Chemical Parameters

NIR Calibrations

For the setting of the feed components to analyze and the storage of the performed analysis on PC it is used the management program **DGNirManager** produced by dinamica generale®.
This software product on PC allows the user to:

- set the Chemical Parameters for the analysis to be performed with the AgriNIR™ system;

- mark the feed components that will be analyzed with the AgriNIR™ system, by means of NIR Families components giving them proper theoretical reference values for the chemical parameters that characterize them; after having completed its own set of feed components, this is transferred to AgriNIR™ system through the USB memory key;
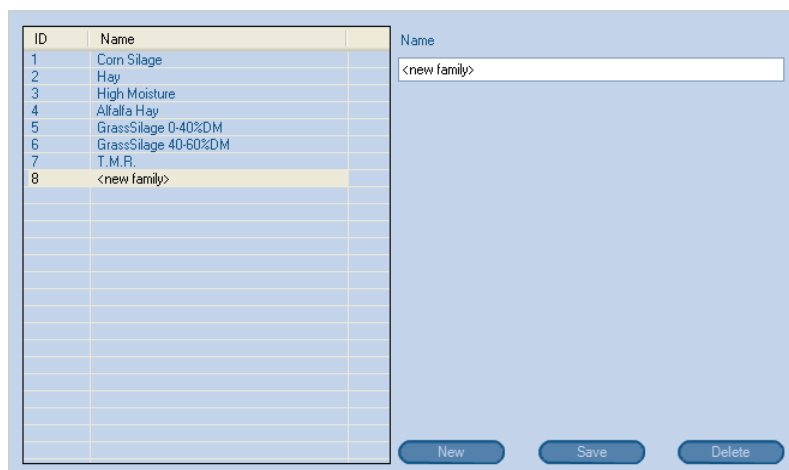
- store all the analysis performed with AgriNIR™ system and relevant optical spectra sensed on the analyzed components, previously stored on USB memory key; after having completed its own set of analysis, new Calibration Curves can be performed, i.e. new setting curves to be transferred to the AgriNIR™ system through the USB memory key, in order to make AgriNIR™ analysis even more accurate.

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6 Use of the Portable AgriNIR™ Analysis System

6.1 NIR Parameters and NIR Families

In case of **dinamica generale®** **standard calibrations package**, the portable analysis system AgriNIR™ can analyze till to a max of **7** chemical parameters for a max of **7** feed components categories of most common use in cattle breeding.

In all NIR analysis systems produced by **dinamica generale®** and therefore also for AgriNIR™ it is defined:

> **NIR Parameters**   all chemical parameters analyzable by an optical NIR analysis system
>
> **NIR Families**   the categories or families of feed components analyzable by an optical NIR analysis system

For cattle feeding, the list of all chemical NIR parameters that can be analyzed for each NIR family is expressed in the following table:

NIR chemical parameters that can be analyzed in every NIR Family DG standard calibrations package		NIR Chemical Parameters						
		Moisture (Humidity)	Starch	Crude Protein	ADF	NDF	Ash	Crude Fat (Ether Extract)
NIR Families	**CORN SILAGE**	YES	YES	YES	YES	YES	YES	YES
	HAY	YES	NO	YES	YES	YES	YES	YES
	HIGH MOISTURE CORN	YES	YES	YES	YES	YES	YES	YES
	ALFALFA HAY	YES	NO	YES	YES	YES	YES	YES
	GRASS SILAGE	YES	NO	YES	YES	YES	YES	YES
	T.M.R.	YES	YES	YES	YES	YES	YES	YES
	SOYBEAN FLOUR	YES	NO	YES	NO	YES	YES	YES

It is necessary to keep this table in mind while defining with **DGNirManager** the feed components to analyze.

- The a.m. definition of the NIR families and therefore of the feed components categories analyzable by NIR systems, is subjected to market requests and intends to include all feed components mostly used in cattle breeding. Moreover, depending on the usage of the AgriNIR™ system (according to the NIR Calibrations carried out by specialized laboratories) it is possible to create NIR Families that are completely different from those mentioned here (e.g. NIR family for Olive Husk).

- For every NIR family it is necessary to set the suitable Theoretical Reference Values for each NIR chemical parameter that can be analyzed (see table above). These reference values are normally the result of laboratory chemical analysis performed on different samples of the NIR family and allow to the AgriNIR™ system to make a "selection" of the optical analysis that result incorrect (ex. due to a bad optical reading, to a false position of the sample under the reading head Read NIR, to a too much damaged component, to external rests present, etc...).

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In case of *dinamica generale*® **grains calibrations package** (optional calibrations for grains), the portable analysis system AgriNIR™ can analyze following NIR grain families and allows these chemical NIR parameters :

NIR chemical parameters that can be analyzed in every NIR Family *DG grains calibrations package [optional]*		**NIR Chemical Parameters**						
		Moisture (Humidity)	**Starch**	**Crude Protein**	**ADF**	**NDF**	**Ash**	**Crude Fat (Ether Extract)**
NIR Families	**CORN GRAIN**	YES	YES	YES	NO	YES	YES	YES
	WHEAT GRAIN	YES	YES	YES	NO	YES	YES	YES

⚠️ The of *dinamica generale*® **grains calibrations package** is an Optional Calibration package that the final customer can add, when he orders a new AgriNIR™ machine.

6.2   Correct Use of the Fodder Box for the Samples to Analyze

Before going on with the real use of the Portable AgriNIR™ Analysis System, it is important to understand the correct use of the fodder box containing the sample to analyze.

This fodder box (provided with the AgriNIR™) is composed by :
- an upper side with glass, to allow the optical scanning of the sample;
- a metallic frame able to maintain the sample properly (with the right pressure!) in front of the scanning window glass.

To fill in the fodder box with the food sample to analyze, it is very IMPORTANT to put in practice the following simple rules:
- make sure the fodder box GLASS IS CLEAN, without residues of other samples;
- in case of very soft materials with long pieces, as *hay, alfalfa*, or *grass silage*, it is NECESSARY :
  - ➢ sampling material using a special *Corer* (strongly suggested!) and then cut the sample in order to have parts with length equal to 2/3 cm;
  - ➢ press the sample in order to reduce its volume up to 1/2 or 1/3 of the original one;
- the sample must be put into the fodder in order to cover completely the scanning window (glass) without open spaces. Below you can see 2 different pictures reporting how the sample has to be putted inside the fodder: quantity, pressure…
- in the first picture below, you can see a sample well prepared and ready for analysis

OK!
good pressure without air spaces.

- in the second picture below, a sample prepared in a wrong way: sample quantity is wrong and its pressure on the glass is too low

NO!
low pressure with air spaces.

- after the insertion of the metallic frame in the fodder for pressing the sample, it is necessary to check that its upper handles do not exceed the fodder profile:

OK!

Upper handles are inside the fodder profile.
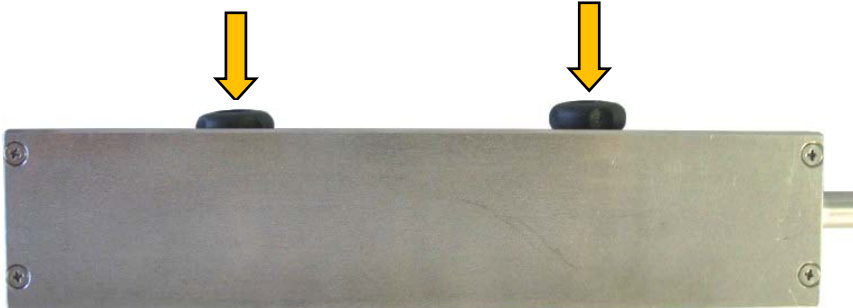
NO!

Upper handles are over the fodder profile, creating mechanical interference during the insertion of the fodder inside the AgriNIR™ body for sample scanning.

As soon as the fodder is ready with sample inside, insert the fodder box (**glass side up**) into the AgriNIR™ body using the hall on the right side (see picture below).

Just started the analysis (after press <ENTER>), it is required to perform the following actions :

- fodder has to be moved front and rear with a uniform speed spending about **2 seconds for a complete scanning cycle**: 1 sec to front and 1 sec to rear;
- the fodder profile has to be always inside the AgriNIR™ box.
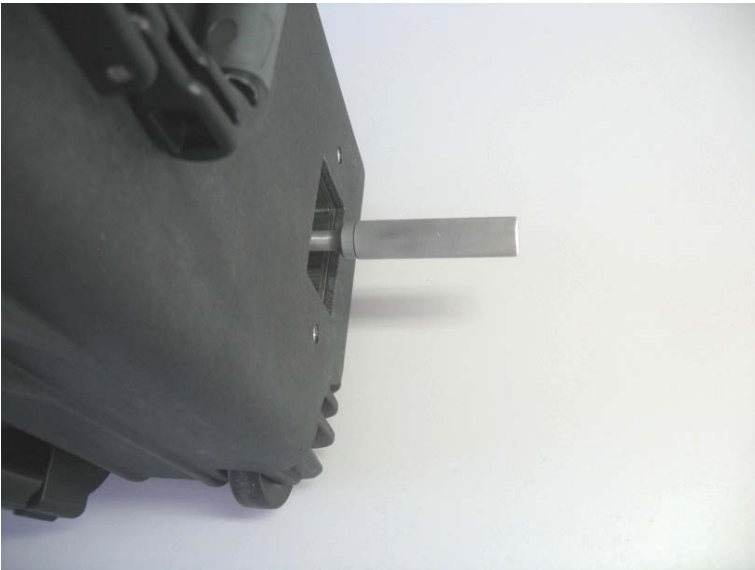
OK!

The fodder box is completely inside the AgriNIR™ body.

OK!

The fodder box is on the edge of the AgriNIR™ body, but **NOT outside**.

NO!

The fodder box is partially outside from the AgriNIR™ body.

6.3   Turning on the AgriNIR™ system

Press key to turn ON the portable AgriNIR™ analyzer, the following screens will appear :

ONLY FOR AgriNIR W:
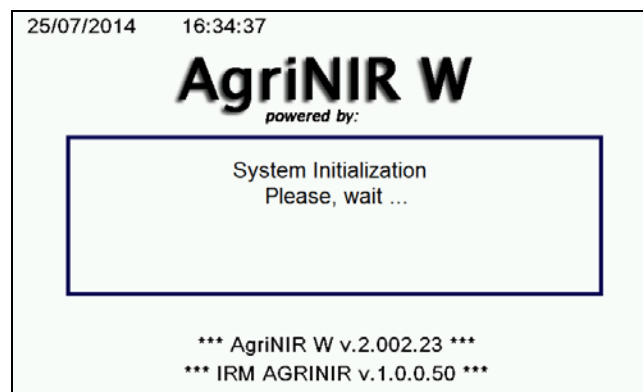
In this phase there is the initialization of AgriNIR™ system either from hardware or from software point of view. During this initialization the device loads all the settings requested from the customer and previously set.
After, ONLY FOR AgriNIR W, a screenshot with an initialization time of 5 minutes appears.

After all initialization phases, the system automatically proposes following screen, where it is possible to set the :

CUSTOMER CODE ← identifier number of the customer (ex. the owner of the forages samples) which the AgriNIR™ system performs the analysis on the requested feed components.

Basically it represents the use mode of the machine on behalf of third parties.

After set the customer code, press <ENTER> [↵] to continue in the main screen :

Temperature of the internal NIR sensor, controlled at 32°C

Power supply voltage

GSM/GPRS signal level

Available only for AgriNIR Analyzer with GSM/GPRS cod. 999-0347

Current Date & Time

18/03/2010   17:24:51 +32.0°C   12.70 S20

Corn Silage   NIR Ready

NIR status icon

List of NIR families available on AgriNIR™ analyzer

01
02
03
04
05
06
07

Name of the selected NIR family

Function Icons

Below in the display there are a set of graphical icons. Every function icon can be activated by one key corresponding of the 6 F-keys on the keypad.

Function Keys on keyboard

Below in the display can appear maximum 6 function icons. In case of more function icon are available the following keys :

← **NEXT PAGE**, to access to the next set of function icons

← **PREVIOUS PAGE**, to return to the previous set of function icons

For example, if you press [icon] in the main screen you can access to the next 4 function icon :

if you press [icon] you can return to the 6 previous function icon :

ONLY FOR AgriNIR W:
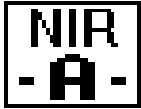
6.4   States & Messaging of NIR analyzer internal system

After turning on the AgriNIR™, before going on with the execution of the analysis it is better to wait always at least **15 minute** before starting to allow :

- the thermoregulation of the NIR optical sensor to reach the target temperature of 32°C;
- the necessary warming up of the internal lamp of the Read NIR reading head;
- one first calibration of the optical references of the internal NIR analysis system.

By the way, to help the user the AgriNIR™ system shows on the right top of the screen an icon referring to the contemporary state of the NIR system:

AgriNIR	AgriNIR W	Description of the icon
		WARM-UP the internal NIR system is executing the initial warm-up phase to reach the target temperature of 32°C and to warm-up of the internal lamp.
		OPTICAL CALIBRATION the internal NIR system is executing the calibration phase of the optical references.
		READY the AgriNIR™ system is ready for the analysis execution.
		RUNNING ANALYSIS the AgriNIR™ system is executing the analysis.
		CONNECTION MISSING or **ERROR STATUS** the NIR group is not connected to the electronic unit or there is an issue the internal NIR system.
		ERROR OF NIR CALIBRATION The system can't performs the calibration.

After turning ON the machine **BEFORE STARTING** with the analysis executions, the AgriNIR™ system executes automatically :

1. the **WARM-UP phase** of the NIR group with status icon , to allow :
    - the thermoregulation of the NIR optical sensor to reach the target temperature of 32°C;
    - the necessary warming up of the internal lamp of the Read NIR head;

2. the **CALIBRATION phase** of the NIR group with status icon , to allow the first calibration of the optical references of the internal NIR analysis system;

3. after these first two phases the AgriNIR™ analyzer is **READY**, with status icon .

 Although the WARM-UP takes less time and the CALIBRATION phase is already done, it's STRONGLY RECOMMENDED to wait always at least 15 minutes before starting use the AgriNIR™ machine.
Please see **NOTES FOR THE USER point N° 1** at page 3.

If you start the analysis execution during the **WARM-UP phase**, the AgriNIR™ system shows the following message:

← The status icon of the NIR system indicates the **WARM-UP** phase.

At the end of the calibration this message disappears and the AgriNIR™ begins automatically the CALIBRATION phase and its message (see the next picture below).

If you start the analysis execution during the **CALIBRATION phase**, the AgriNIR™ system shows the following message :

← The status icon of the NIR system indicates the **CALIBRATION** phase.

At the end of the calibration this message disappears and the AgriNIR™ begins automatically the ANALYSIS EXECUTION of the selected component.

During normal functioning, the AgriNIR™ machine executes automatically the optical calibration phase :

- **every 5 minutes;**
- **just after every analysis execution.**

For this reason it's possible :

➢ the NIR status icon changes automatically to [NIR Calib] ;

➢ to have the NIR calibration message during analysis execution.

6.5   Error Messaging of NIR analyzer internal system

After turning on the AgriNIR™, set the Customer Code to continue in the main screen, if appears (before start the WARM-UP phase) :

NIR system is in **Error State**

It's NOT possible to detect the temperature of the internal NIR sensor
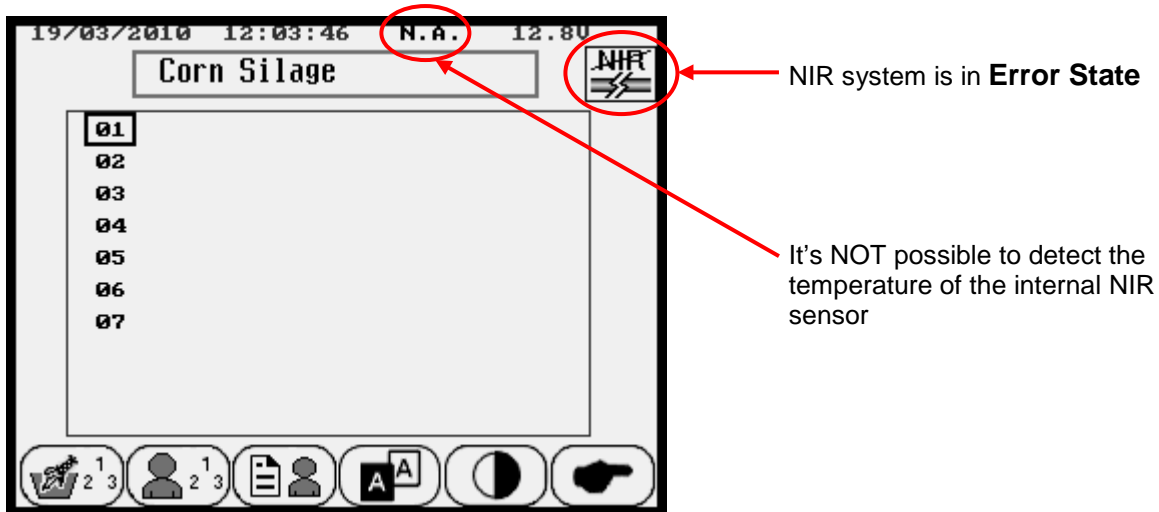
TROUBLESHOOTING

1. Please check if a data cable is connected to the PROG / DATA connector (please see the picture at page 10). In this case the internal NIR system takes more time to start the communication and to update NIR status icon and NIR temperature.

2. Please check if the communication cable from Electronic Unit (front control panel) is connected to the NIR group inside the bottom box.

3. Please check if the communication cable from Electronic Unit to NIR group is not damaged.

4. If is not the case 1 or 2, please contact the dinamica generale® Customer Service.

During functioning of the AgriNIR™ machine, if appears this following messages :
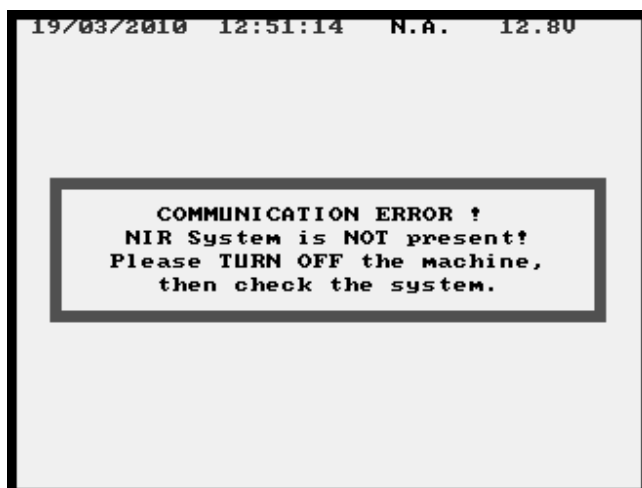
← the AgriNIR™ machine cannot communicate with its internal NIR analyzer.

TROUBLESHOOTING

1. Please check if the communication cable from Electronic Unit (front control panel) is connected to the NIR group inside the bottom box.

2. Please check if the communication cable from Electronic Unit to NIR group is not damaged.

3. If is not the case 1 or 2, please contact the **dinamica generale®** Customer Service.

During functioning of the AgriNIR™ machine, if appears this following messages :

```
19/03/2010  14:39:08    N.A.    12.80



        ATTENTION!
 Temperature is out of range
  Analysis will not be made
   Please, turn off machine
    for at least 30 minutes

```
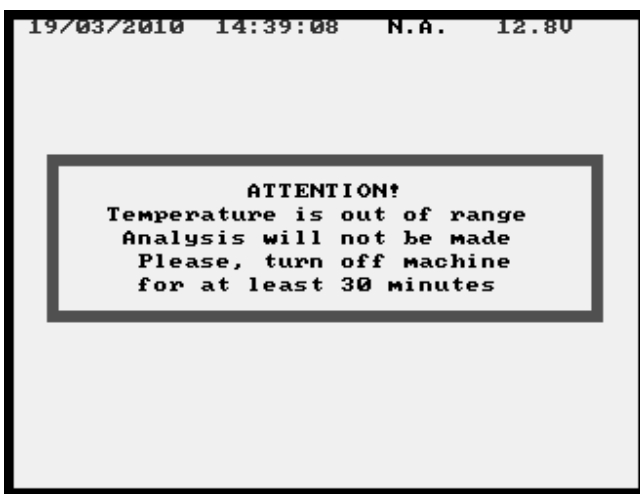
← the thermoregulation of the internal NIR optical sensor CANNOT maintain the target temperature of 32°C.

Please IMMEDIATELY turn OFF the AgriNIR™ machine and leave it off for at least 30 minute.

TROUBLESHOOTING

1. Verify if the environmental temperature, where the AgriNIR™ machine is located, is out of the **Working Temperature range**. Please see Technical Data at page 5.

2. Remove completely the NIR group from the AgriNIR™ machine, then check if the filter fan and the finned heat sink (visible on the back side where the shield is pierced) are clean. Otherwise proceed to clean using a low flow of compressed air.

3. Verify if the fan on the connector side of the NIR Group is working, otherwise contact the **dinamica generale®** Customer Service for the spare part.

4. If is not the case 1, 2 or 3, please contact the **dinamica generale®** Customer Service.

6.6   Initial Optical Checking of the AgriNIR™ system

> ⚠ Every day **BEFORE** start using the AgriNIR™ analyzer, **dinamica generale®** recommend to execute the **OPTICS TEST** using the **CHECK-CELL accessory.**

ENGLISH
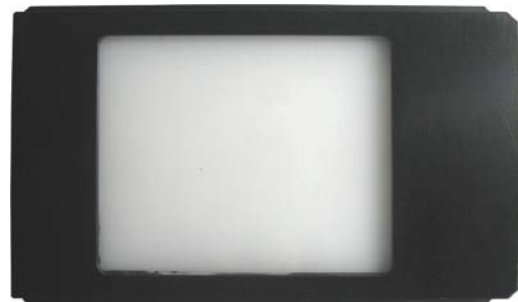
CHECK CELL ← special sample cell acetyl resin for the optics testing of the AgriNIR™ machine.

Follow the procedure below to perform the **OPTICAL TEST PROCEDURE**.

1. Insert the CHECK-CELL in the dedicated seat on the upper edges of the fodder box, making sure the correct orientation :

back right angle corner

beveled corner to match to the seat of the fodder box

NO
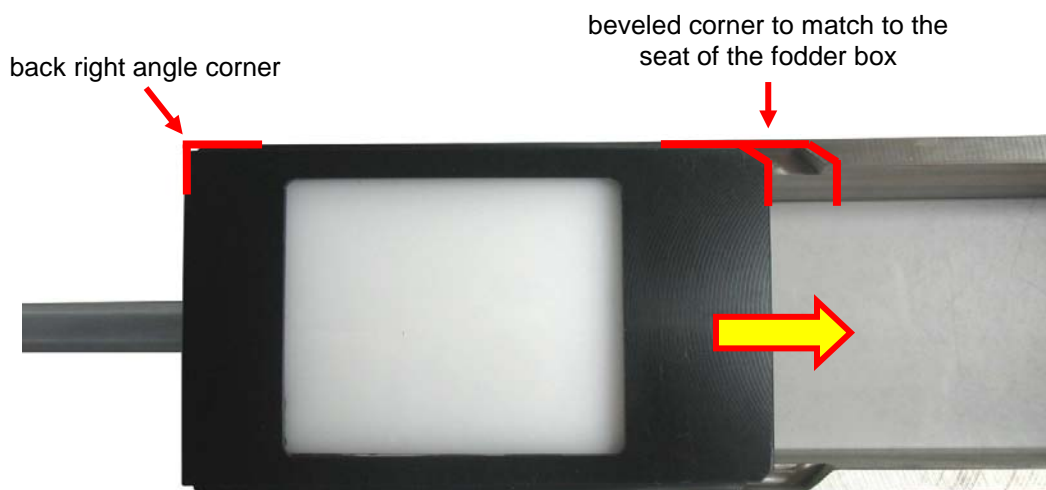
2. Insert completely the fodder box and the **CHECK-CELL with its glass-face side up**, inside the
AgriNIR™ box until the bottom :

3. In the main screen, press to access to the next 4 function icon, then press to enter
on **AGRINIR OPTICS TEST** procedure :
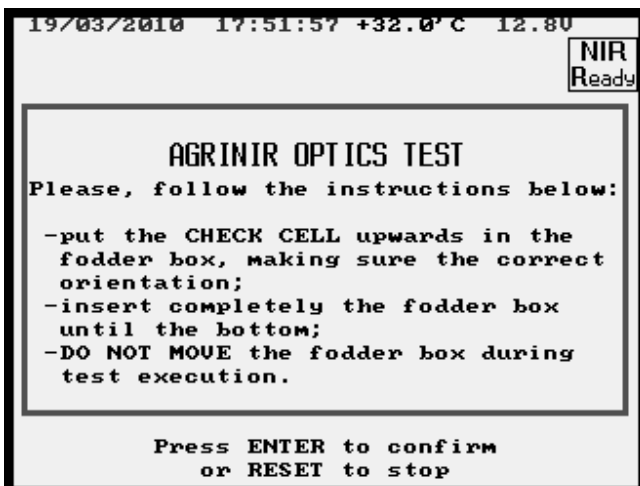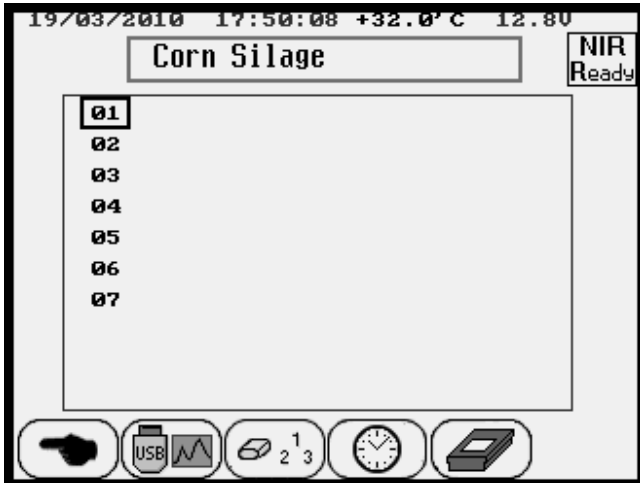
← the AgriNIR™ analyzer shows instructions to
execute properly the **OPTICS TEST**.

Press <ENTER> to start optics test

or <RESET> to exit without testing.

4. Press <ENTER> [enter icon] to start the automatic testing procedure :
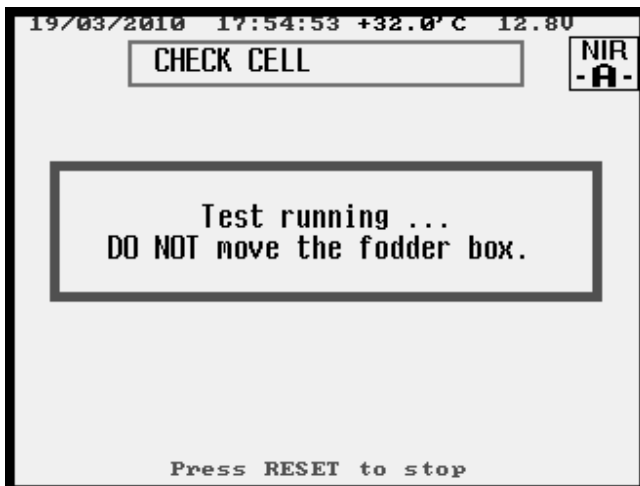
WARNING!

DO NOT move the fodder box with the CHECK-CELL inside during testing execution.

If you move the fodder box, the CHECK-CELL cannot be in front of the internal optical reading window (ReadNIR window, where is the lamp light); consequently the CHECK-CELL cannot be properly read.

Pressing <RESET> [reset icon] testing execution is immediately aborted.

5. After 40 seconds, the AgriNIR™ analyzer shows the optical test result :
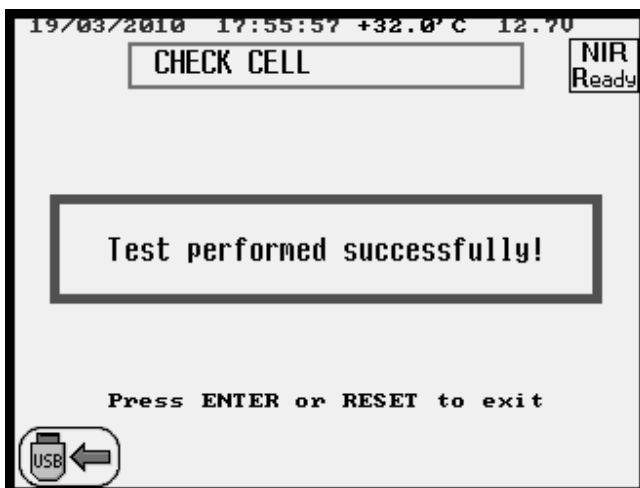
The AgriNIR™ internal optics is OK!
Now you can proceed to execute analysis.

Press <ENTER> [enter icon] or <RESET> [reset icon] to exit and continue.

6. If the testing execution takes more than 40 seconds (2 minutes), the optics test could fail. In this case the AgriNIR™ analyzer shows following message :
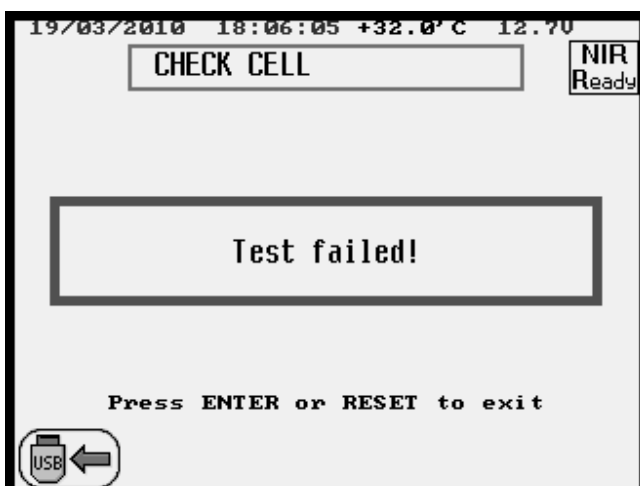
WARNING!

The AgriNIR™ internal optics is FAIL!
Consult the following troubleshooting procedure to solve the issue.

Press <ENTER> [enter icon] or <RESET> [reset icon] to exit and continue.

In this case you can save the optical spectra on

USB memory key pressing F-key [usb icon], then send data to the **dinamica generale®** Customer Service for checking.

TROUBLESHOOTING

1. Verify if the CHECK-CELL is properly inserted inside the fodder box. Please see the pictures at page 23 point 1.

2. Verify if the fodder box with CHECK-CELL is properly inserted inside the AgriNIR™ analyzer box. Please see the pictures at page 24 point 2.

3. Verify the cleaning of the CHECK-CELL glass or the ReadNIR glass inside the NIR group on the bottom side.

4. Verify if the CHECK-CELL glass or the ReadNIR glass is broken, otherwise contact the **dinamica generale®** Customer Service for the spare parts.

5. Verify if the lamp inside the NIR group is not on its correct position or its time life is expiring (1 year); in second case, please contact the **dinamica generale®** Customer Service for the spare part.

6. Verify if the optic fiber terminal (visible inside the NIR group through the glass window on the bottom side) is properly inserted on its brass fitting, otherwise if it's moved please contact the **dinamica generale®** Customer Service.
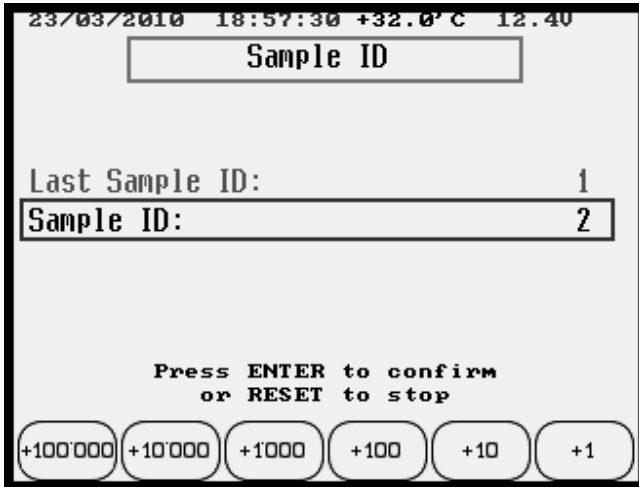
7. If it's none of the previous cases, please save the optical spectra on USB memory key and contact the **dinamica generale®** Customer Service.
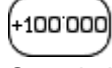
6.7   *Analysis Samples Identifying*

Before starting the analysis on the forage sample, it's possible to set the following identifiers.

If you press F-key [icon] it's possible to set :

```
23/03/2010   18:57:30 +32.0'C   12.40
            Sample ID

Last Sample ID:                     1
Sample ID:                          2




          Press ENTER to confirm
            or RESET to stop
+100'000 +10'000 +1'000  +100   +10    +1
```

← **SAMPLE ID**, it allows to mark the parti-cular physical sample to analyze.

Press the cursor keys [↑+] [−∨] or the F-keys [+100'000] … [+10] [+1] to change the Sample ID value.

Press <ENTER> [↵] to exit and save value.

Press <RESET> [Reset] to exit without saving.

🔍 **SAMPLE ID**
is the current sample identifier number : this ID number will be automatically proposed before starting the analysis on the sample and it will be printed on the tickets at the end of analysis execution.
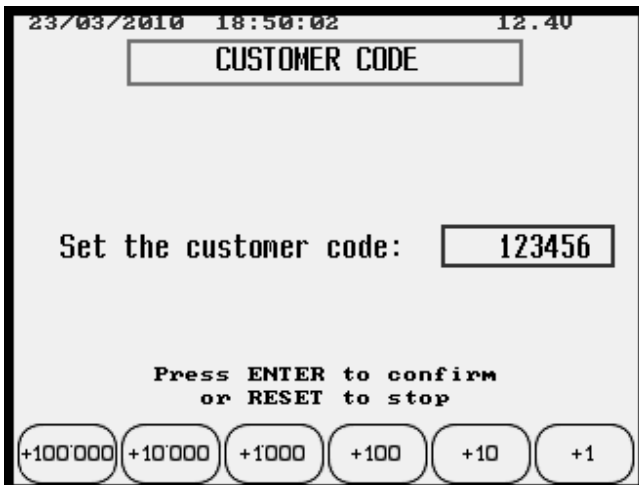
🔍 **LAST SAMPLE ID**
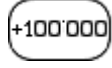is the previous sample identifier number used in the last analysis.

🔍 After every analysis the **SAMPLE ID number** is automatically increased by 1.

If you press F-key [icon] it's possible to set :

```
23/03/2010   18:50:02            12.40
         CUSTOMER CODE




  Set the customer code:      123456



          Press ENTER to confirm
            or RESET to stop
+100'000 +10'000 +1'000  +100   +10    +1
```

← **CUSTOMER CODE**, it allows to give a code number to the client who the analysis sample belongs.

Press the cursor keys [↑+] [−∨] or the F-keys [+100'000] … [+10] [+1] to change the Customer Code value.

Press <ENTER> [↵] to exit and save value.

Press <RESET> [Reset] to exit without saving.

🔍 **CUSTOMER CODE**
this number will be printed on the tickets at the end of analysis execution.

ENGLISH

If you press F-key ⬚ it's possible to set :

```
23/03/2010  18:59:20 +32.0'C  12.40
           Client Information

Company:              DINAMICA
Contact:              GENERALE
Address:              V. Mondadori 15
Country / City:       ITALY
ZIP code:             46025
Province:             MN
Phone:                +39 038652134
```

← **CLIENT INFORMATION**, it allows to give more details about the client who the physical sample belongs.

Only the **COMPANY** name will be printed on the tickets at the end of analysis execution.

All the **CLIENT INFORMATIONs** will be stored in the **INFO.DAT file** containing the Client's data, when analysis is saved on USB memory key.

To modify the data in the **CLIENT INFORMATION** window :

➢ press keys ⬆⬇ to move up / down the cursor and select the information;

➢ press F-key ⬚ to enter in edit mode on the selected information.

```
23/03/2010  19:03:52 +32.0'C  12.40
           Client Information

Company:              DINAMICA
Contact:              GENERALE
Address:              V. Mondad_
Country / City:
ZIP code:
Province:
Phone:
```
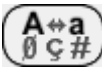
After pressed F-key ⬚ appear automatically the string icons on the bottom :

➢ press keys ◀ ▶ to move right / left the cursor "_" ;

➢ press (ABCD) to insert a character at the beginning;

➢ press ⟨A↔a⟩ to select capital letters / small letters, numbers, symbols;

➢ press ⟨ABꜜCD⟩ to insert a character at the cursor position;

➢ press ⟨ABⅩD⟩ to delete a character at the cursor position;

➢ press ⟨ABⅩ⟩ to delete all characters from the cursor position to the end on the right;

➢ press ⟨ABCD⟩ to insert a character at the end on the right;

➢ press <ENTER> ⤶ to confirm the new data string;

➢ press <RESET> Reset to exit without modify the data string;

➢ press F-key to save all data and quit

If you press F-key you can recall the **Client Information previously stored on internal memory**.

If you press F-key you can recall the **Client Information defaults** provided on the AgriNIR™ analyzer by dinamica generale® :

6.8   *Analysis Execution with AgriNIR™ System*

After turned ON the AgriNIR™ system and performed following phases :

- WARM-UP (at least 15 minutes) and CALIBRATION ← please see at page 19 for more details;

- optics test with CHECK-CELL ← please see at page 23 for more details;

- identification of the sample (using SAMPLE ID) and set the customer information (CUSTOMER CODE and CLIENT INFORMATION);

it's possible to prepare the sample inside the fodder box (see at page 14 for more details) and starts to execute the analysis.

In the main screen it's possible to select the component to analyze by pressing the keys :
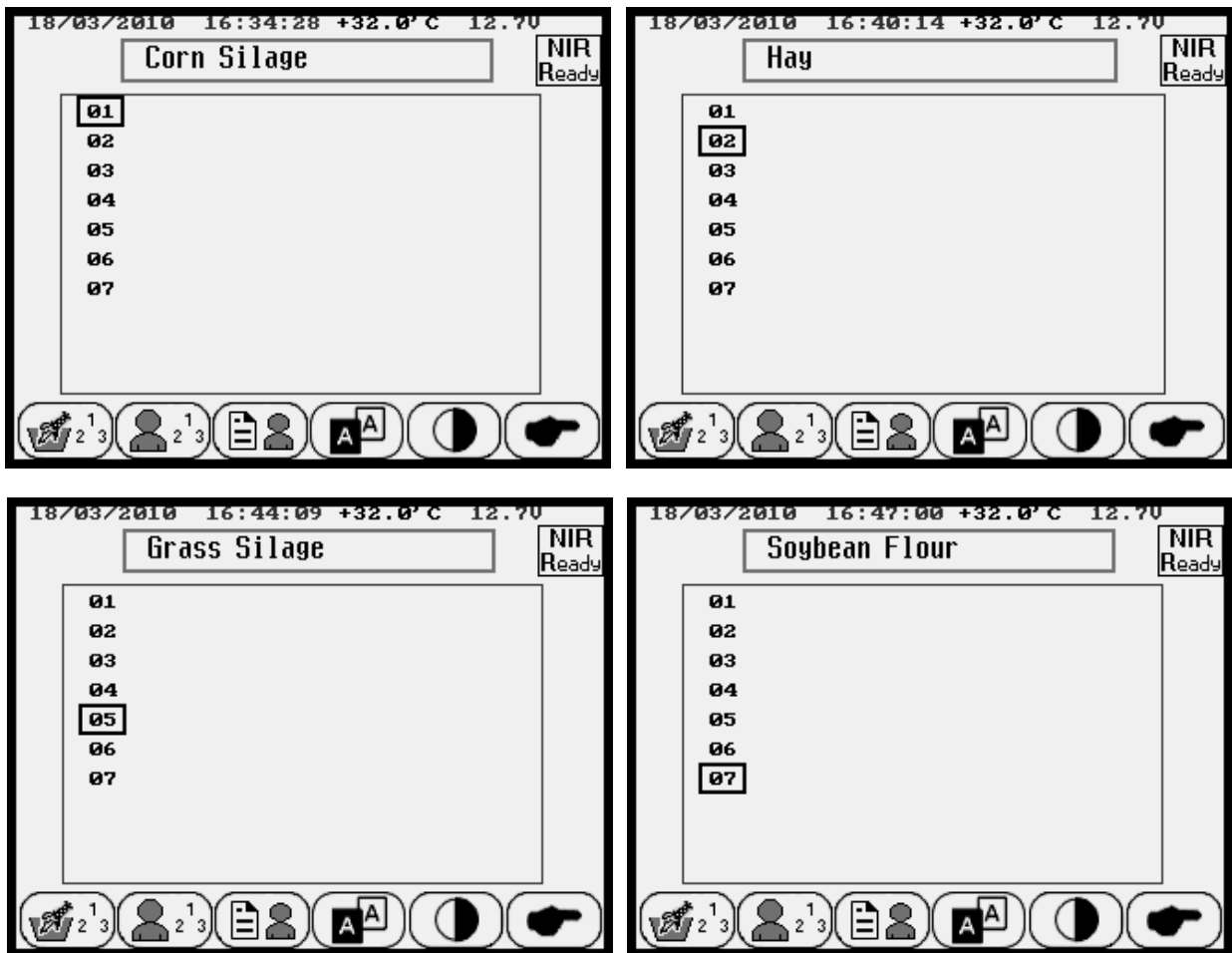
In case of **dinamica generale®** standard calibrations package, the portable analysis system AgriNIR™ can analyze till to a max of **7 NIR families** (feed components categories) as mentioned at page 13.
Moving the pointer you can choose among 7 NIR families / components (Corn Silage, Hay, High Moisture Corn, Alfalfa Hay, Grass Silage, TMR, Soybean Flour) : every component that can be chosen in this list represents a feed components category (the NIR family) which the sample to analyze can belong.
Select a different component / NIR families means select a different NIR calibration inside the AgriNIR™ analyzer.

> ⚠ **Please take care to select the correct Component / NIR family before starting the analysis on the forage sample.**
>
> **The Component / NIR family selected represents the feed components category which the sample to analyze belong.**

ENGLISH

Examples :
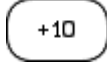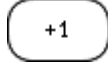
- Sample of *HAY OF STEADY LAWN* :
  sample must be taken by the Corer (or shredded), then put it in the fodder box;
  select the component (or NIR family) N° 2 → HAY to execute the analysis.

- Sample of *CORN SILAGE* :
  sample must be taken without grinding, then put it in the fodder box;
  select the component (or NIR family) N° 1 → CORN SILAGE to execute the analysis.

After selected the component to analyze, the AgriNIR™ system propose the Sample ID number to assign on the physical sample to be analyzed :

```
23/03/2010  18:57:30 +32.0'C  12.40
          Sample ID


Last Sample ID:                 1
Sample ID:                      2




        Press ENTER to confirm
          or RESET to stop
+100'000 +10'000 +1'000 +100  +10   +1
```
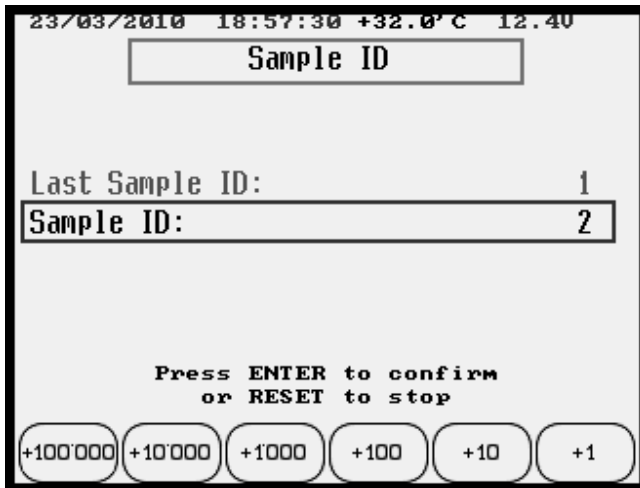
SAMPLE ID, it's the actual number to assign to the physical sample.

LAST SAMPLE ID, it's the previous number assigned to last physical sample analyzed.

Press the cursor keys or the F-keys

+100'000 … +10 +1 to change the Sample ID value.

Press <ENTER> to confirm the Sample ID and continue with analysis execution.

Press <RESET> to quit immediately the analysis (without executing) and return to the main screen where you can choice a different component.

If you press <ENTER> to confirm, the AgriNIR™ system gives the possibility to choose between two analysis execution modes :

```
20/03/2010  10:25:00 +32.0'C  12.70  NIR
   Hay                                Ready


    ┌─────────────────────────────┐
    │      MULTIPLE ANALYSIS ?     │
    │                             │
    │  ENTER : Multiple Analysis  │
    │  RESET : Single Analysis    │
    └─────────────────────────────┘
```
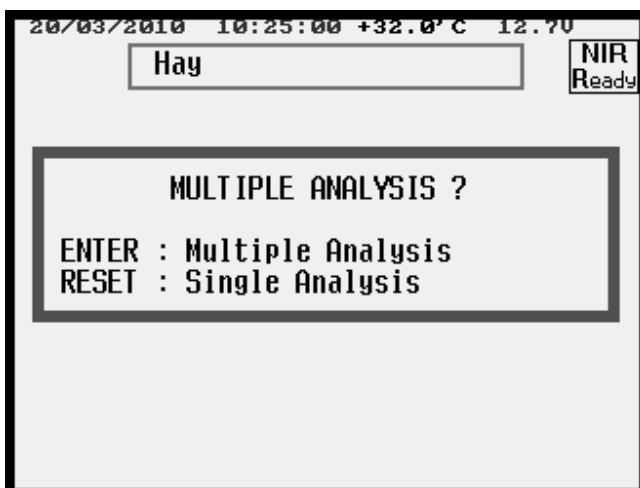
press <ENTER> of you want choose the **MULTIPLE ANALYSIS** mode;

press <RESET> of you want choose the **SINGLE ANALYSIS** mode;

The AgriNIR™ analyzer allows two analysis execution modes to satisfy following cases :

INSTRUCTIONS FOR PROPER SELECTION OF ANALYSIS MODE

➔ **Case of SAMPLES HOMOGENEOUS and LOW QUANTITY**

<u>Examples</u> : High Moisture Corn, Soybean Flour

1. If the sample is already grinded not more than 2/3 mm, it's possible to put directly the sample inside the fodder box.
2. Select **SINGLE ANALYSIS mode** to execute the analysis.

➔ **Case of SAMPLES NOT HOMOGENEOUS**

<u>Examples</u> : Corn Silage, Hay, Alfalfa Hay, Grass Silage, TMR

1. Provide to shred the material to obtain pieces not longer than 2/3 cm, then put the sample inside the fodder box.
2. Select **MULTIPLE ANALYSIS mode**, using **at least 3 analysis**.
3. Mix the sample inside the fodder box between a single analysis and the next.

➔ **Case of LARGE SAMPLE QUANTITY**

<u>Examples</u> : bunker of Corn Silage, Grass Silage or TMR; bale of Hay or Alfalfa Hay

1. Collect enough samples that are representative of the entire bunker front, or the entire bale, etc…
2. Provide to shred each samples to obtain pieces not longer than 2/3 cm, then put one sample inside the fodder box.
3. Select **MULTIPLE ANALYSIS mode**, using **N° of analysis = N° of collected samples**.
4. After executed a single analysis, take next the sample and put it into the fodder box.

In case of **SINGLE ANALYSIS** execution mode (pressing <RESET> Reset) :

the AgriNIR™ system starts automatically with the execution of a <u>single analysis</u> on the selected component and therefore on the sample in the fodder box.

⚠️ **WARNING!**

Please start IMMEDIATELY to move the fodder box as soon as you press <RESET> Reset .

If you want to quit immediately the analysis, press<RESET> Reset during the analysis execution.

In case of **MULTIPLE ANALYSIS** execution mode (<ENTER> ⏎) :
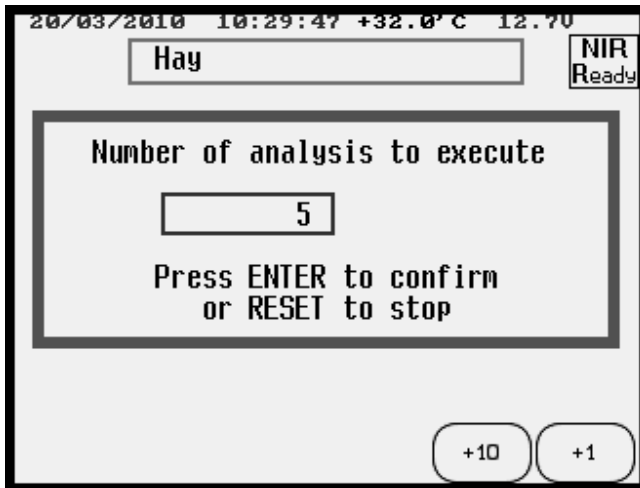
the AgriNIR™ system requests the number of analysis to perform on the component in the fodder box :

MAXIMUM 20 ANALYSIS

⚠ **WARNING!**

Please start IMMEDIATELY to move the fodder box as soon as you press <ENTER> ⏎ .

During the execution of the repeated analysis are shown screens like this :
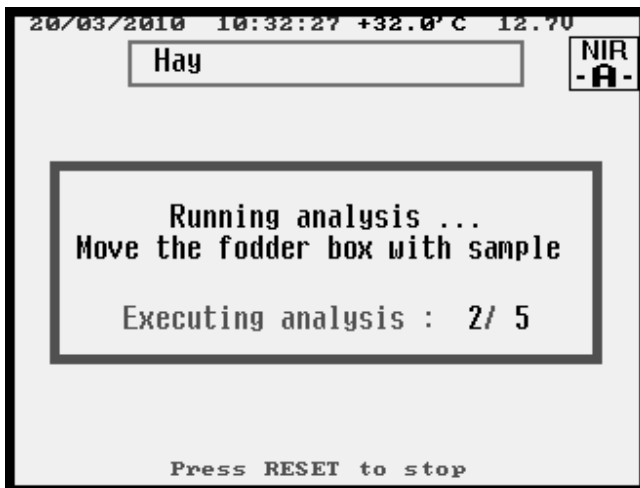
Here it's indicated the execution in progress of the analysis N° 2 of the 5 total analysis.

Before starting every single analysis (of the total N° scheduled), the AgriNIR™ system asks always for a confirmation from the operator.

ENGLISH

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At the end of the analysis executions (single or multiple) the AgriNIR™ system shows the results :

	%AsIs	%DM
Moisture:	9.2 %	90.8 %
Starch:	n.a.	n.a.
Protein:	15.0 %	16.5 %
ADF:	30.3 %	33.4 %
NDF:	44.6 %	49.1 %
Ash:	8.5 %	9.4 %

MOISTURE (Humidity) value of the sample.

DRY MATTER value of the sample : calculated as 100% - Moisture.

Chemical Parameters on DM the chemical values expressed on the dry matter : calculated as Param$_{AsIs}$ / DM%

Chemical Parameters on AsIs values of the sample.

On display it is shown a table that reports the prediction values of NIR chemical parameters obtained from the analysis performed on the sample in the fodder box.
The values of the chemical parameters are always expressed in % and in 2 columns :

- in the left column are the **prediction values expressed on AsIs**, that is to say the total % present in the sample just analyzed;
- in the right column are the **prediction values expressed on the DRY MATTER**, that tot o say on the sample part without water.

**NOTE.** In case of **MULTIPLE ANALYSIS** the AgriNIR™ system does not show the results after every single analysis performed but only at the end of the execution of the last analysis.
The prediction values of the NIR chemical parameters are the result of the prediction AVERAGES of the single analysis performed. In case of analysis not right performed, the AgriNIR™ system does not consider them in the final average of the results.

In case a NIR chemical parameter following results :

n.a.   **Parameter NOT AVAILABLE**
This chemical parameter hasn't been defined for the NIR family chosen in analysis.

Err.   **Parameter with WRONG RESULT**
The AgriNIR™ analyzer cannot predict this chemical parameter.
Please check the sample in the fodder box, the NIR family chosen or the NIR calibration.

Out.   **Parameter OUT OF RANGE**
This chemical parameter prediction value is out of the acceptability range.

	%AsIs	%DM
Moisture:	89.3 %	10.7 %
Starch:	n.a.	n.a.
Protein:	Out.	Out.
ADF:	Err.	Err.
NDF:	Err.	Err.
Ash:	6.2 %	58.0 %

In this picture you can see :

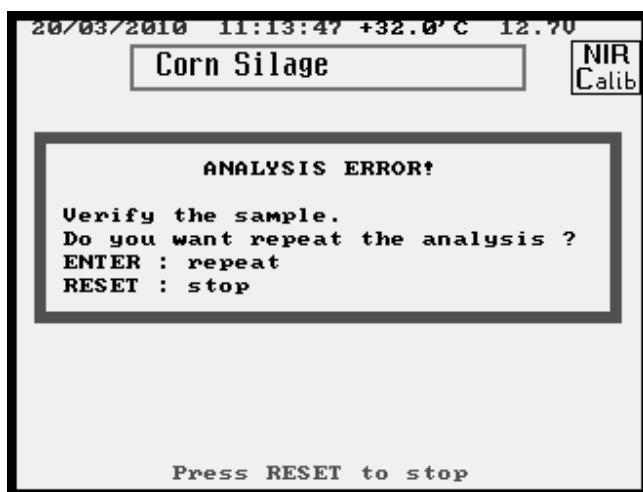STARCH is not available for GRASS SILAGE

PROTEIN is out of range

ADF, NDF are not possible to predict

6.9   *Case of incorrect analysis*

In case of analysis (single or repeated) that are NOT correct, the AgriNIR™ system shows the following error message :

If you press <ENTER> the AgriNIR™ system proposes again to execute the analysis on the same component just selected.

If you press <RESET> the AgriNIR™ system quit the analysis execution phase on the selected component.

TROUBLESHOOTING

1. Verify if the sample is properly inserted inside the fodder box. Please see the paragraph *Correct Use of the Fodder Box for the Samples to Analyze* at page 14.

2. Verify if the fodder box is properly moved during analysis execution. Please see the paragraph *Correct Use of the Fodder Box for the Samples to Analyze* at page 16.

3. Verify if you have chosen the correct NIR family / component before start the analysis on the sample.

4. Verify the cleaning of the Fodder Box glass or the ReadNIR glass inside the NIR group on the bottom side.

5. Verify if the Fodder Box glass or the ReadNIR glass is broken, otherwise contact the Customer Service for the spare parts.

6. Verify if the lamp inside the NIR group is not on its correct position or its time life is expiring (1 year); in second case, please contact the dinamica generale® Customer Service for the spare part.

7. Verify if the optic fiber terminal (visible inside the NIR group through the glass window on the bottom side) is properly inserted on its brass fitting, otherwise if it's moved please contact the dinamica generale® Customer Service.

8. If it's none of the previous cases, please contact the dinamica generale® Customer Service.

6.10   Analysis printing on tickets

At the end of analysis execution, when the AgriNIR™ system shows the results table :

If you press the F-key you can **PRINT ON A TICKET** the analysis results.

If you press the F-key you can set the **PRINTOUT NUMBER** i.e. the number of copies of the ticket (max. 99 copies) displaying the current number of printouts in a small box on the bottom of the screen.

Press the cursor keys or the F-keys to change the PRINT N°.

Then press <ENTER> to confirm the set copies of the ticket to print and exit.

After setting the number of copies of the ticket, press the F-key to PRINTS all the requested copies of the ticket of analysis results.

The printout of the ticket after the analysis performed on a sample is :

```
Dinamica Generale
  Agri NIR
  Analyzer
-----------------
  Via Mondadori 15
  46025 Poggio Rusco
  Mantova - ITALY
tel. ++39 - 0386 - 52134
------------------------

  Customer Cod: 54321
  Company: DINAMICA

  Sample ID: 654321
  Component Nr.: 1

    "Corn Silage"

            %AsIs   %DM
Moisture:   60.1   39.9
  Starch:   11.5   28.9
 Protein:    3.5    8.7
     ADF:    9.4   23.6
     NDF:   18.3   45.9
     Ash:    1.6    4.0
Crude Fat:   1.2    2.9

------------------------
13:52:26 - 15/02/2011

Machine S/N: 1ZZ602ZD
------------------------
```

Printer Header
[see at page 48 how to set]

Customer Code and Company Name
who the particular sample belongs

Identifier Number of the Analyzed Physical Sample

NIR Family Identifier Number

Kind of Analyzed Component (NIR Family Name)

Analysis Results of Chemical Parameters
(on AsIs and on the Dry Matter)

Time - Hour of the Analysis Execution

AgriNIR machine serial number

ENGLISH

6.11   Analysis saving on USB pen drive

At the end of analysis execution, when the AgriNIR™ system shows the results table, you can store the results on the USB memory key :

Press F-key to SAVE THE DATA ON USB PEN DRIVE (on USB memory key).
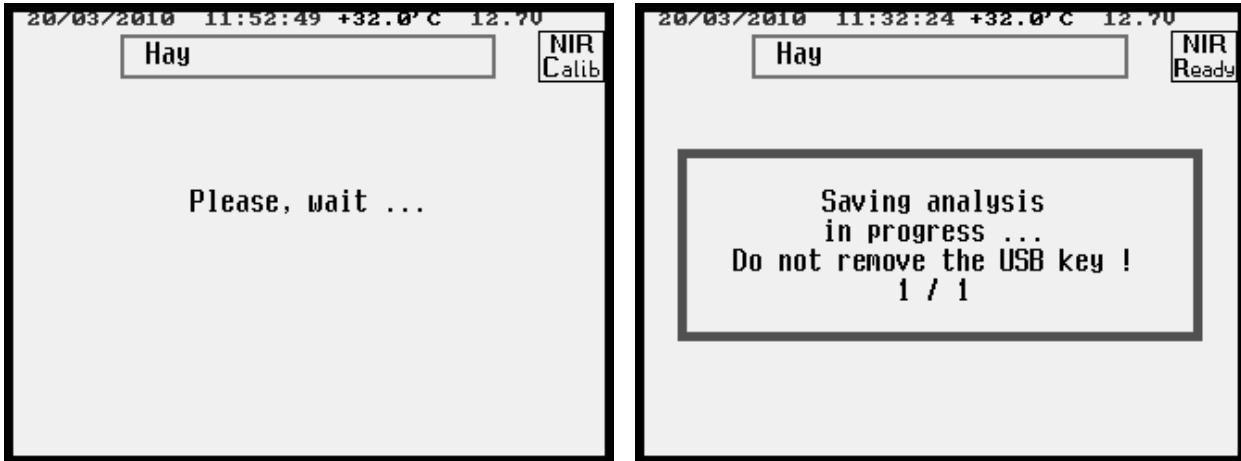
On USB memory key a file folder is created with naming convention **< Date Time >**, which contains :
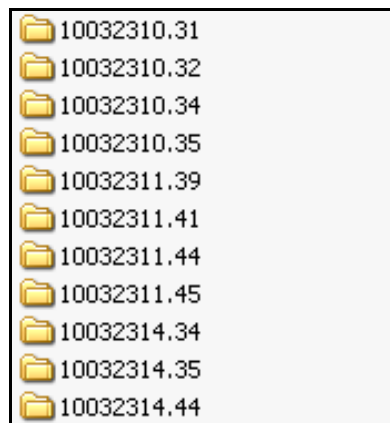
analysis folders on USB key

➢ one file *.txt* with naming convention **< ID NIR Family _ progressive number >** for each single analysis just executed (1 file in Single Analysis mode, N file in Multiple Analysis mode);
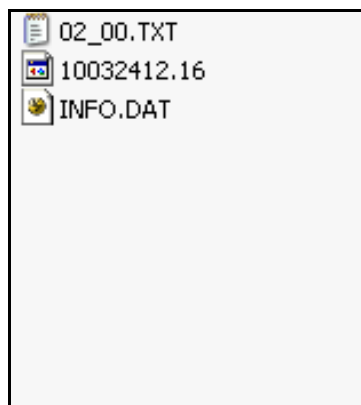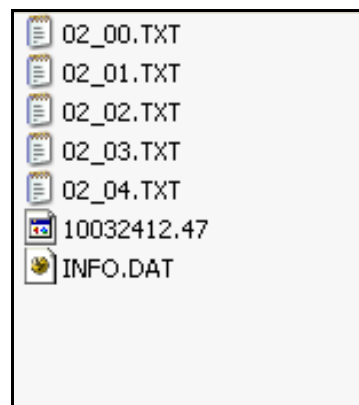
single analysis mode   multiple analysis mode

NOTE. These files *.txt* is used only associated with **DGNirManager** software to store the optical spectra of the analyzed samples, then to create new calibration curves.

➢ the file **INFO.DAT** containing the Client's Data set on AgriNIR™ by Client Information windows (see at page 30) :

INFO.DAT

```
Company: DINAMICA
Contact: GENERALE
Address: Mondadori 15
Country / City: Poggio Rusco
ZIP code: 46025
Province: MN
Phone: 0386 52134
```

ENGLISH

➢ the file with naming convention **< DATE&TIME >** containing the analysis results (show on display at the end of analysis execution) :

11011217.33

```
13,"12/01/2011 - 17:33:20",2,"Moisture",8.92,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"Starch",0.00,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"Protein",5.09,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"ADF",38.48,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"NDF",64.20,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"Ash",6.72,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"Crude Fat",0.76,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"free",0.00,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"free",0.00,"1ZZ810YB/11"
13,"12/01/2011 - 17:33:20",2,"free",0.00,"1ZZ810YB/11"
```
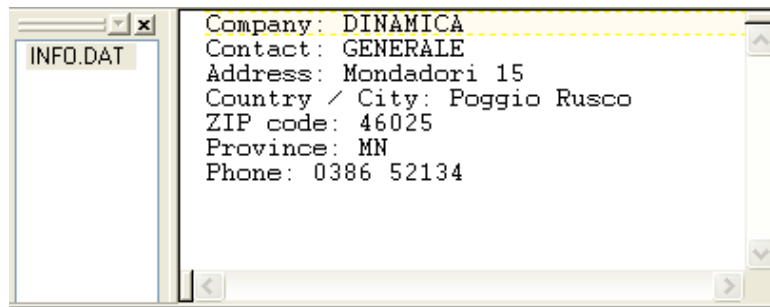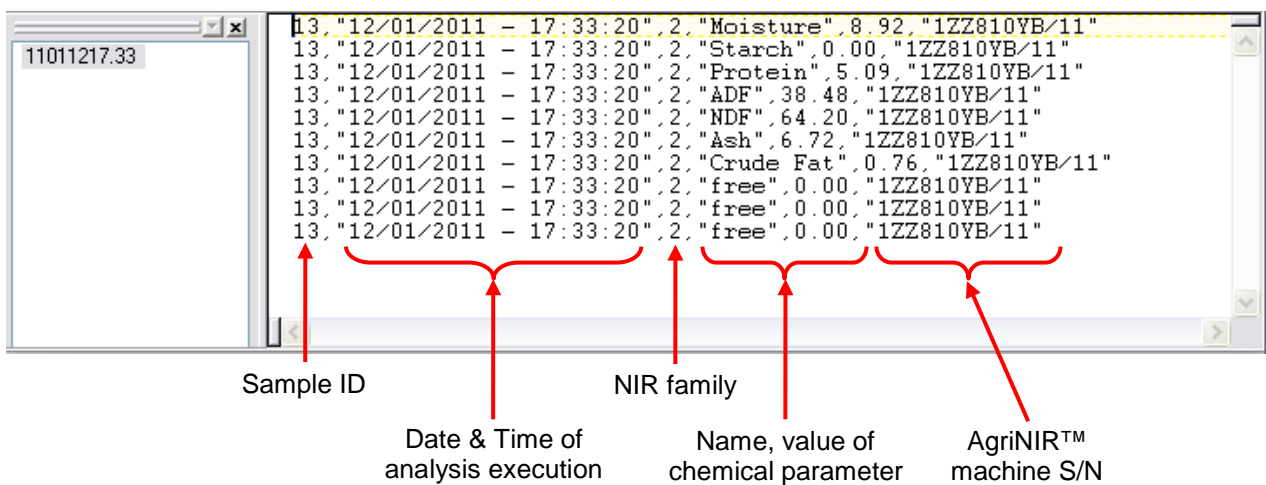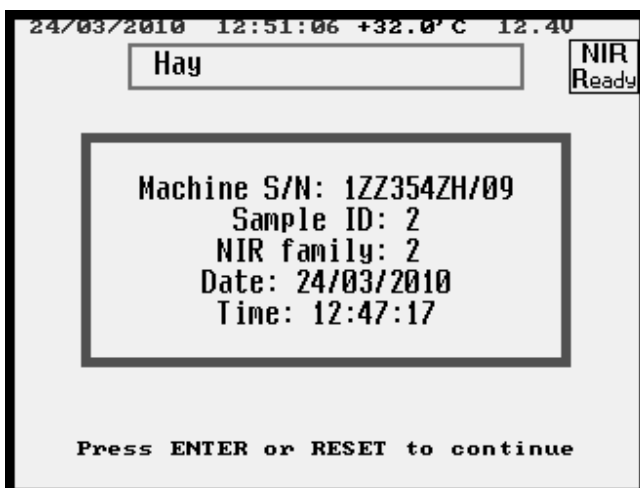
Sample ID   NIR family

Date & Time of   Name, value of   AgriNIR™
analysis execution   chemical parameter   machine S/N

At the end of data saving on USB key, automatically :
- is PRINTED the number of ticket set previously;
- the following message is shown on the display :

```
24/03/2010  12:51:06 +32.0'C  12.40
 Hay                                    NIR
                                       Ready

    Machine S/N: 1ZZ354ZH/09
        Sample ID: 2
        NIR family: 2
        Date: 24/03/2010
        Time: 12:47:17


  Press ENTER or RESET to continue
```

Machine S/N → serial number of AgriNIR™ device used to make the analysis

Sample ID → identifier number of the particular physical sample just analyzed

NIR family → identifier of the NIR family of the analyzed component

Date → date of the analysis execution

Time → hour of the analysis execution

During the data store on USB Key, if the following error messages appear :

| Fig. 1 | Fig. 2 |

Error message in Fig. 1 → the USB Key (Pen Drive) is not connected to the proper USB port on AgriNIR™;

Error message in Fig. 2 → the USB Key (Pen Drive) has been disconnected from USB port or It's necessary to erase a part of data stored on USB Key.

6.12 Analysis History – available only for AgriNIR W

The AgriNIR™ W save automatically the last 100 analysis executed inside an archive.
It is possible recall the analysis through this history in order to save it (on USB key), display it on the screen, and eventually print it.

On the main page, press the [key icon] key in order to switch to the next page and then press [magnifier icon].

At this point, the follow screen will appear with the list of analysis executed:
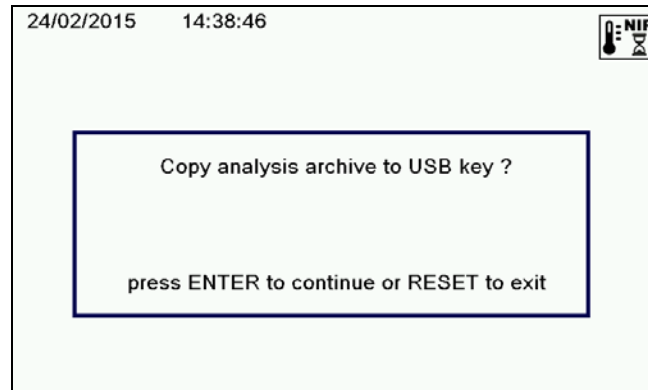
Press the [USB key icon] key in order to copy the datas of analysis on the usb memory card.

```
24/02/2015     14:38:46                              [NIR icon]



            Copy analysis archive to USB key ?



            press ENTER to continue or RESET to exit

```

Press the [eraser key icon] key in order to delete the archive relative to the analysis.

```
24/02/2015     14:39:09                              [NIR icon]



            Delete the analysis archive?



            press ENTER to continue or RESET to exit

```
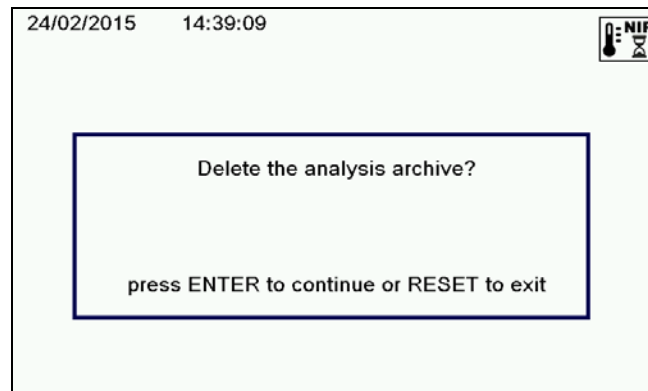
6.13   Other Settings of AgriNIR™ System

In the main two screens, the AgriNIR™ system allows other simple setting commands :

☞ ⬅ ➡ buttons to go to the NEXT and PREVIOUS screen.
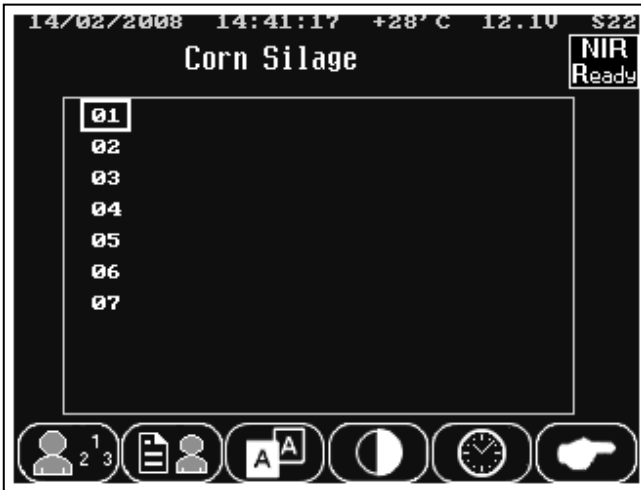
☞ A A B&W DISPLAY INVERSION

with this command you can invert the display from white background to black background and vice versa.
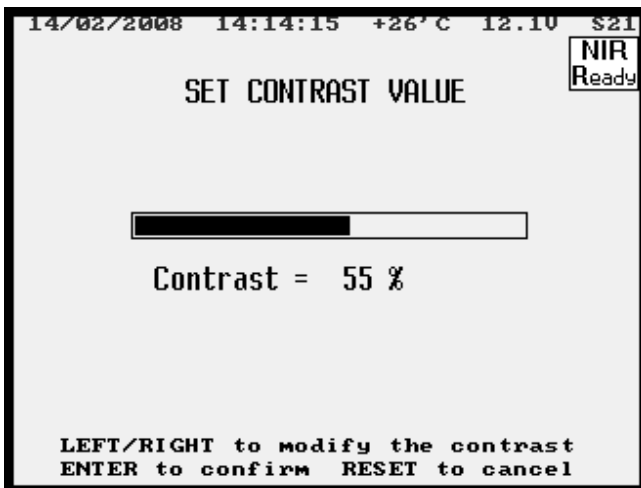
☞ ◐ CONTRAST ADJUSTMENT

with this command you can adjust the display contrast.
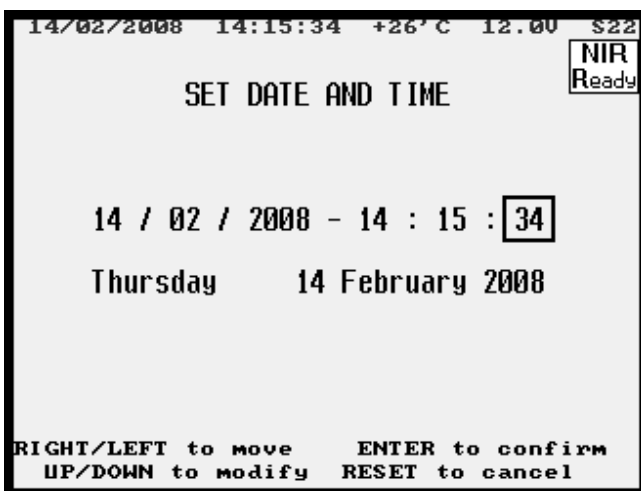
☞ 🕐 DATE & TIME SETTING

with this command you can set the current date and time of the AgriNIR™ system.

NOTE. This is important for a correct data chronology.

6.14   *Calibration Updating of AgriNIR™ System*

In the second main component selection screen, the AgriNIR™ system offers the following setting commands :

☞ 🔲 USB 〰   CALIBRATION CURVES
UPDATING
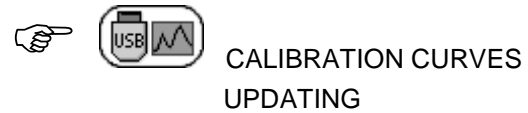
With this command you can update the calibration curves of the NIR families (available on the main screen list) that can be analyzed by the AgriNIR™ system.

To update the calibrations :
1.   insert the USB memory key with the file **comp.a37** containing the new calibration curves;
2.   select the ID of the component (see component list in the main screen) where you wish to update the calibration;
3.   press the special key 〰➡ to update the calibration in the internal memory of the AgriNIR™ system.

NOTE. DO NOT remove the USB memory key until the message of ended calibration is displayed!

If the file **comp.a37** that contains the new calibration curves IS NOT available on the USB Key, the error message here shown on the left appears.

47

6.14.1 *Update Calibrations for AgriNIR W*

Switch ON the AgriNIR-W machine **keeping pressed both the** [⏻] **+** [⬆] **buttons** until the **BOOTLOADER** screen appears.

Press the **F5 button** to start loading the AgriNIR-W calibration upgrade.
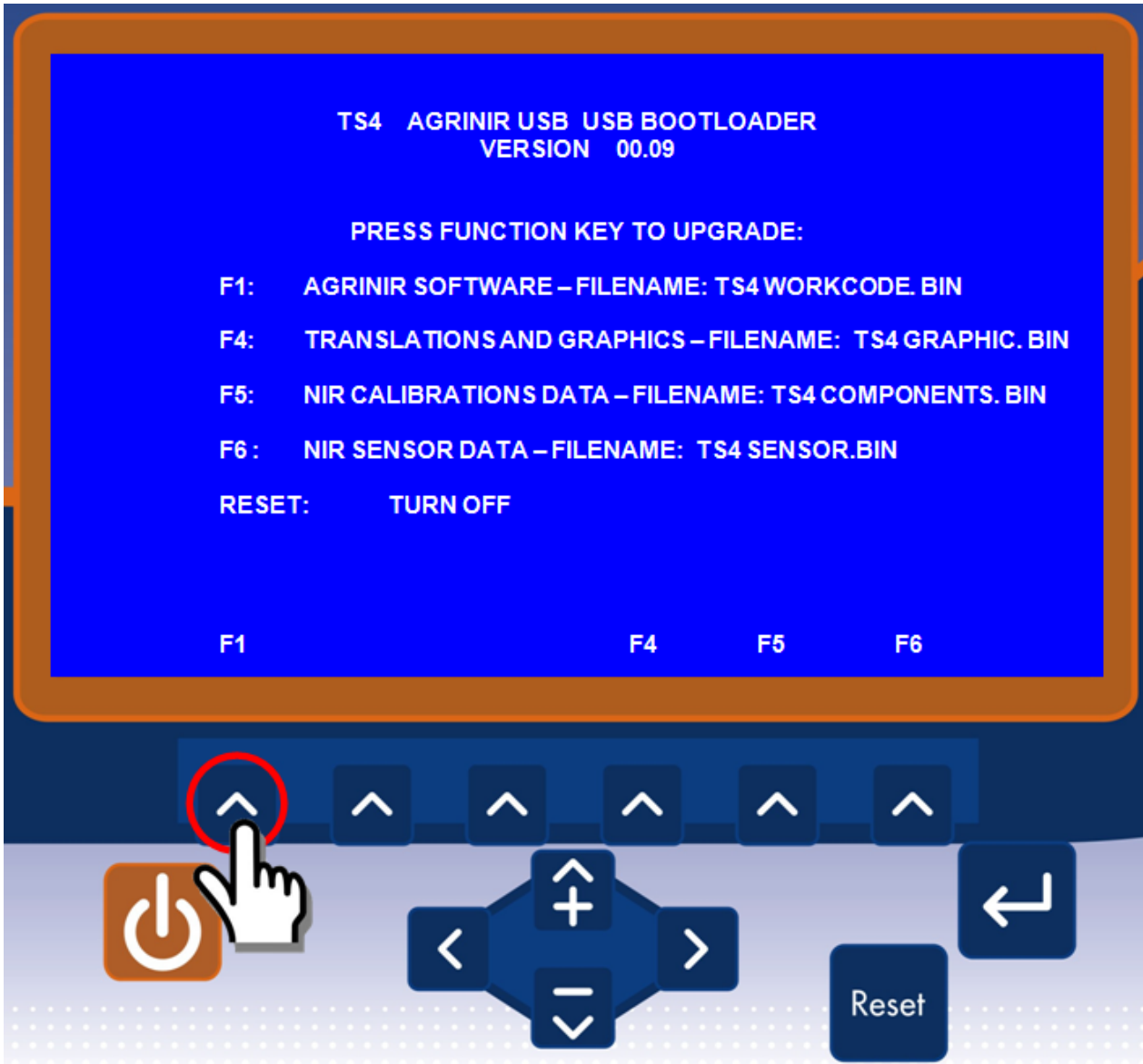
Press the **F1 button** to continue the AgriNIR-W calibration upgrade.
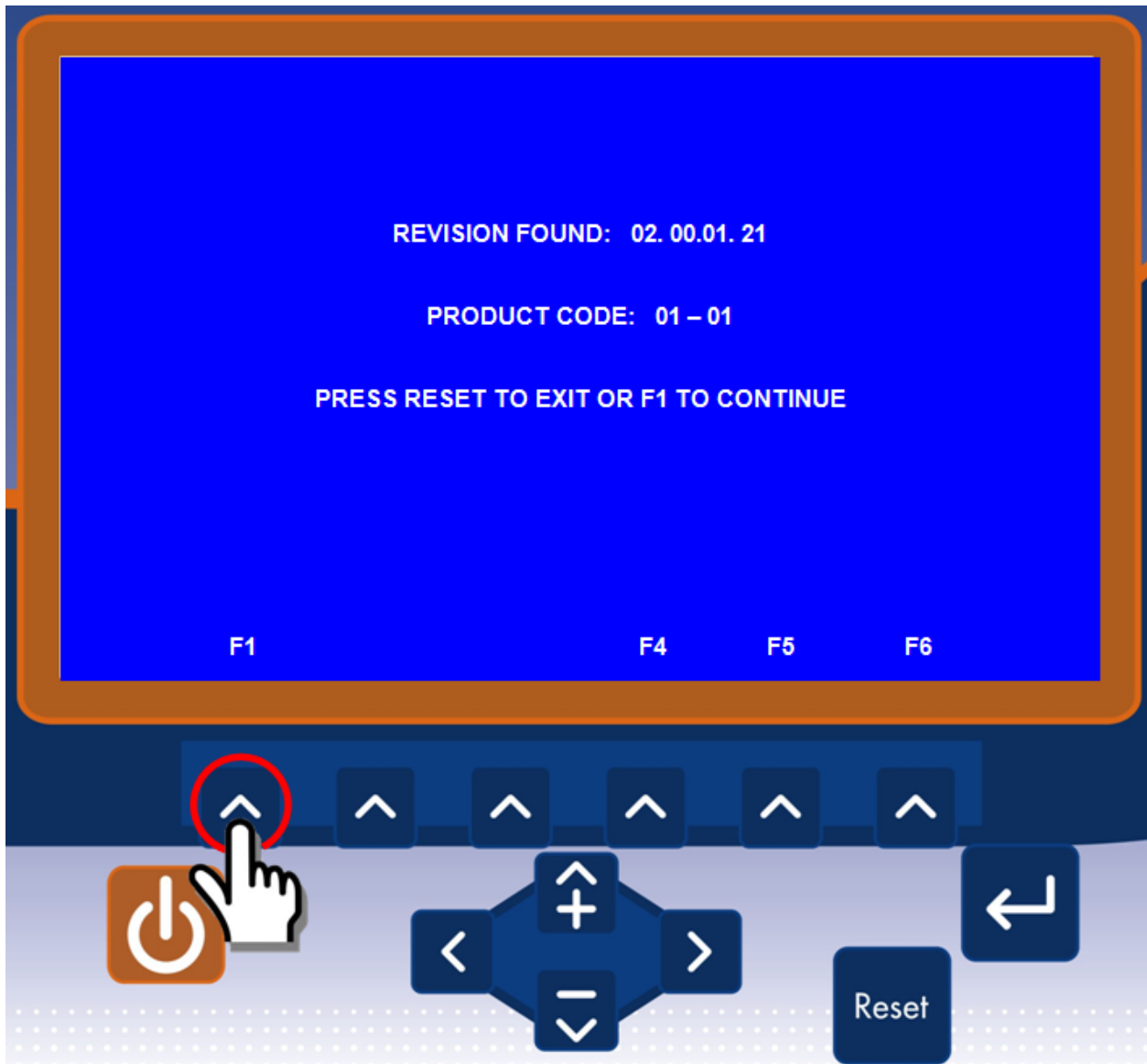
Wait the calibration loading (few seconds) until the **GREEN SCREEN** will appear.

Press the [power icon] button to **switch OFF** the AgriNIR-W machine.

6.15 LOADING OF NEW NIR DATA STRUCTURE (NIRDATA.BIN file)

Chiavetta USB

nirdata.bin *file*
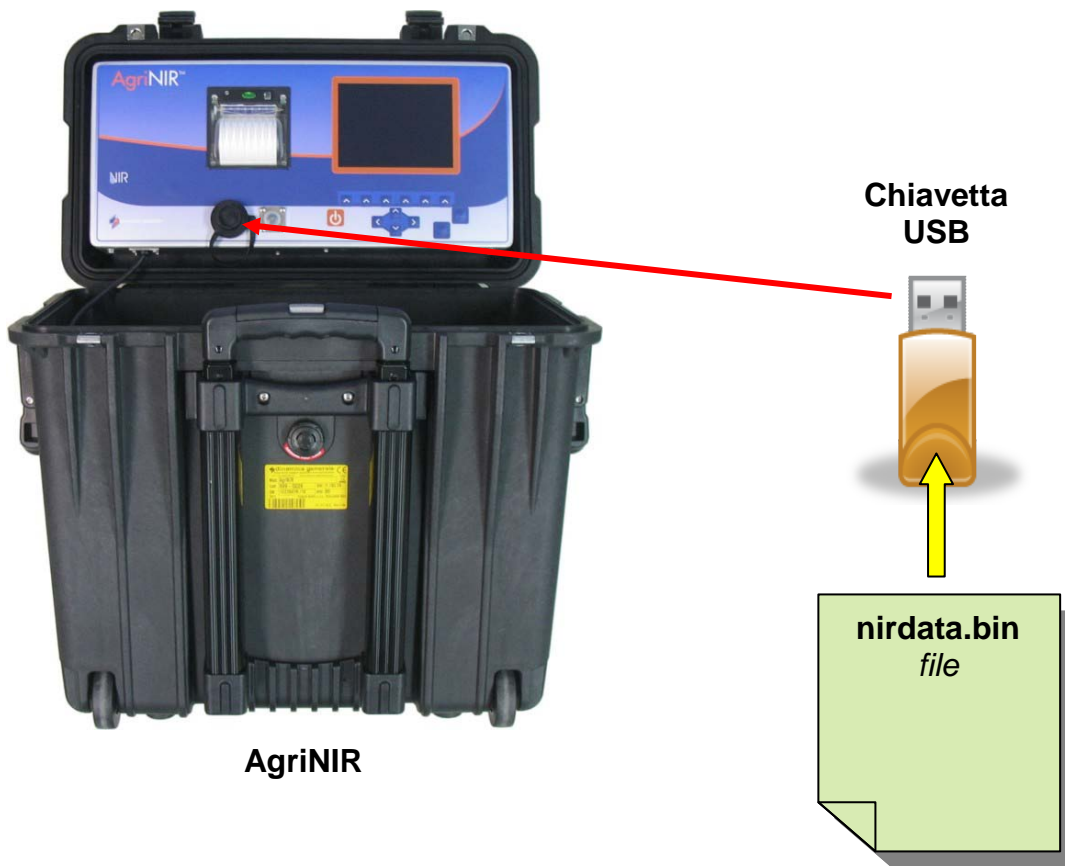
AgriNIR

The **NIR Data Structure** contains the list of the NIR families and chemical parameters available for the analysis performed by the AgriNIR™ analyzer.

For **NIR Data Structure** upgrading is necessary to reload the configuration file **nirdata.bin** (provided by dinamica generale or created by *DGNirManager* program). Please follow the steps below.

1. Copy **nirdata.bin** file into the USB key : please, don't use any other existing folders!

2. Connect the USB key to the AgriNIR™ machine.

3. Turn ON the AgriNIR™ machine and press <ENTER> to accept the new NIR Data Structure :

4. DO NOT remove the USB memory key while the file is being loaded!

```
          Please wait:
    data copy in progress ...

    Do not remove the USB key !




      *** AgriNIR v.1.162.28 ***
```

5. Verify the new NIR Families list just loaded on the AgriNIR™ machine.

```
18/03/2010  16:34:28 +32.0'C  12.70
                                 NIR
      Corn Silage               Ready

    01
    02
    03
    04
    05
    06
    07
```
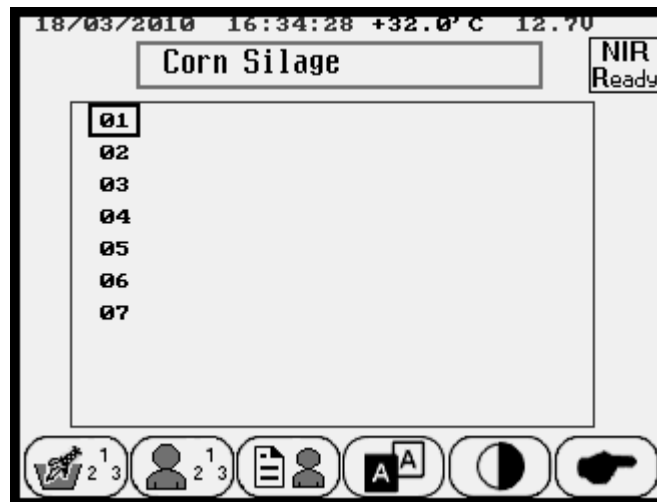
6. Execute an analysis to check the new Chemical Parameters now available on the AgriNIR™ machine.

```
20/03/2010  10:36:27 +32.0'C  12.70
                                 NIR
      Hay                       Calib


                   %AsIs    %DM
       Moisture:   9.2 %    90.8 %
         Starch:   n.a.     n.a.
        Protein:  15.0 %    16.5 %
            ADF:  30.3 %    33.4 %
            NDF:  44.6 %    49.1 %
            Ash:   8.5 %     9.4 %
```
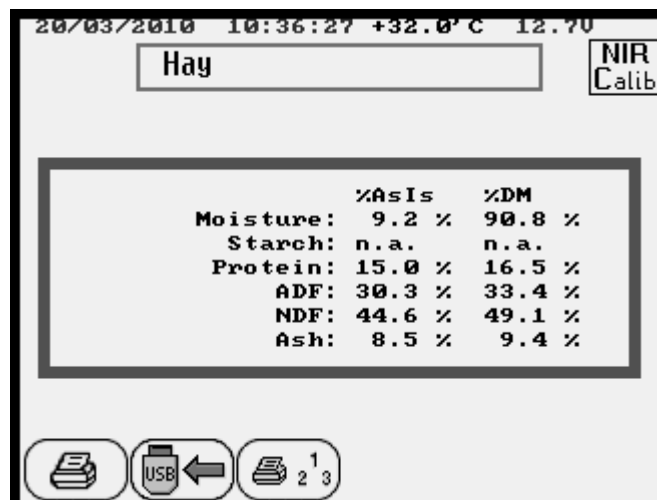
6.16   *Deleting Analysis on internal memory*

☞ (⌨ 2 1 3)   DELETING ANALYSIS DATA FROM INTERNAL MEMORY

With this command you can permanently delete the data from the internal memory concerning the analysis performed (either valid or wrong) and relevant optical spectra acquired from the analyzed samples.
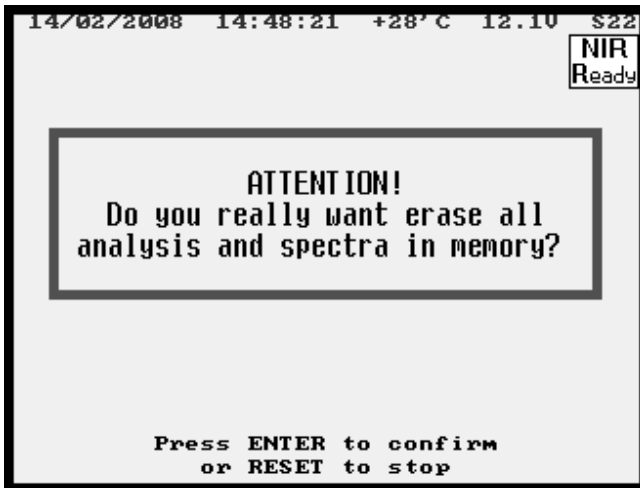
Pressing <ENTER> you start the deleting procedure of the analysis data from the internal memory of the AgriNIR™ system.
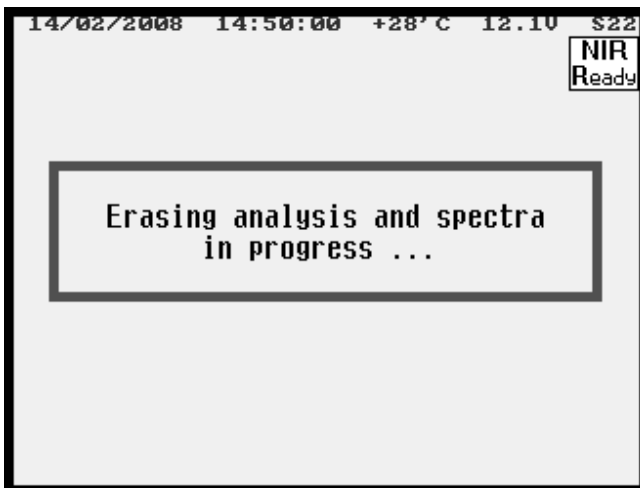
In this phase all data concerning the CORRECT ANALYSIS, i.e. with no errors, are deleted from the internal memory.
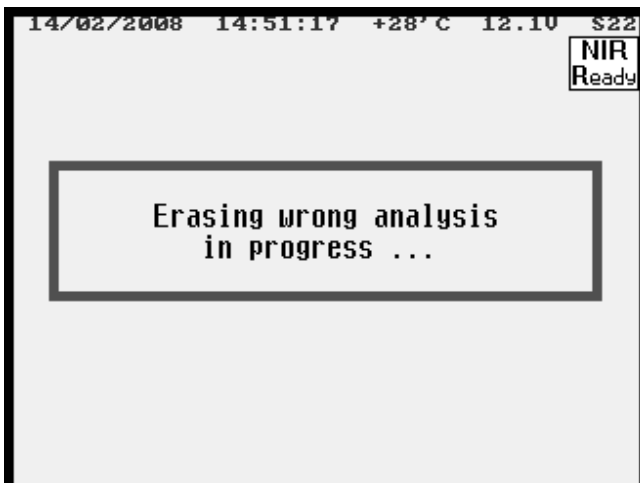
In this phase all data concerning the WRONG ANALYSIS, i.e. with errors or not successful ("Analysis Error" is displayed), are deleted from the internal memory

6.17   *Deleting the initial message of FULL MEMORY*

After a certain number of analysis (approx. 60-70) performed with the AgriNIR™ system, the following message may appear when switching the system on :

When switching the system on, this message is displayed to warn that the space of the internal memory for the Analysis Execution Log is reaching its full capacity.

NOTE. This section of internal memory is NOT accessible to the user and may NOT be deleted with the deleting function $\boxed{\oslash\,_2{}^1{}_3}$, as this function refers only to the memory area for the analysis data performed.

To delete the section of internal memory for the Analysis Execution Log follow this procedure :

When switching the system on, when the message "System Initialization" is displayed, press <ENTER> for a few seconds until the SYSTEM CONFIGU-RATION environment appears.
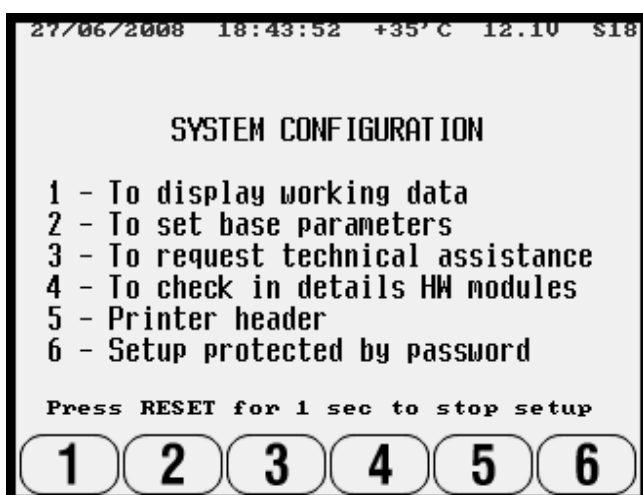
Access the configuration menu 6 :
☞ "Setup protected by password"

ENGLISH

```
14/02/2008   15:17:11   +29'C   12.10   S21

                 ADVANCED SETUP



        Set the password:          1334




(+100'000)(+10'000)(+1'000)( +100 )( +10 )( +1 )
```
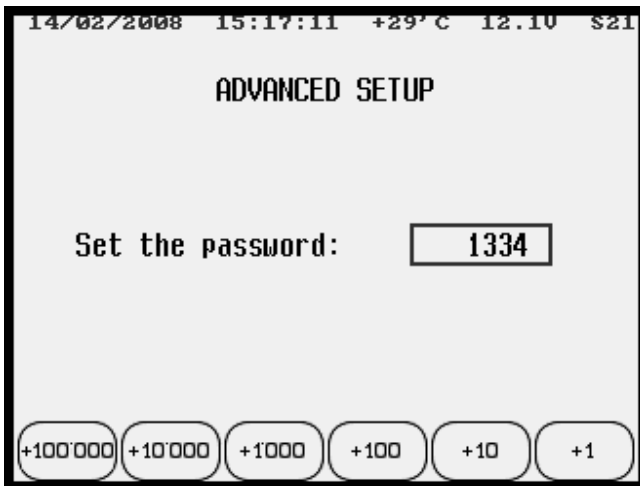
Enter the password **1334** to access the deleting procedure of the Analysis Execution Log in the internal memory of the AgriNIR™ system.

```
14/02/2008   15:18:33   +29'C   12.10   S21




     Warning! Reset all executions
           stored in memory?




   ENTER to confirm   RESET to cancel
```

Press <ENTER> to confirm the deleting procedure of the Analysis Execution Log.

```
12/12/2007   18:29:07   +30'C   12.10   S15




         Executions deleted!
```

After a few seconds you get the message informing that the deleting procedure of the Analysis Execution Log was successful!

At the end you return to the main screen of SYSTEM CONFIGURATION :

☞ press < RESET > for at least 1 SEC to exit and return to the use environment of the AgriNIR™ system.

6.18 Printer Header Settings

It is possible to set the Printer Header on tickets printed by the AgriNIR™ system, with your preferred data :

Printer Header

ENGLISH
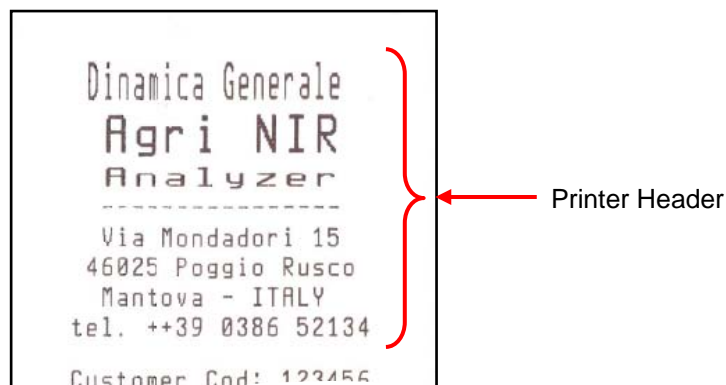
To set your Printer Header on the tickets, follow this procedure :

When switching the system on, when the message "System Initialization" is displayed, press <ENTER> for a few seconds until the SYSTEM CONFIGURATION environment appears.

Access the configuration menu 5 :
☞ "Printer header"

```
27/06/2008  18:45:32  +35'C  12.10  S17
          PRINTER HEADER SETUP

01   2¦   Dinamica Generale
02   3¦   Agri NIR
03   1¦   Analyzer
04        ----------------
05        Via Mondadori 15
06        46025 Poggio Rusco
07        Mantova - ITALY
08        tel. ++39 0386 52134
09
10
```

☞ press ▲▼ buttons to select data to modify;

☞ press [icon] to recall the default printer header ("Dinamica Generale …").

```
27/06/2008  18:48:38  +35'C  12.10  S18
          PRINTER HEADER SETUP

01   2¦   Dinamica Generale
02   3¦   Agri NIR
03   1¦   Analyzer  _
04        ----------------
05        Via Mondadori 15
06        46025 Poggio Rusco
07        Mantova - ITALY
08        tel. ++39 0386 52134
09
10
```
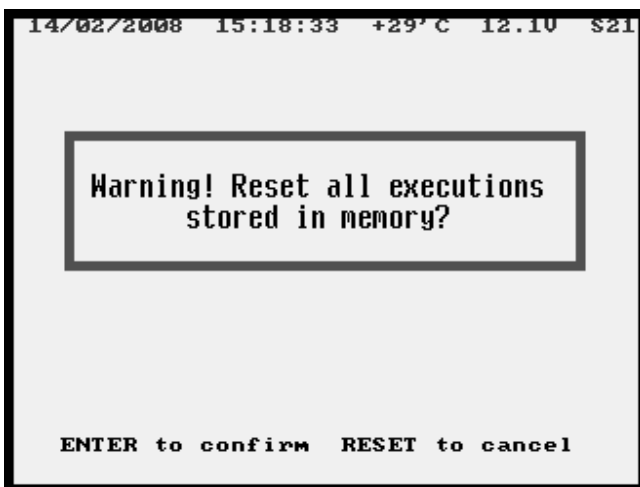
☞ press <ENTER> to edit the new data value

☞ press ▲▼ buttons to insert a character;

☞ press ◀ ▶ to move the cursor;

☞ press (ABCD) to insert a character at the beginning;

☞ press (A↔a Ø Ç #) to select capital letters / small letters, numbers, symbols;

☞ press (AB CD) to insert a character at the cursor position;

☞ press (AB D) to delete a character at the cursor position;

☞ press (AB) to delete all characters from the cursor position to the end on the right;

☞ press (ABCD) to insert a character at the end on the right.

☞ press <ENTER> to confirm the new data value;

☞ press <RESET> to exit without modify the data value.

You can use the SPECIAL CHARACTERS (not printable!) :

1¦ ← to set <u>double width</u> characters, on the printable string

2¦ ← to set <u>double height</u> characters, on the printable string

3¦ ← to set <u>double width and double height</u> characters, on the printable string

At the end, after set all data on the Printer Header :

☞ press < RESET > to return to the main screen of SYSTEM CONFIGURATION;

☞ press < RESET > for at least 1 SEC to exit and return to the use environment of the AgriNIR™ system.
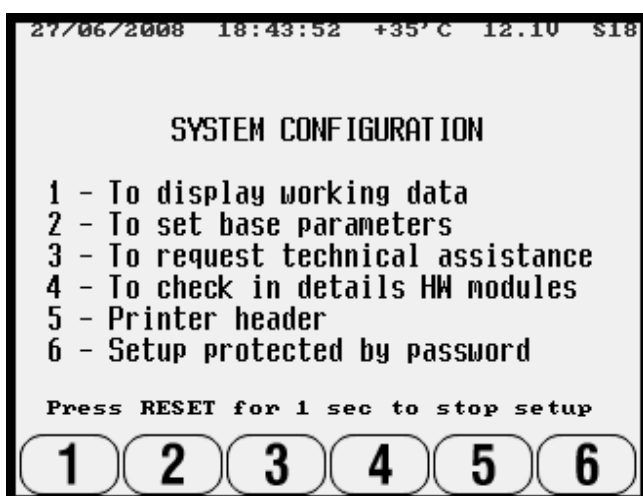
7   CLEANING THE DEVICE

It is important to clean thoroughly and periodically the AgriNIR™ system, especially the lower metal body where the sample fodder box and the Read NIR module are positioned.
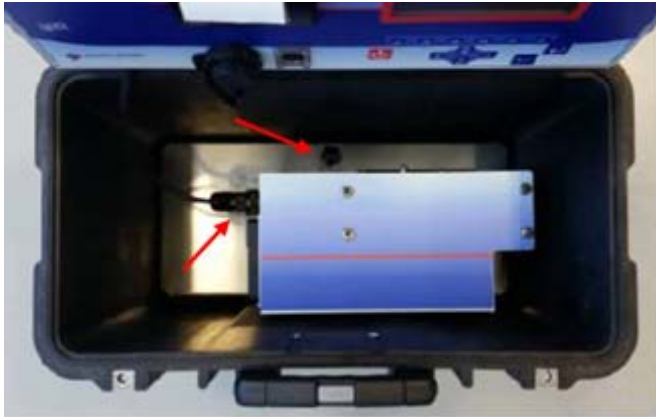
Pict. 6A
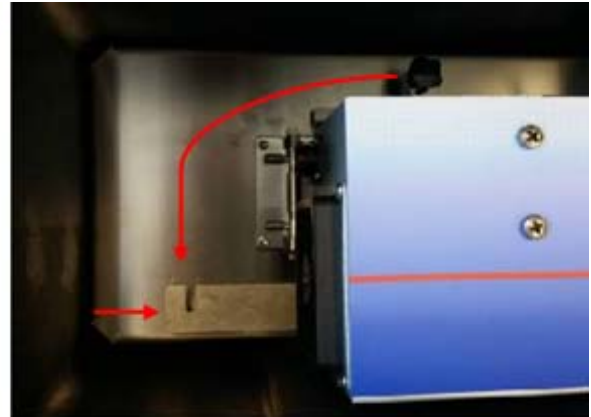
Pict. 6B

Pict. 6C

Read NIR reading head's window

Fodder box sliding site
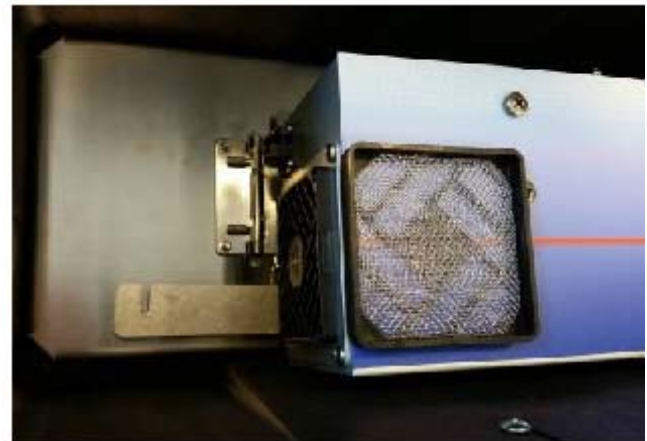
Pict. 6D

To clean the system correctly going on as follows:
- disconnect the connector of the electric cable and loosen the securing knob of the NIR Group, as shown in pict. 6A;
- turn the securing bracket of the NIR Group by 90° anticlockwise, as shown in pict. 6B;
- raise the NIR Group up as shown in pict. 6C;
- clean with a soft lightly wet cloth the Read NIR reading head's window and eliminate the residues around (see pict. 6C);
- clean with a soft wet cloth or even with pressurized air (a low pressure of 2/3 bar max) the fodder box sliding site (see pict. 6C);
- it is possible disconnect the fan filter and clean it with pressurized air (a low pressure of 2/3 bar max) (see pict. 6D).

It would be better to follow this procedure after executing analysis on samples with a high water percentage (for example, corn silage).

ENGLISH

8   DEVICE SERVICING

8.1   Verification and Servicing of the Optical Group

a) Remove the NIR Group from the metal support in the bottom of the case.
To do this :
   - open the NIR Group (as indicated in section 6 pict. 6A and 6B);
   - unhook the metal hinge supporting the NIR Group:

push the 2 levers towards the centre of the hinges and turn them up

   - remove the NIR Group from the metal bottom of the case.

b) Verify the protection glass of the Read NIR head.
If it is broken, get in touch with **dinamica generale®** Assistance Service.

c) Verify the communication state between NIR Group and Electronic Unit :
   - a few seconds after switching on the system, also the lamp of the Read NIR reading head must turn on (visible from the hole for inserting the fodder box on the right side of the case);
   - after 2 minutes the actuator must move the optical calibration door (just under the Read NIR reading head's window see sect. 6 pict. 6C) towards the optical fiber, taking it in working conditions after about 1 minute.

d) Verify the condition of the lamp: if during the checks made according to step C the lamp has not turned on, check that the lamp is correctly connected in the Read NIR head (open the door on the side of the head unscrewing the 4 M4 self-locking nuts) and check that the lamp is not damaged.
To access the lamp:
   - unscrew the 4 M4 self-locking nuts from the lamp cover on the NIR Group side
   - **CAREFULLY** remove the cover with the lamp disconnecting the cable from the lamp socket;

If the lamp is broken or not correctly working, get in touch with **dinamica generale®** Assistance Service.

e) Verify the state of the linear actuator: if during the checks listed in step C the linear actuator has not moved the calibration door, check the actuator's connection to the Read NIR's electronic board (open the door on the side of the head unscrewing the 4 M4 self-locking nuts and check the 4-wired-connector).
If during the checks listed in step C the calibration door does not move from one side to the other of the reading window, check that there are not mechanical obstacles.

f) Verify the optical fiber: execute the analysis of the component. If AGRINIR™ continues showing the message "ANALYSIS ERROR!", check that the extremity of the optical fiber inside the Read NIR reading head's window is clean.
<u>**WARNING!**</u> The optical fiber is directly connected inside the NIR optical sensor and shows a little glass fiber inside, that's why:
   - **THE NIR GROUP SHOULD NOT BE OPENED** (except for the lamp cover as indicated in step D and E);
   - in case of faults, get in touch with **dinamica generale®** Assistance Service.

8.2   *Replacement of the Printer's Paper*

a) Turn the AGRINIR™ off.

b) Open the front panel of the printer by pressing the central green key (it lights up when the AgriNIR™ system is switched on).

c) Pull out the empty paper plastic support.

d) Insert the new **THERMIC PAPER** roll, keeping attention to insert correctly the paper through the printer site.

e) Hook again the front panel of the printer, exerting a light pressure on the points show in the picture below :

f) Turn the AGRINIR™ on.

g) Let the paper advance pushing <FEED> on the printer. If the paper is blocked, check that it has been inserted correctly.

9   *RESPONSIBILITIES*

The AgriNIR™ system is an analysis device that needs moving material in front of the optical reading head Read NIR, to have a good scan of the sample in the fodder box and obtain therefore a prediction in line with the expectations.

We remind that the AgriNIR™ system can have the *GSM communication system,* which gives the possibility to :

- monitor the functionality of the AgriNIR™ system from a remote service centre;
- update the internal calibrations of NIR analysis;
- send collected samples to analyze in a laboratory according to the "SAMPLES COLLECTION HANDBOOK".

All the analysis values performed by AgriNIR™ system are shown on display and stored for future controls through the use of the special USB memory key (Pen Drive).
In particular the AgriNIR™ analysis results:

- are available directly on the screen or can be printed on a ticket at the end of the analysis;
- can be transferred on PC, through the USB memory key (Pen Drive), to the management program *DGNirManager* to store and use them for any updating of the calibration curves of the NIR families analyzed by the AgriNIR™ system.

10 CE CONFORMITY DECLARATION

Company's name :   Dinamica Generale spa

Company's address :   Via Mondadori, 15
                                     46025 Poggio Rusco (MN)
                                     ITALY

WE DECLARE THAT THE PRODUCT:

Model :	AgriNIR™ ANALYZER
Description :	Portable Analysis System
Options :	All configurations

is made in conformity with the following directives and standards required by European 2004/108/EC, respecting the following laws:

EMC generic standard for emission:

> EN 61326-1
> EN 55011 (1999) – A1 (2000) – A2 (2003)

EMC generic standard for immunity:

> EN 61000-4-2 (96) – A1 (99) – A2 (01)
> EN 61000-4-3 (97) – A1 (02)
> EN 61000-4-4 (96) – A1 (01) – A2 (01)
> EN 61000-4-5 – (1997)
> EN 61000-4-6 (97) – A1 (01)
> EN 61000-4-8 (97) – A1 (01)

POGGIO RUSCO, 28/08/2006

11 WARRANTY

The supplier guarantees, for 24 months from the delivery date, the good quality of materials used, the excellent construction and the steady functioning of the instrument they have manufactured and that bears the trademark or the production serial number. During the warranty period the supplier undertakes to repair or replace, free supplier's head office, faulty parts due to poor materials or faulty construction, provided that such parts are delivered free port supplier's head office.

Shortcomings and defects due to incorrect use of instruments, inadequate maintenance, changes carried out without the supplier's approval, normal wear are not included in this guarantee.

Liability and compensations by the supplier due to direct or indirect damages to persons, objects or production, even as a consequence of faulty functioning of the supplied instruments or of material or construction defects, are not included in this warranty.

NOTES :

Congratulations Dear User!

You have chosen a product by dinamica generale®, a leading company in the development and production of electronic weighing systems, automation systems and NIR solutions. These systems bring a highly technological level in every field of application such as zootechnical, feeding, industrial and biomedical. Year by year the international market recognizes our quality, experience, reliability and most of all our innovative technology, as a part of a highly developed and innovative know how. These are the pillars of our work and according to these beliefs we are at your service, providing you with a simple as well as new, precise and professional product, which is going to make your job easier for many years. This users manual intends to take you through the different performances of the weighing system in the easiest way and to show you some new functions as well. dinamica generale® did not forget to provide you even with the basic information: the configuration, the use of different accessories at your disposal, the service of "searching for faults" and the equipment's safety rules, in order to guarantee our customers always more and more support and technical assistance for years to come.

Now there is nothing left for us to do but wish you a work well done!

The team of dinamica generale®

Research & Development

Production & Logistic

Sales & Marketing

NIR. Lab

4500 m^2 (43000 feet^2) covered, divided on 2 buildings on a total area of 12500 m^2 (134400 feet^2).

CONTACTS

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CUSTOMER SERVICE
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ASSISTANCE

Technical assistance 24 hours a day, 365 days a year.

QUALITY & CERTIFICATIONS

For **dinamica generale**, sustainability means integrating long term economic, environmental and social dimensions into the way we operate our business according to the:

ISO 9001:2008

ISO 14001:2004

ISO 13485:2012

Dinamica Generale® uses PEFC paper for printing manuals and catalogues.