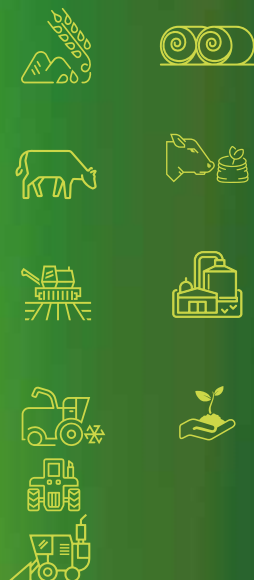


REFERENCE INSTRUMENTS
FOR SPECTROPHOTOMETRIC ANALYSIS



POLISPEC.COM

SOLUTIONS FOR
AGRICULTURE

polispec
GETTING INSIGHT

POLISPEC

Getting insight

ITPHOTONICS.COM

*We are a dynamic and creative company founded in 2012, **specialising in spectrophotometry and applied electronics.** We use our theoretical and practical knowledge and methodologies to design and **build electronic systems and measuring instruments.** Our core business is **applied spectrophotometry**, in its various forms and for each application sector.*

We have created **Polispec (Portable and On-Line SPECTrophotometer)**, a line of compact spectrophotometers with an industrial design, conceived and built for both portable use and online installation and available for different wavelength ranges. Their operation is based on the interaction of a light source with the molecules and with the chemical bonds that characterise the matrix to be analysed, thus performing both quantitative and qualitative measurements.

The instruments of the Polispec line are designed to **guarantee their intensive use in all processes in which immediate and precise measures are required for the management of variables and for self-control systems.**

PRESENTATION



. DESIGN



. QUALITY



. SOFTWARE INNOVATION



P O L I S P E C

Portable and On Line SPECTrophotometer

Professional spectrophotometers for portable and line analysis. They have no limits in their applications because they are designed for the measurement of all organic matrices and are designed for immediate and multi-parametric analyses.



L I T E



N I R



N I R e



V I S - N I T

Target



BREEDERS



AGRONOMISTS



NUTRIZIONISTS



FORAGES
PRODUCERS



FEED MILL COMPANIES
AND CEREAL INDUSTRY



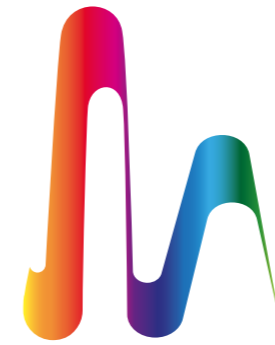
AGRICULTURAL MACHINERY
MANUFACTURERS



BIOGAS PLANTS AND BIOENERGY
PRODUCERS

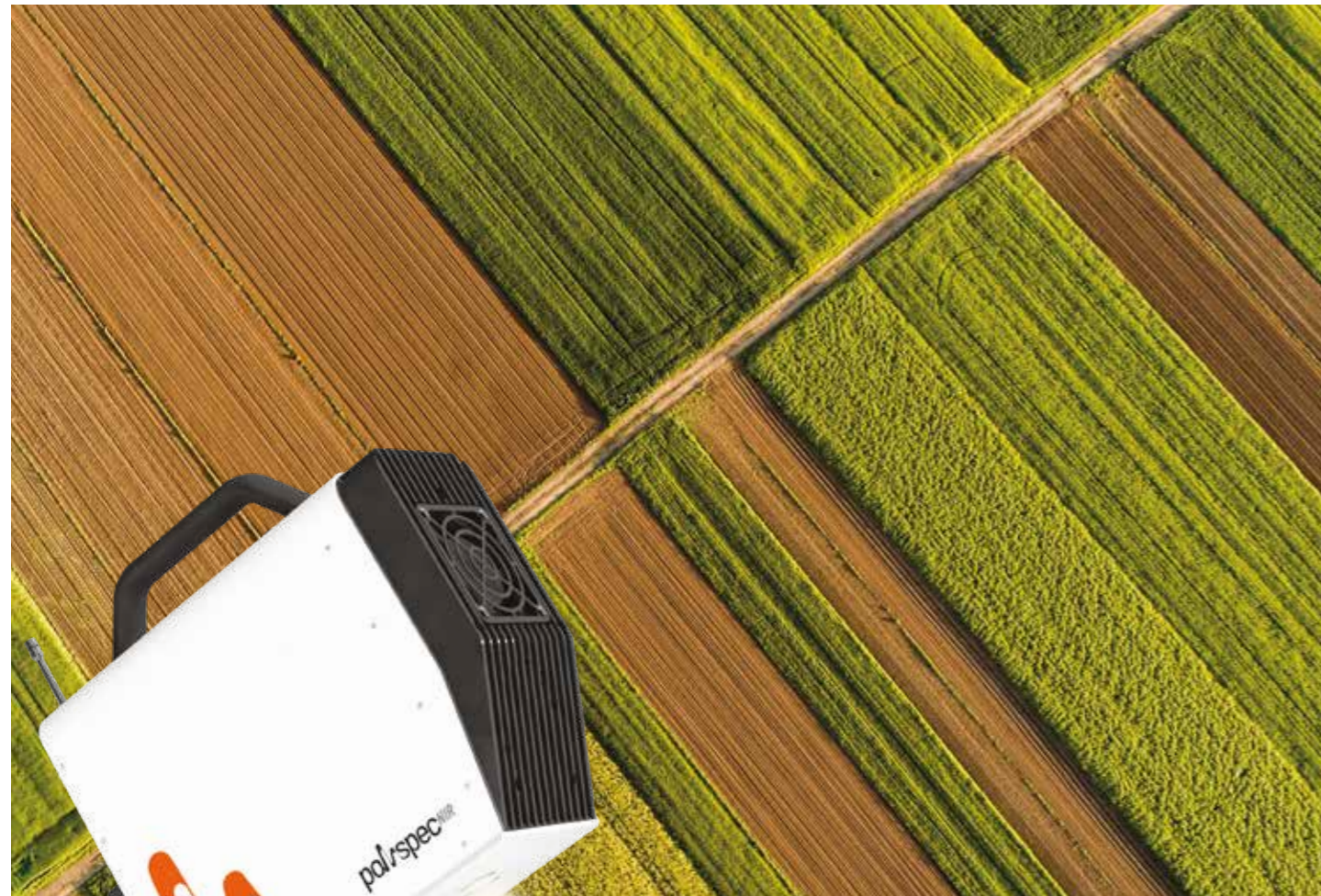


CONTRACTORS



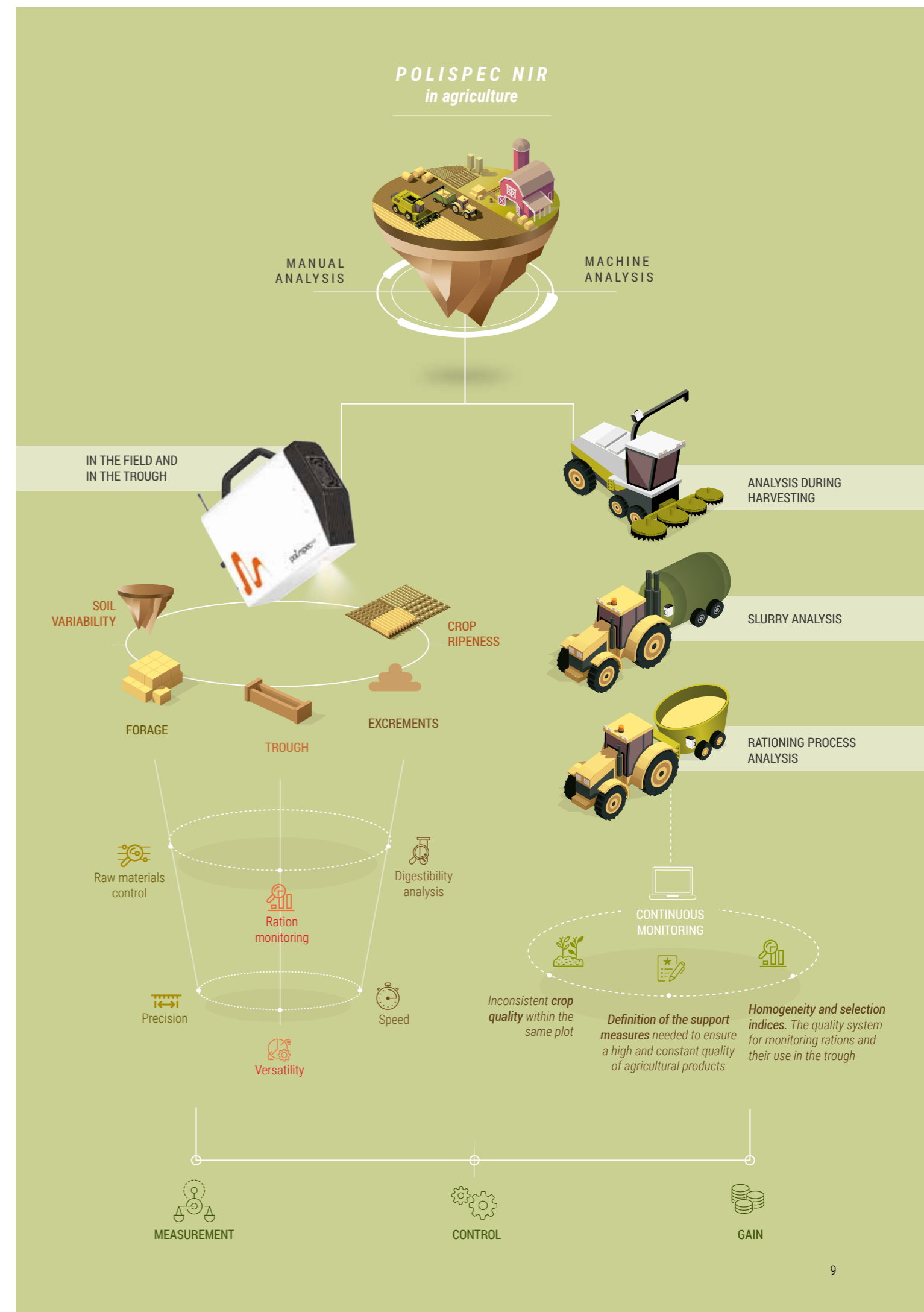
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For some time, we have been involved in developing "ready-to-use" solutions for the agriculture and agro-industry sectors. With applications created on the basis of our own technology, we offer systems for both portable use and installation on machinery and plants, complete with accessories, software, and a wide selection of calibration models.

Polispec line instruments are designed to guarantee intensive use in all agricultural processes requiring immediate, precise measurements to manage variables and for self-control systems.



AG.01 NIR portable



Ergonomic handle, control buttons, WiFi communication, rechargeable battery, *rugged 10" touchscreen tablet* with poliDATA software and ready-to-use calibration curves installed. All of this makes **Polispec NIR** the best portable instrument invented for applications in the field, in the workplace, and anywhere quick measurements and accurate answers are required.

System for portable use

Battery-powered and controlled by two convenient buttons located on the side of the handle, the instrument is connected wirelessly to a practical industrial tablet on which the poliDATA software and calibration curves are installed.



PORTABLE EXTENSION KIT

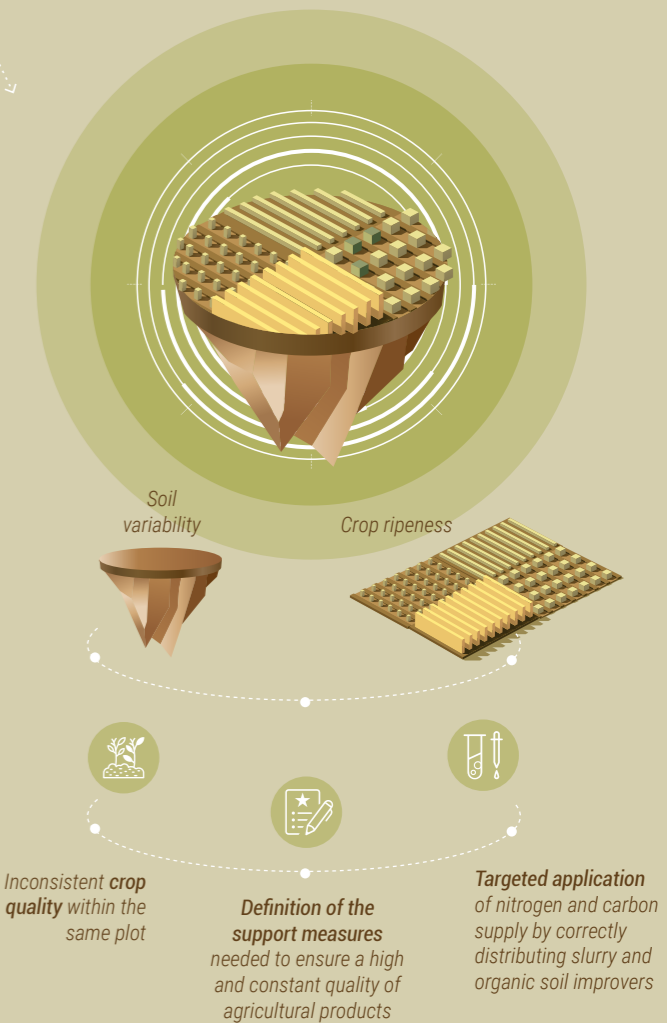
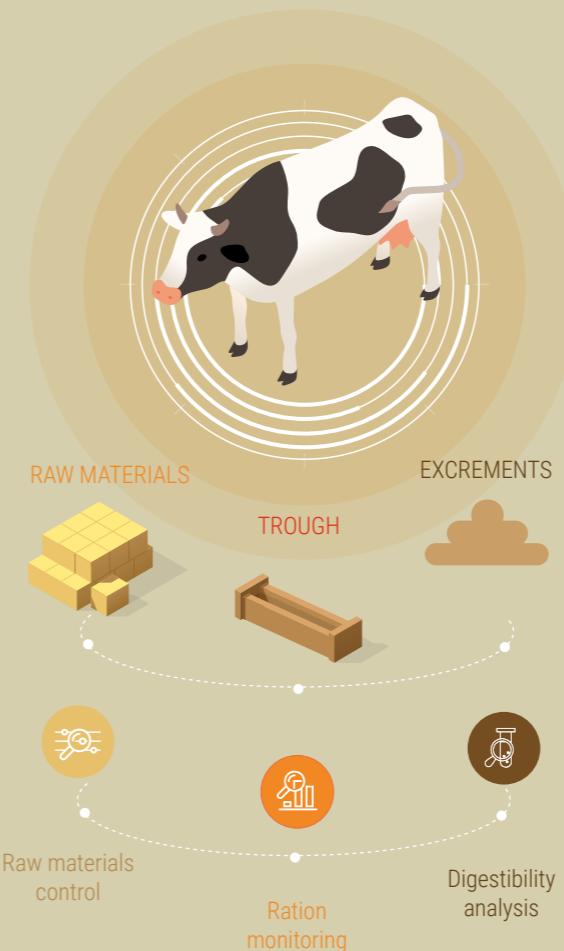


SELECTABLE CALIBRATION CURVES
Access the specific page

POLISPEC NIR in agriculture

IN THE TROUGH:
measurement of food variables
directly on the farm

IN THE FIELD:
measurement of crop variables
directly in situ



- Precision
- Versatility
- Speed

- Reduced response times
- Reduced sampling operations, which are often complicated and variable

AG.02 NIR

integrated on
**self-propelled
mixer wagon**

Polispec NIR for precision feeding in a single configuration specific for integration on mixer wagons. The sensor is installed on the mixing tank, where it can provide accurate measurements regarding the nutritional composition of the TMR and the homogeneity of how the nutrients and physical particles that compose it are cut and mixed.

INTEGRATED INSTALLATION ON THE MACHINE CANBUS/ISOBUS NETWORK

The system is integrated via CANbus network, thereby allowing the sensor to be simultaneously connected to the machine and to the weighing system and to be controlled by the machine itself*.

* solution specifically for agricultural machinery manufacturers

OPERATION

Installed on the mixer wagon tank, the system measures the product contained in the skip and its mixing status in real time, running a nutritional check of the ration itself with the corresponding recipe. By measuring both the nutritional properties (protein, fibre, and starch) as well as the physical ones (length of the particles and how they are distributed), the system is able to alert the operator when proper mixing status is achieved and record the data measured associated with the actual weight of the ration

(if connected to weighing) and the content of dry matter available per animal.

POLISPEC + INSTALLATION KIT INSTALLED ON TANK

The **Polispec system** communicates with ISO BOX (cab display) to send and process data.

The three programs, **poliTMR, TMR Manager, TMR Sync**, process the information and generate targeted, custom analyses.



INTEGRATED INSTALLATION ON the machine CANbus/ ISOBUS NETWORK



ISO BOX

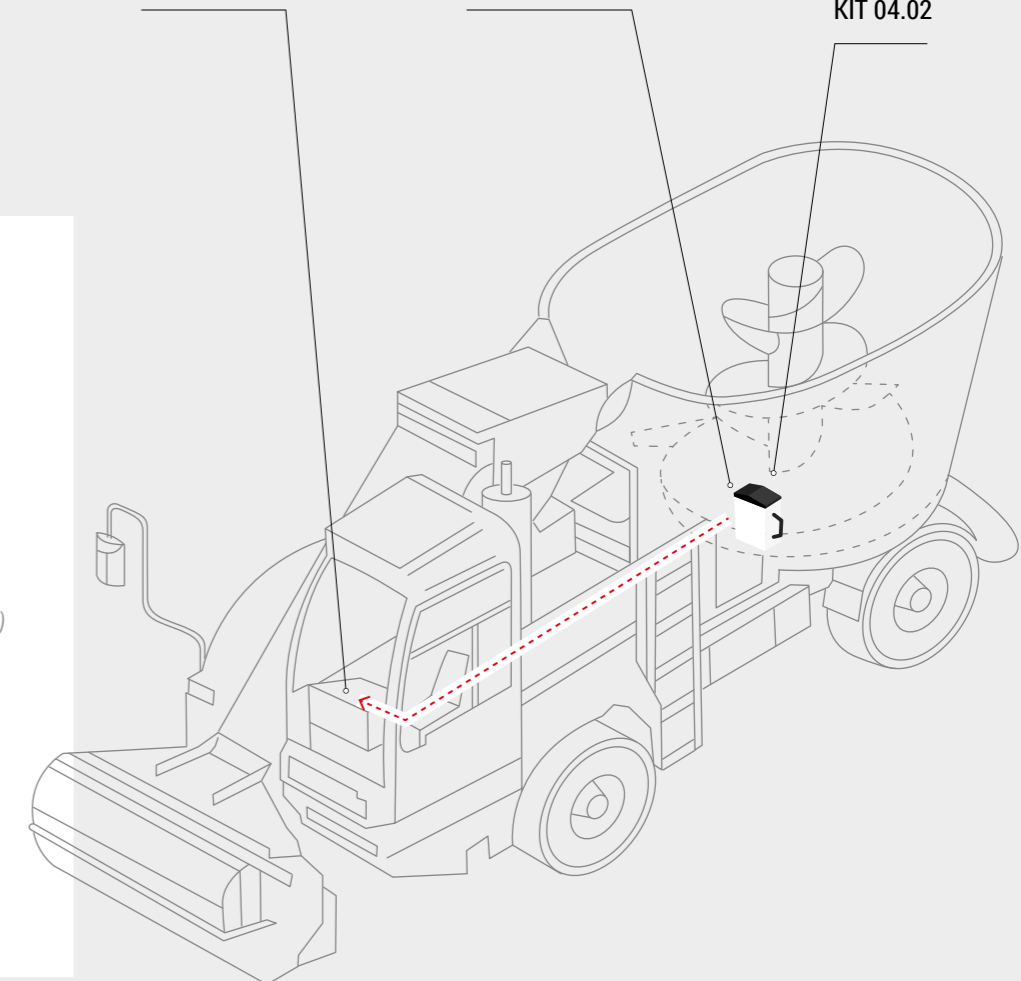
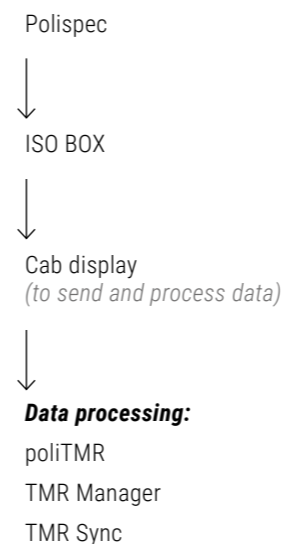


polispec^{NIR}



KIT 04.02

OPERATION



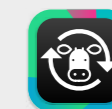
SOFTWARE



poliTMR
software that is installed on ISO BOX or on a tablet and allows the system to operate



TMR Manager
software that is installed on a company computer to display and monitor data, as well as create graphic reports



TMR Sync
software that uses a wireless or hotspot connection to synchronise the data measured by the system with the cloud

AG.03A NIR for self-propelled mixer

"ADD-ON" INSTALLATION

Available for installation on self-propelled, towed, and stationary mixer wagons, with the option of connecting via CANbus network at weighing*.

** connection not necessary for the system to operate, check model compatibility*

The monitor is installed in the cab via a *vehicle docking station* designed specifically to be able to release the screen and use the system also as a portable instrument.

OPERATION

Installed on the mixer wagon tank, the system measures the product contained in the skip and its mixing status in real time, running a nutritional check of the ration itself with the corresponding recipe. By measuring both the nutritional properties (protein, fibre, and starch) as well as the physical ones (length of the particles and how they are distributed), the system is able to alert the operator when proper mixing status is achieved and record the data measured associated with the actual weight of the ration

(if connected to weighing) and the content of dry matter available per animal.

POLISPEC + INSTALLATION KIT INSTALLED ON TANK

The **Polispec system** communicates with POWER BOX + *tablet + docking station* to send and process data.

The three programs, **poliTMR**, **TMR Manager**, **TMR Sync**, process the information and generate targeted, custom analyses.

SOFTWARE



poliTMR
software that is installed on ISO BOX or on a tablet and allows the system to operate

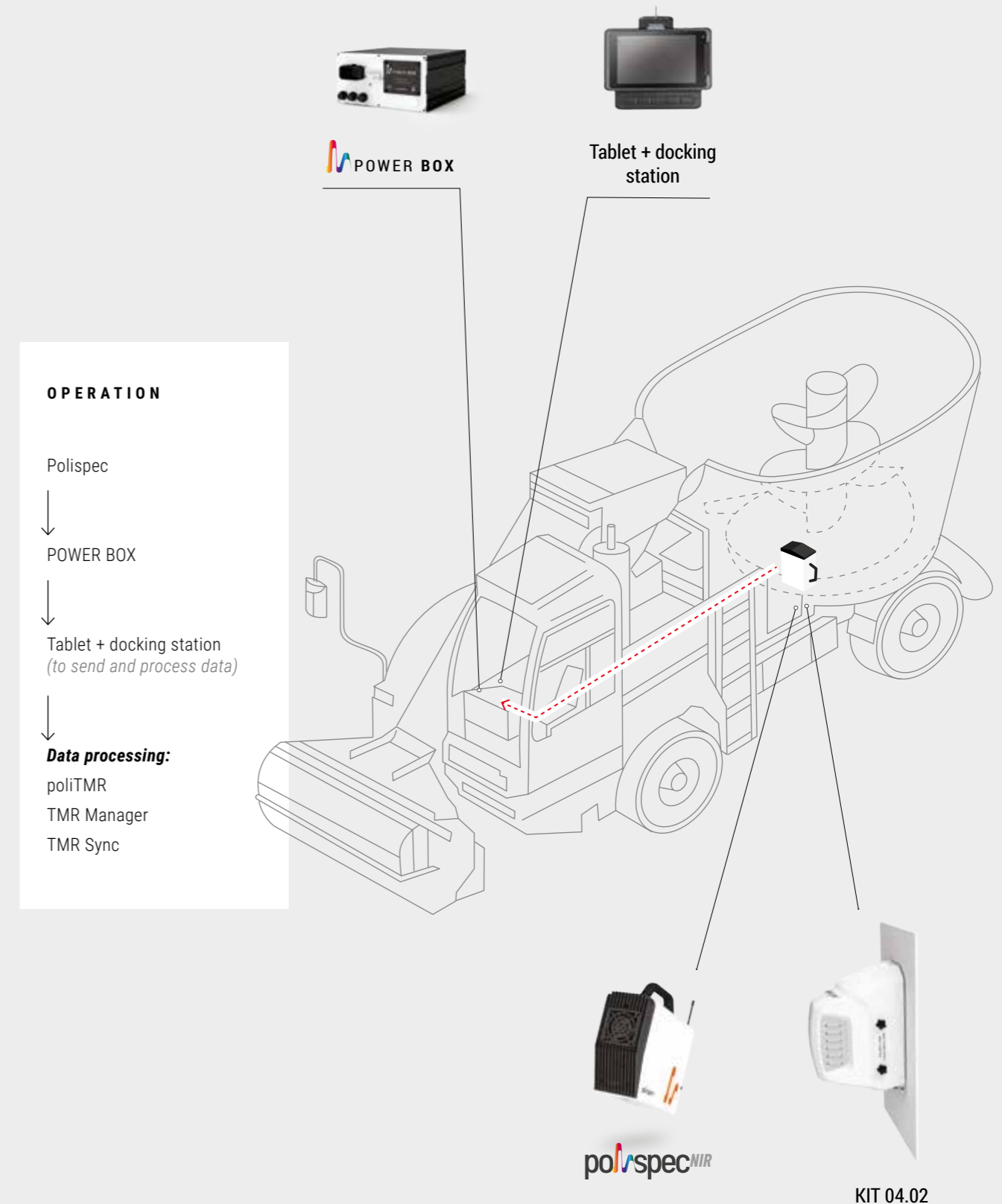


TMR Manager
software that is installed on a company computer to display and monitor data, as well as create graphic reports



TMR Sync
software that uses a wireless or hotspot connection to synchronise the data measured by the system with the cloud

SELF-PROPELLED MIXER WAGON "ADD-ON" INSTALLATION



AG.03B NIR for towed mixer wagon

Polispec NIR for precision feeding in a single configuration specific for installation on towed wagons.

The sensor is installed on the mixing tank, where it can provide accurate measurements regarding the nutritional composition of the ration and the homogeneity of the cutting and mixing of the nutrients and physical particles that compose it.

Available for installation on self-propelled, towed, and stationary mixer wagons, with the option of connecting via CANbus network at weighing*.

** connection not necessary for the system to operate, check model compatibility*

The monitor is installed in the cab via a *vehicle docking station* designed specifically to be able to release the screen and, therefore, use the system as a portable instrument.

OPERATION

Installed on the mixer wagon tank, the system measures the product contained in the skip and its mixing status in real time, running a nutritional check of the ration itself with the corresponding recipe. By measuring both the nutritional properties (protein, fibre, and starch) as well as the physical ones (length of the particles and how they are distributed), the system is able to alert the operator when proper mixing status is achieved and record the data measured associated with the actual weight of the ration

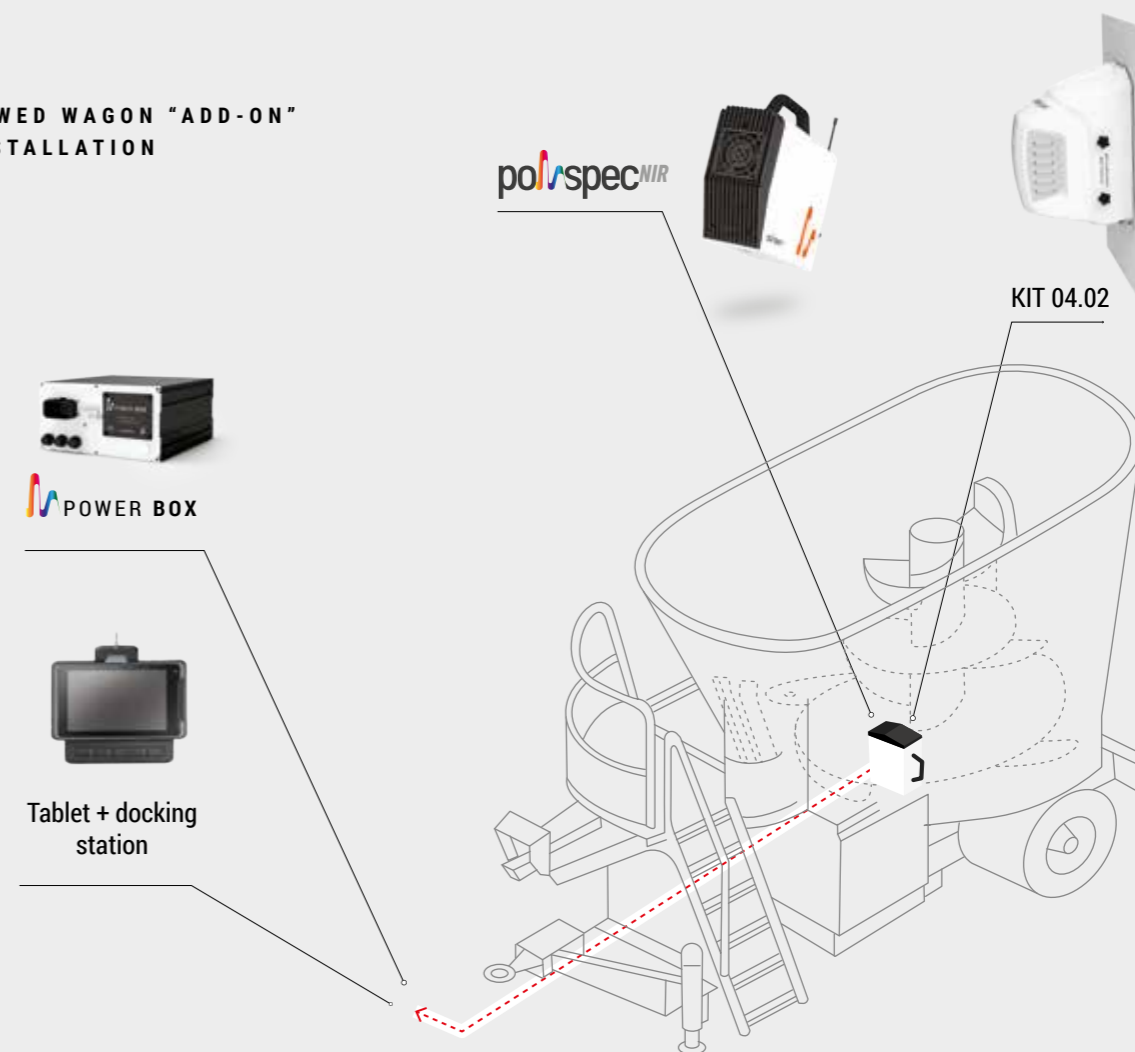
(if connected to weighing) and the content of dry matter available per animal.

POLISPEC + INSTALLATION KIT INSTALLED ON TANK

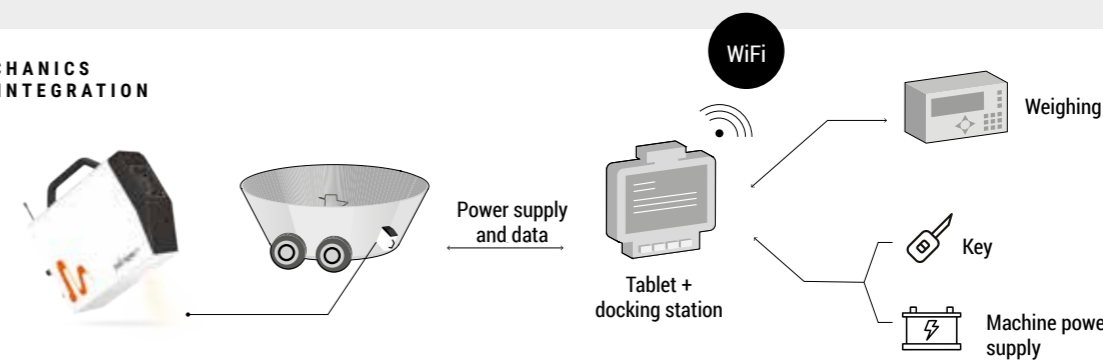
the **Polispec system** communicates with POWER BOX + tablet + docking station to send and process data.

The three programs, **poliTMR**, **TMR Manager**, **TMR Sync**, process the information and generate targeted, custom analyses.

TOWED WAGON "ADD-ON" INSTALLATION



MECHANICS OF INTEGRATION

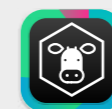


SOFTWARE



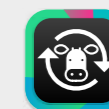
poliTMR

software that is installed on ISO BOX or on a tablet and allows the system to operate



TMR Manager

software that is installed on a company computer to display and monitor data, as well as create graphic reports



TMR Sync

software that uses a wireless or hotspot connection to synchronise the data measured by the system with the cloud



AG.03C NIR for stationary mixer wagon

STATIONARY

Available for installation on self-propelled, towed, and stationary mixer wagons, with the option of connecting via CANbus network at weighing*.

* connection not necessary for the system to operate, check model compatibility

The monitor is installed in the cab via a *vehicle docking station* designed specifically to be able to release the screen and, therefore, use the system as a portable instrument.

OPERATION

Installed on the mixer wagon tank, the system measures the product contained in the skip and its mixing status in real time, running a nutritional check of the ration itself with the corresponding recipe. By measuring both the nutritional properties (protein, fibre, and starch) as well as the physical ones (length of the particles and how they are distributed), the system is able to alert the operator when proper mixing status is achieved and record the data measured associated with the actual weight of the ration

(if connected to weighing) and the content of dry matter available per animal.

POLISPEC + INSTALLATION KIT INSTALLED ON TANK

the **Polispec system** communicates with ISO BOX (cab display) to send and process data.

The three programs, **poliTMR**, **TMR Manager**, **TMR Sync**, process the information and generate targeted, custom analyses.

SOFTWARE



poliTMR

software that is installed on ISO BOX or on a tablet and allows the system to operate



TMR Manager

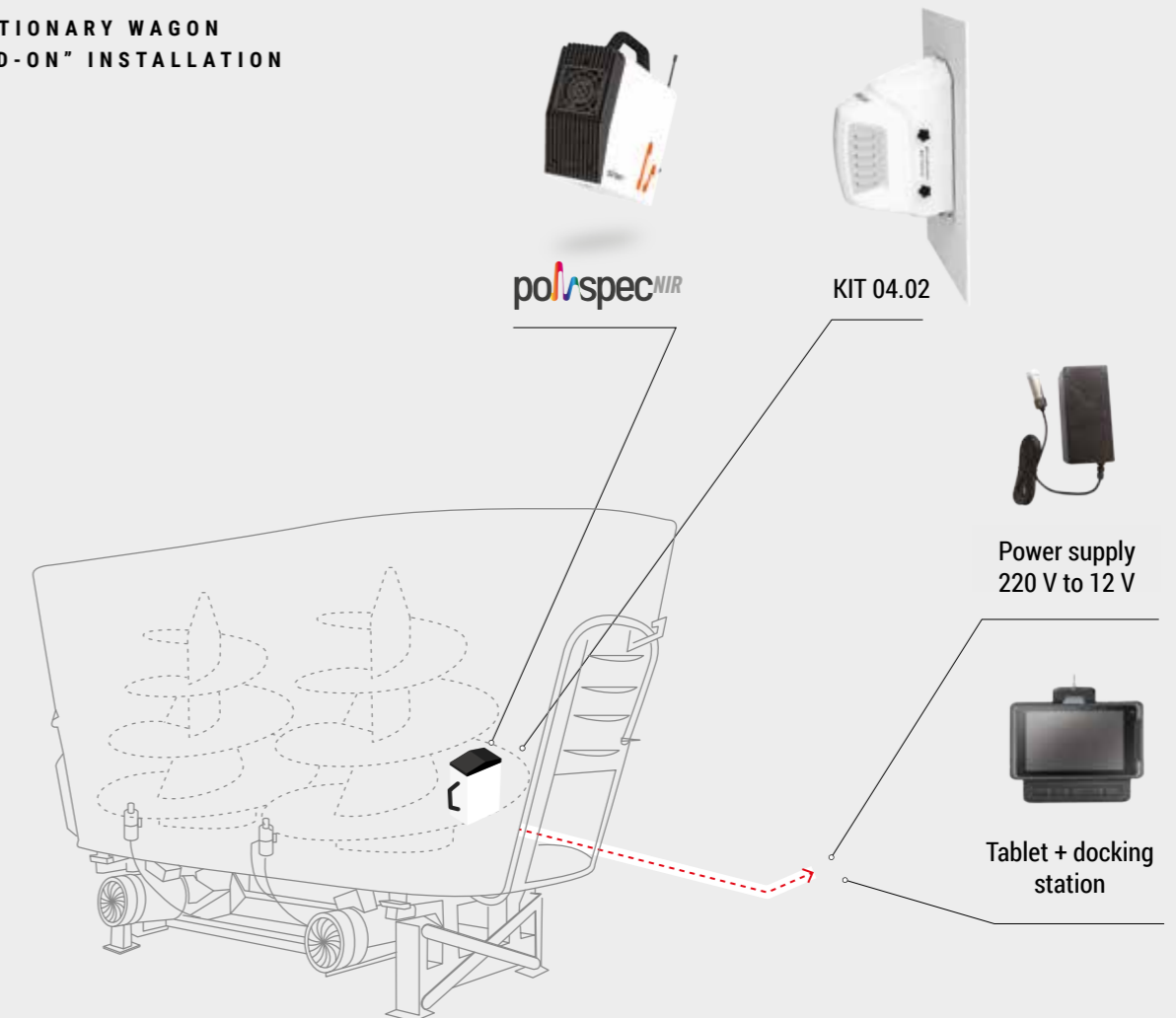
software that is installed on a company computer to display and monitor data, as well as create graphic reports



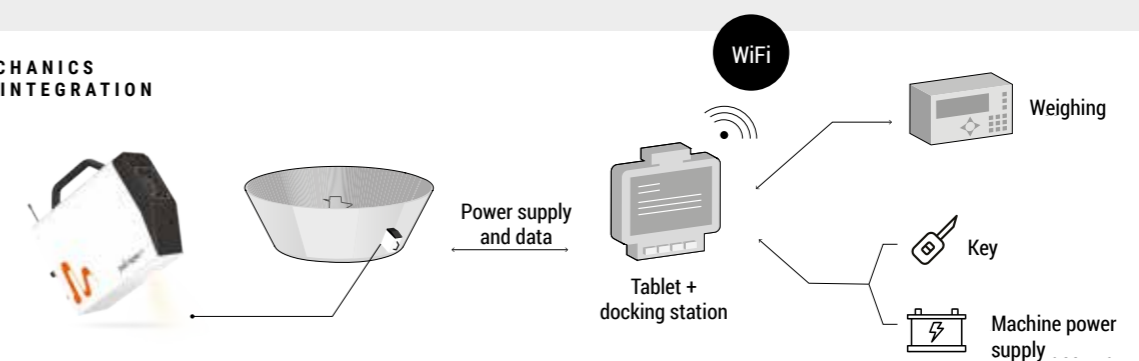
TMR Sync

software that uses a wireless or hotspot connection to synchronise the data measured by the system with the cloud

STATIONARY WAGON "ADD-ON" INSTALLATION



MECHANICS OF INTEGRATION



AG.04 NIR Combine

Polispec NIR for installation on combines. A smart solution dedicated to those who harness the potential of precision farming to learn and optimise farming techniques in order to maximise harvest quantity and quality.

The **Polispec NIR** is installed on the machine grain elevator thanks to **AGS (Active Grain Sampler)**, a device that can continuously sample the flow of harvested product and self-adjust based on the instantaneous flow.

Connected via ISObus to the virtual terminal of the machine and to the GPS antenna, the **Polispec NIR** system can provide detailed maps on harvest quality, guaranteeing traceability and providing essential data to develop a proper agricultural plan.

Composed by:

polispecNIR



ISO BOX



AGS



* Optional::

U BeQuo



* Required set-ups:

UNIVERSAL TERMINAL (UT) with Task Controller



OPERATION

The **Polispec NIR** is installed on the combine grain elevator thanks to the specific AGS (Active Grain Sampler) accessory. This way, the qualitative aspects of the harvested product can be measured at a rate that is always proportional to the flow of material.

The data are sent to the ISOBus control unit and are then processed in order to be displayed on the machine console and properly recorded by the Task Controller along with the GPS coordinates.

COMBINE

KEY

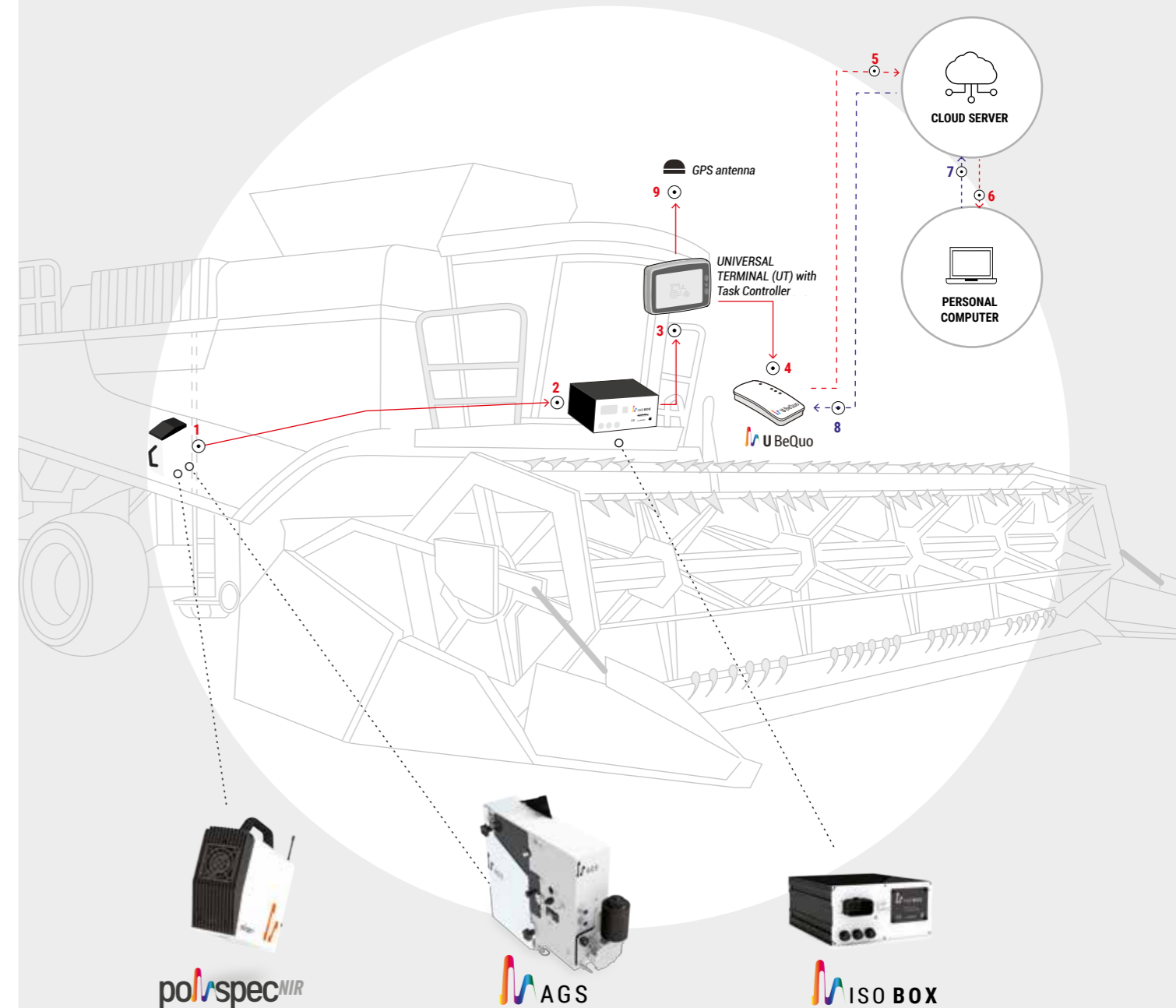
Data transfer via web



Data transfer via cable



Data transfer via WiFi



POLISPEC NIR ISOBOX

NIR sensor to measure dry matter, protein, fats, and starch in harvested products

AGS (ACTIVE GRAIN SAMPLER)

an accessory that is required to install the Polispec sensor and analyses a rate that is always representative of the product, proportionally to the harvest flow

ISO BOX

control unit that properly powers the Polispec sensor, managing protected switch-on and off. It also manages all measurements, processing the collected signal and sending the data on the machine ISObus network



AG.05 NIR

Forage harvester

Polispec NIR installed on forage harvesters, an innovative system that guarantees constant control of all the harvested product and, via integration on the machine ISObus network and the GPS antenna, collects precise data on the quality of the harvested products and maps them onto the surface of the cultivated areas, in order to ensure agricultural processes are managed properly. The collected data are, therefore, extremely useful to properly determine the qualitative and financial value of harvests and can be used to improve how cultivated areas are managed with regard to their production capacity.

Composed by:



- * **Optional:** U BeQuo
- * **Required set-ups:** UNIVERSAL TERMINAL (UT) with Task Controller, GPS Antenna

OPERATION

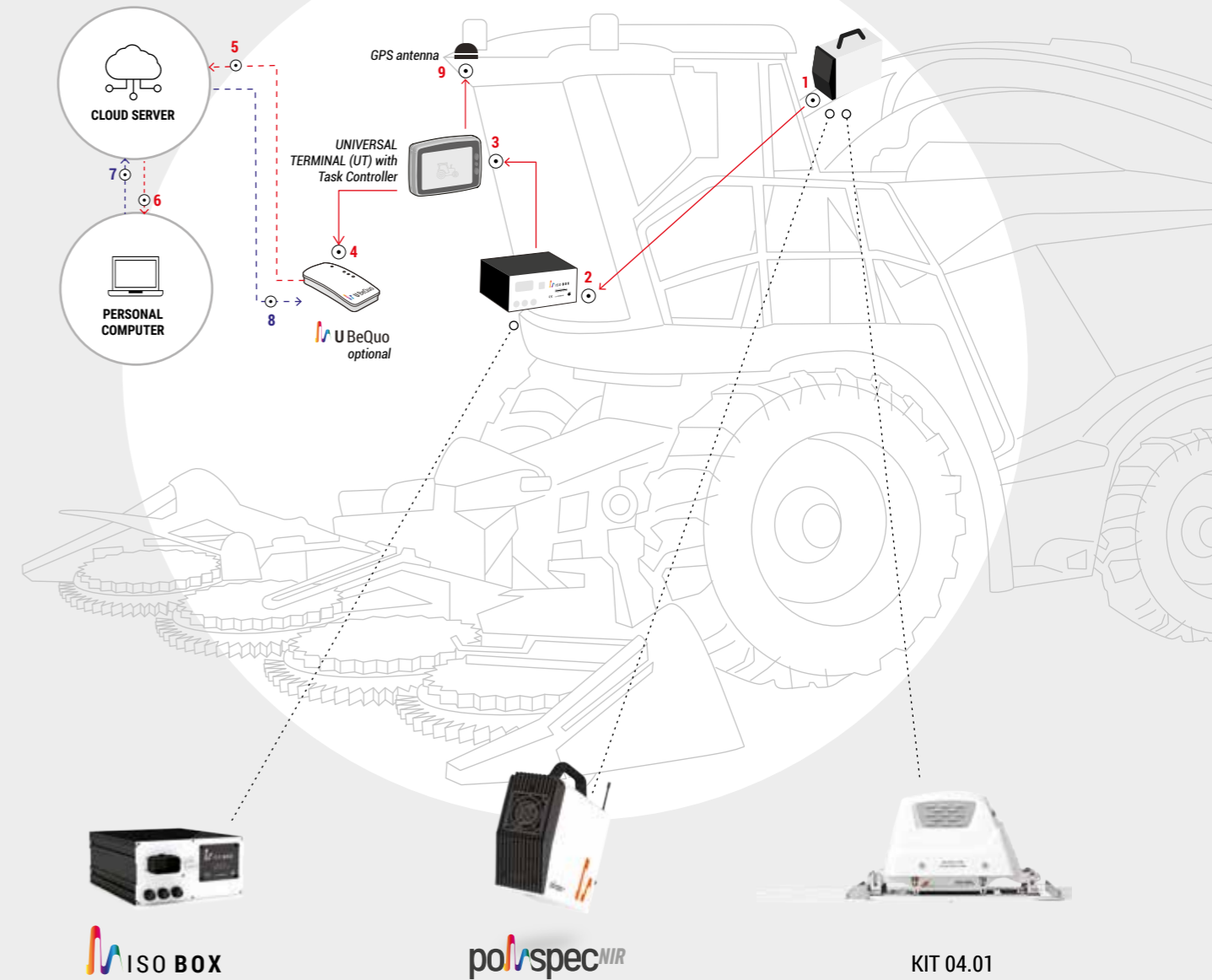
The Polispec sensor is installed on the forage harvester spout, using the special universal installation kit. This way, the qualitative aspects of the harvested product can be measured continuously and sent to the ISOBus control unit, where they are then processed in order to be displayed on the machine console and properly recorded by the Task Controller along with the GPS coordinates.



FORAGE HARVESTER

KEY

- Data transfer via web
- Data transfer via cable
- Data transfer via WIFI



ISO BOX
control unit that properly powers the Polispec sensor, managing protected switch-on and off. It also manages all measurements, processing the collected signal and sending the data on the machine ISObus network

POLISPEC NIR
NIR sensor to measure dry matter, protein, fibre, and starch in harvested products

KIT 04.01
universal installation kit for forage harvesters to safely install the Polispec sensor and quickly remove it for cleaning and inspection

AG.06A NIR Slurry spreaders

System to measure the content of nitrogen, phosphate, and organic material on slurry spreaders. The system is comprised by a duct to install the **Polispec NIR** sensor and is available in two versions.

OPERATION

Installed in order to run analyses during loading, the system is able to provide mean data that can be used to properly set the discharge volumes to spread the slurry at a fixed rate or as prescription map input to spread the slurry at a variable rate.

The **Polispec NIR** sensor, installed via the specific kit for ducts under pressure (6" or 8" pipes), measures and sends data to the processing unit located in the cab and readily available to the operator.

"ADD-ON" INSTALLATION

Suitable for integration both on self-propelled and towed machinery. The system is managed by a tablet per vehicle, installed in the cab on a specific support, while the control unit manages proper power supply to the sensor.

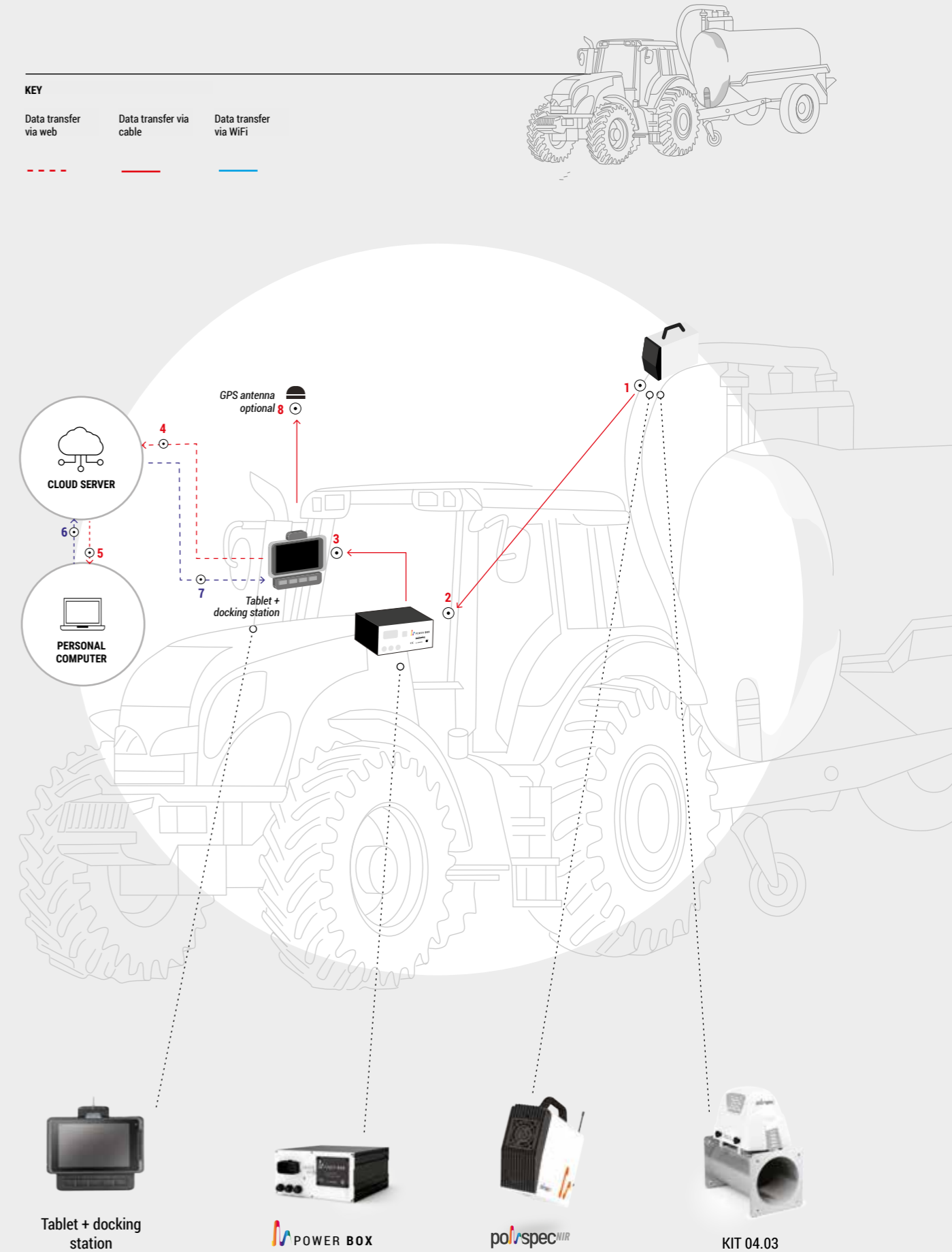
Composed by:



"ADD-ON" INSTALLATION

KEY

Data transfer via web (dashed red line)
 Data transfer via cable (solid red line)
 Data transfer via WiFi (solid blue line)



AG.06B NIR Slurry spreaders

System to measure the content of nitrogen and organic material on slurry spreaders. The system is comprised by a duct to install the **Polispec NIR** sensor and is available in two versions.

OPERATION

The **Polispec NIR** system to measure the content of nitrogen and organic material in livestock slurry and biogas. Installed in order to run analyses during loading, the system is able to provide mean data that can be used to properly set the discharge volumes to spread the slurry at a fixed rate or as prescription map input to spread the slurry at a variable rate.

The **Polispec NIR** sensor, installed via the specific kit for ducts under pressure (6" or 8" pipes), measures and sends data to the processing unit located in the cab and readily available to the operator.

INTEGRATED INSTALLATION ON the machine CANbus/ISObus NETWORK

Especially suitable for integration on self-propelled machinery.

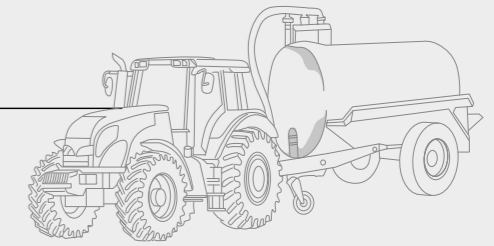
A CANbus or ISObus control unit manages the entire system while the data are shown on the machine (or tractor) display.

* solution specifically for agricultural machinery manufacturers

Composto da:

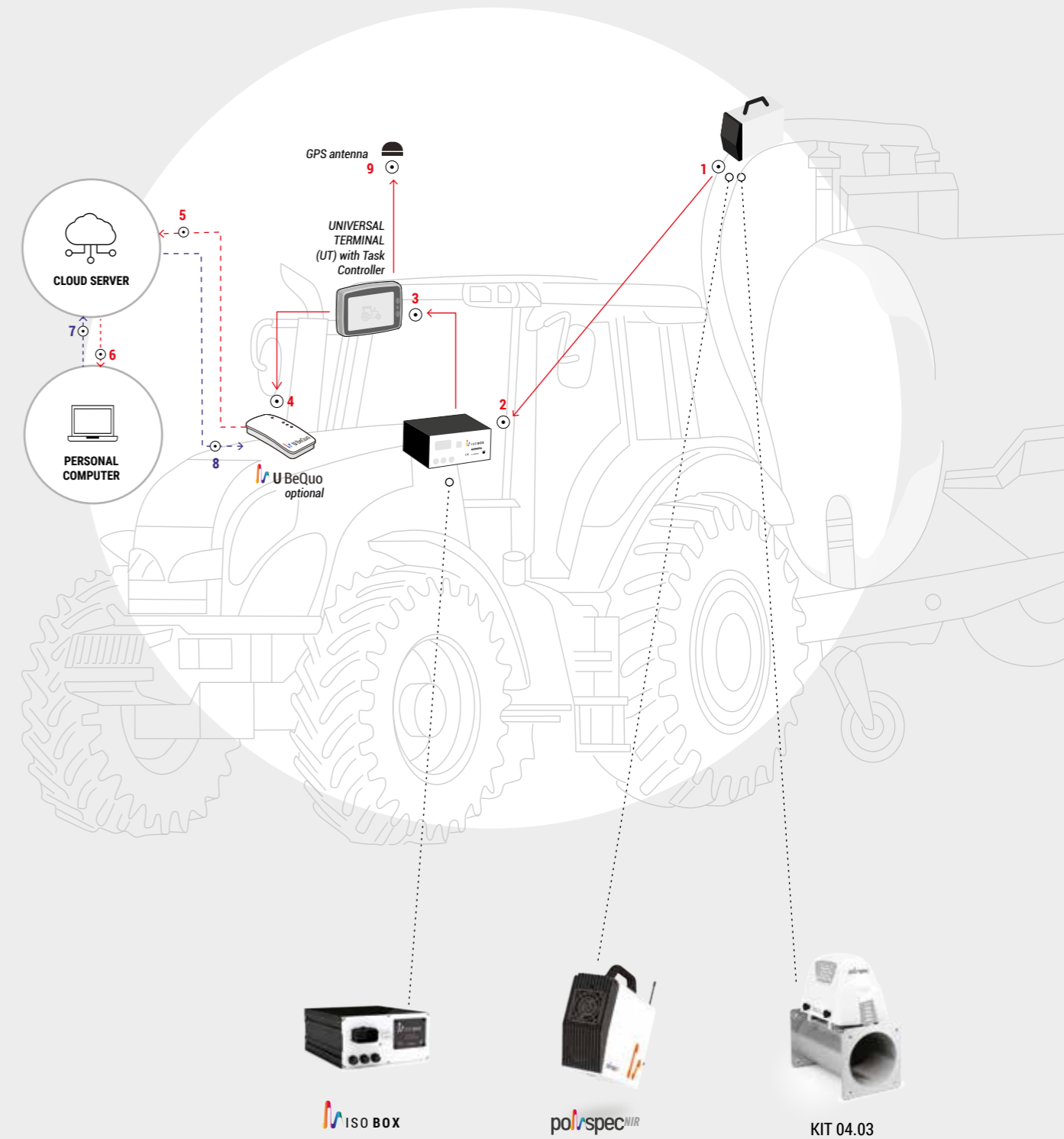


INTEGRATED INSTALLATION ON the machine CANbus/ISObus NETWORK



KEY

Data transfer via web
Data transfer via cable
Data transfer via WiFi

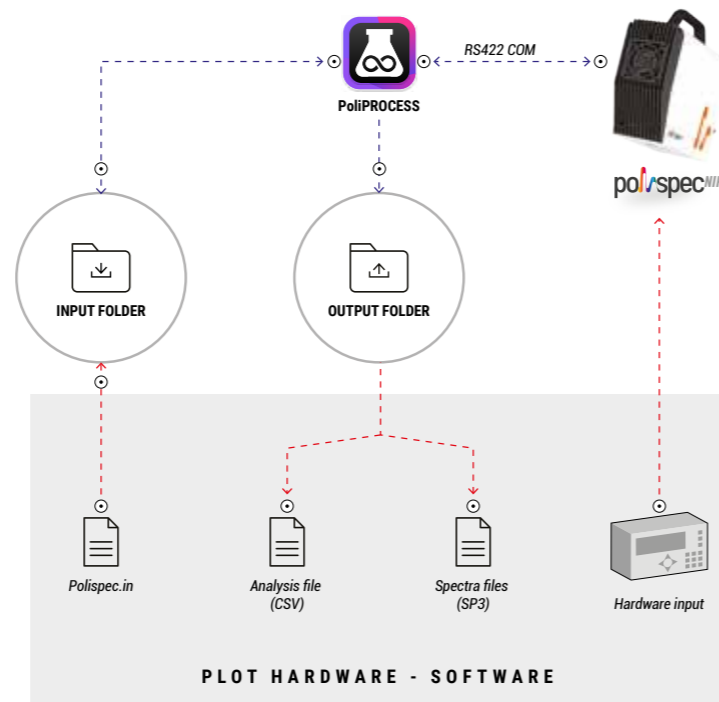


AG.07 *Function* **Plot harvesting**

The **poliPROCESS software with Plot Harvesting mode** uses the **Polispec** (Lite, NIR and NIRe) instruments for measurements on plot harvesting machinery.

In this configuration, the software accepts an input file to set the chemometric model to use, define the name of the plot, and make sure the reference acquisition procedure (spectrophotometer white and dark) launches.

The analysis is checked via trigger hardware (N.O. contact), therefore the instrument acquires spectra for the entire time the contact is closed. Once acquisition is complete, all the obtained spectra are filtered and the final result corresponds to an average measurement that is assigned to the plot. The acquired spectra and the analysis are saved and exported to files in order to archive the results.



OPERATION

On the main page of the **software with Plot Harvesting mode**, two main icons describe:

- the status of the connected **Polispec** instrument (with corresponding model and S/N) and activation of the module to manage plot harvesting
- the pathway of the folder used for the INPUT files (instructions for acquisition, naming the plots, selecting the calibration mode...)

There are three main buttons on the bar to the side:

- access the process page
- check alarms
- display the settings page.

poliPROCESS with Plot Harvesting mode, main page



AG.08 Calibration curves



SOFTWARE

For the **Polispec NIR** instruments purchased under **"AGRI solution"**, there is a wide range of ready-to-use calibrations available, suitable for measuring raw materials, main crops used for forage, livestock rations, slurry, and solid waste. All calibration curves are granted with an annual user licence with no obligation to select or renew.

Calibration curves for portable use Polispec NIR systems:

Calibration curves for Polispec NIR systems for portable use:



SILAGE AND FORAGE

Maize silage, grass silage, grain silage, sorghum silage, chopped corn cob mix, chopped high-moisture corn, dried hay and forage, alfalfa hay, grass hay

chopped green sorghum, chopped green alfalfa, chopped green high-moisture corn, chopped green corn cob mix



RAW MATERIALS

Cornmeal, cottonseed extraction meal, soybean extraction meal, DDGS, corn fibre, corn germ



RATIONS FOR RUMINANTS

Dairy cow TMR without silage, dairy cow TMR, beef cattle TMR, dry cow TMR



GRAINS

Soy, wheat, corn, cotton



CHOPPED WHOLE GREEN CROPS

Chopped green maize, chopped green cereal crops, chopped green grass crops,



FAECES AND SLURRY

Faeces of lactating cows, faeces of cows for fattening, slurry (bovine and biogas)

Calibration kits for Polispec NIR systems installed on machinery:



MIXER WAGON KIT



COMBINE KIT



FORAGE HARVESTER KIT



SLURRY SPREADER KIT

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M. info@itphotonics.com

I T P H O T O N I C S . C O M