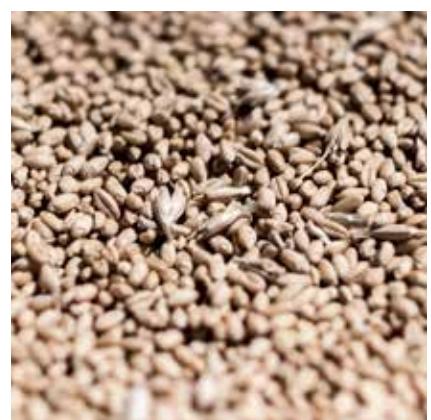


FOSS

PROFOSS™ 2

WHOLE GRAIN PROCESS ANALYSIS



ANALYTICS BEYOND MEASURE



MORE KNOWLEDGE, MORE VALUE

Whether you are meeting specs with least cost or making a premium quality blend for optimal results in milling and malting, knowing more about your grain will always give you the power to achieve better business results.

By providing continuous measurements of moisture and protein in whole grain in real-time, ProFoss™ 2 empowers you to make the best decisions when receiving and shipping grain.

Now in its second generation, ProFoss™ 2 for whole grain is built on innovation in both hardware and digitalization to ensure consistent high performance. Accuracy is aligned against the renowned Infratec™ grain analyzer.

GRAIN ANALYSIS GOES IN-LINE

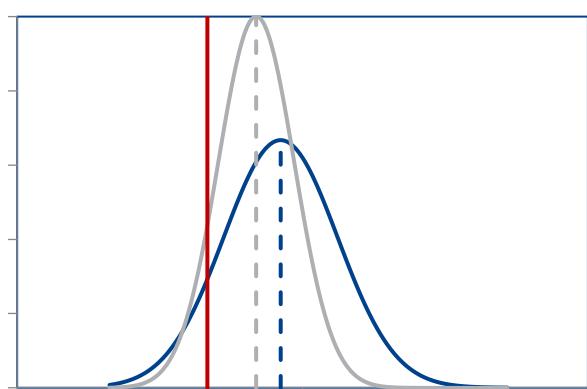
ProFoss™ 2 for whole grain is an in-line process analysis solution that provides continuous measurements of moisture and protein in whole grain in real-time.

By 'in-line', we are talking about doing analysis exactly at the spot where whole grain needs to be measured. For instance, this could be as grain is transported into the silo at receival, as it is blended before loading onto a ship, as it is received at the malting plant or as it is blended before heading into the flour milling process.

The big advantage of in-line analysis compared to tests with a traditional benchtop analyzer is that measurements are taken automatically every few seconds. At the same time, the measurements are just as good as those you are used to with the well-proven Infratec™ grain analyzer.

To put this into perspective, let's take an example of blending of grain shipments as they are loaded onto the ship at port. Instead of taking samples and doing periodic tests, the grain is tested every three seconds as it is transported onto the ship. These are fed back to a computer screen (or control system) so that you can constantly monitor levels for protein and moisture as you build the perfect blend for the shipment.

ProFoss 2 for whole grain gives you the real-time data you need to match your targets more precisely.

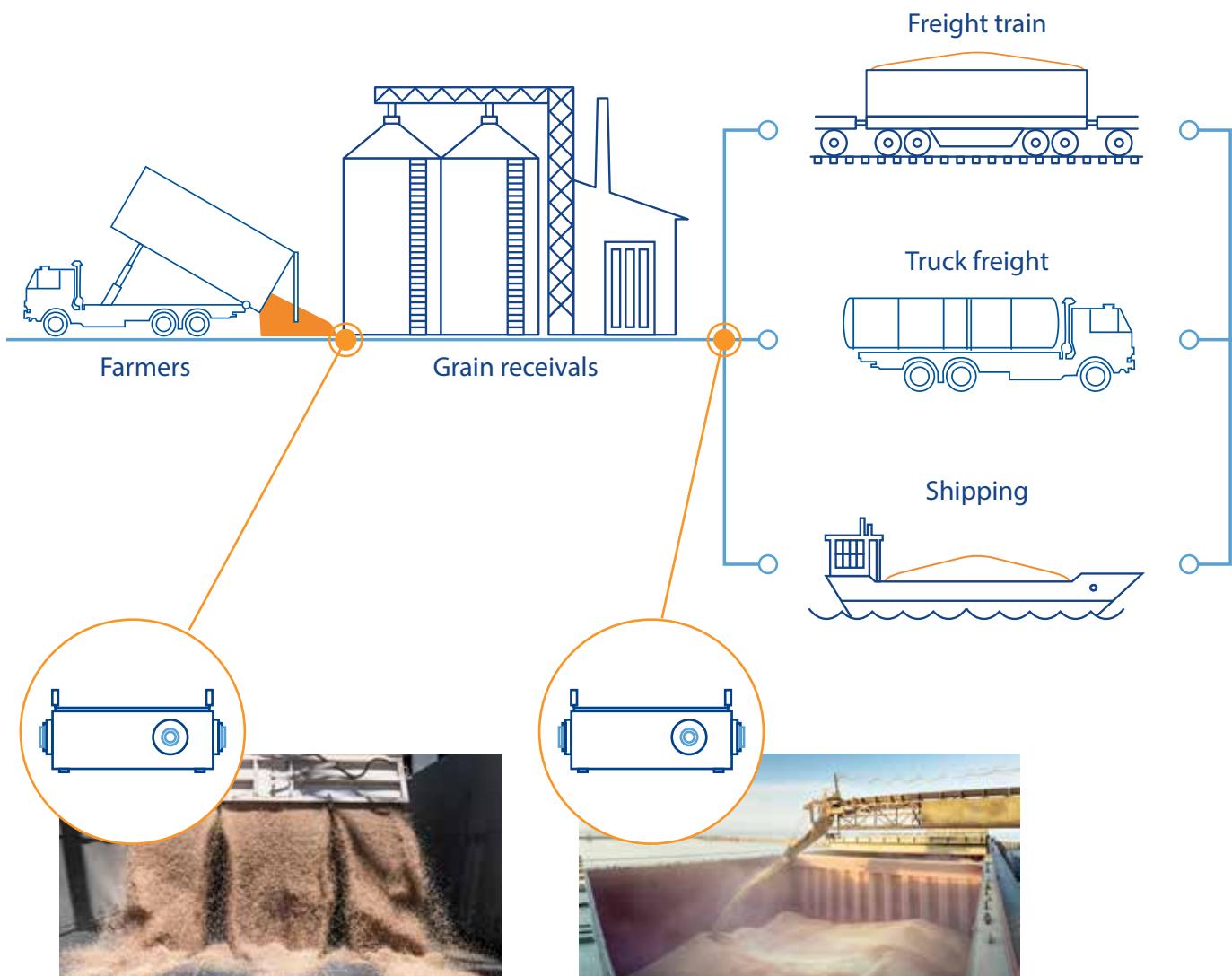


For example, assume that you are building a 20,000 ton ship load of grain to a target of 10.5% protein. You are using two grades of wheat and there is a price difference of EUR 10 between the grades. The real-time data offers insight that allows you to use 15% more wheat from the lower grade wheat and save 15% high quality wheat. Given the 20,000 ton load, 15% equals 3,000 tons of grain at EUR 10 higher price, resulting in a saving of EUR 30,000.

Additional benefits include labor savings, reduced chance of human error in data handling and optimized energy consumption, for example, through more efficient drying of incoming grain based on continuous insights into moisture content.

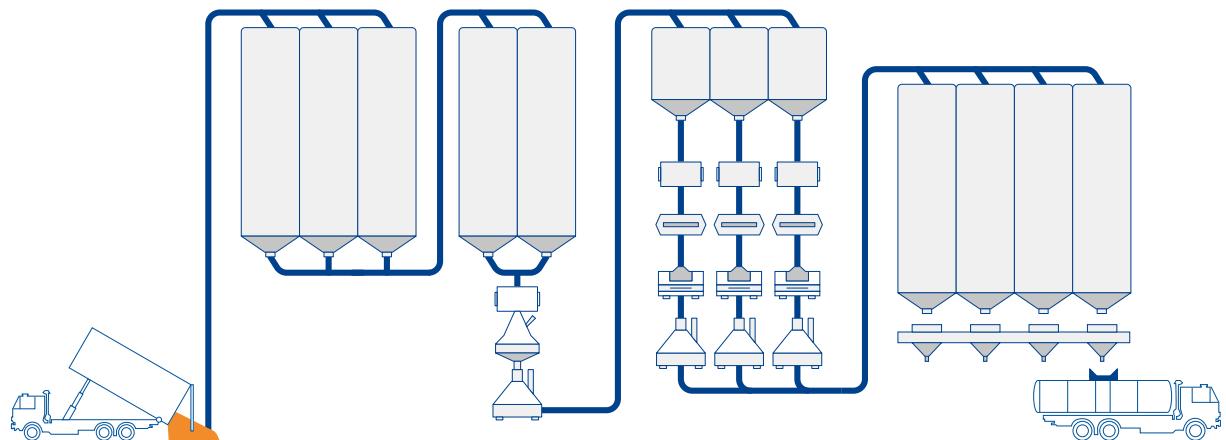
KNOW MORE IN GRAIN HANDLING, MILLING AND MALTING

The new ProFoss™ 2 for whole grain can measure grain moisture content and protein content in process lines every three seconds (approx 1200 data points per hour). This provides unprecedented levels of control in grain receival, segregation and blending as well as in flour milling and in malting.

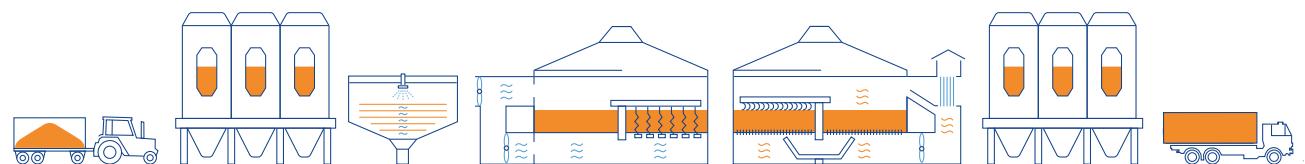


In grain handling, you can measure at transport to the silo to improve segregation and minimize use of energy when drying grain.

Measuring at transport to the train, truck or ship allows you to match contract specifications more precisely while reducing the risk of disputes.



During tempering, continuous measurements help to ensure optimal moisture content. Consistently high milling yield can be achieved while minimizing the use of water.



A major challenge in malting is ensuring that barley is homogenous. The ProFoss™ 2 for whole grain enables you to understand and control grain variations in all your barley more efficiently, allowing more precise segregation against protein specifications.



The analyzer is housed in a robust cabinet for installation close to the point of measurement. The measurement sensor is installed at the appropriate location in the process, for example, in the transport pipe to a silo. It is connected to the analyzer via fiber optic cable. Measurements are displayed on a computer screen and results can be fed into a regulation system for closed-loop automatic control.



THE ACCURACY OF INFRATEC™ GOES IN-LINE

ProFoss™ 2 whole grain is built on proven technology with a direct line to the Infratec™ grain analyzer – a proven performer which has become the cornerstone of grain quality control around the globe.

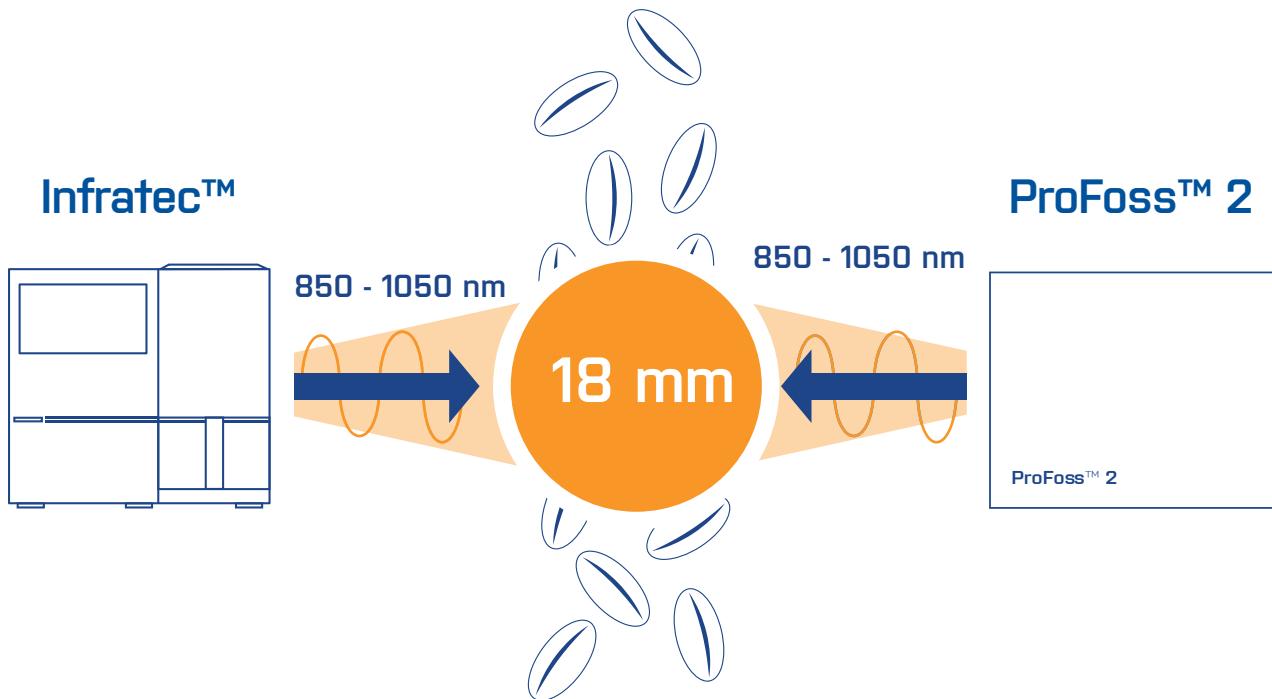
The ProFoss 2 uses the same form of near infrared (NIR) analysis called NIR transmittance. As the name suggests, the infrared light is transmitted through the sample. This is in contrast to NIR reflectance solutions where the light is reflected off the surface of the sample. This detail is relevant for whole grain, for instance, when testing parameters such as moisture. The moisture can be unevenly distributed in the kernel and so affect the result if only the surface is measured.

In fact, the solution is unique in offering in-line analysis of grain based on NIR transmittance. It does this using a specially designed sample interface known as the lateral transmittance probe. The probe is located directly in the transport pipe and tests the grain as it flows by.



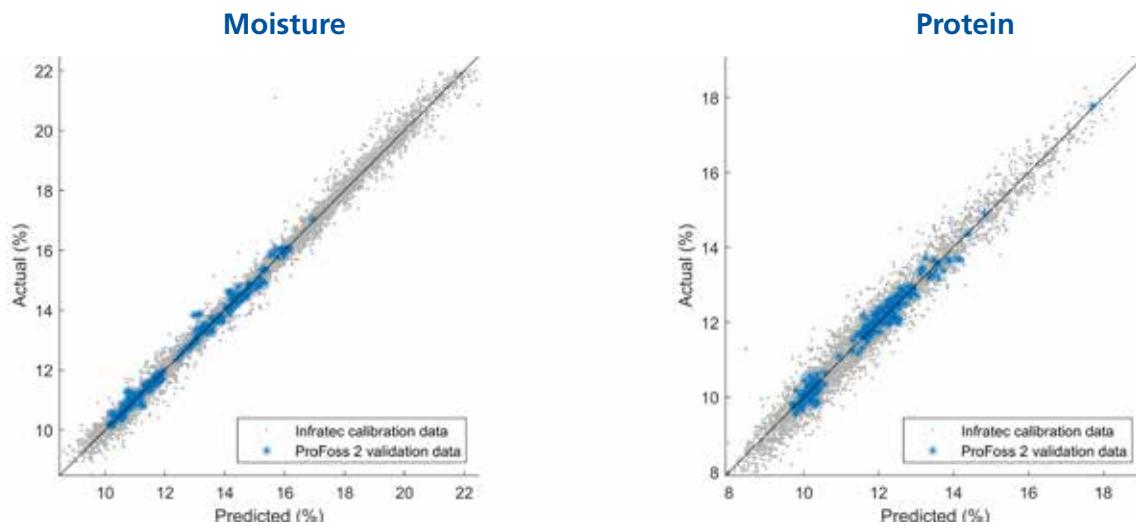
Measurements every few seconds provide a reliable platform for more informed decision-making.

Analysis using NIR transmittance analysis is often done at a low wavelength range where the NIR light energy is high and it is possible to penetrate deep into the sample. A more representative spectrum of the sample is obtained giving a more reliable measurement. The ProFoss 2 for whole grain measures grain to a depth of 18 mm in the transport pipe.



ProFoss™ 2 models based on Infratec™ data acquired over decades of harvests

Accurate analytical models provided with the ProFoss 2 are based on the global Infratec database. This ensures reliable results irrespective of grain origin, growing conditions or grain quality. In short, the ProFoss 2 delivers highly accurate and reproducible whole grain measurements, every time, every harvest, every region.



Plots showing correspondance between results from Infratec™ and ProFoss™ 2.

TOTAL SOLUTION

The ProFoss™ 2 for whole grain is a total solution. It includes instrumentation, set-up and calibration. Not least, it also includes support from experts in person or online and all enabled by the latest in digital connectivity services.

Simple to implement and run

ProFoss 2 for whole grain can be supplied pre-calibrated with models ready to use from day one. The models are transferable between units ensuring easy expansion to other measurement points.

ProFoss instruments are standardized and are highly stable. Once calibrated, there is no need for constant adjustments caused by drift or other weaknesses. The high stability ensures the same accuracy day in and day out without hidden operational costs. The stability also makes it straightforward to install multiple units.

Experts to support you

To keep your solution running as smoothly as possible, we offer a wide variety of service programs to suit your individual business needs. Ranging from on-site staff training to preventative maintenance options and remote instrument surveillance, we give you the support you need for maximum uptime and minimal disruption.

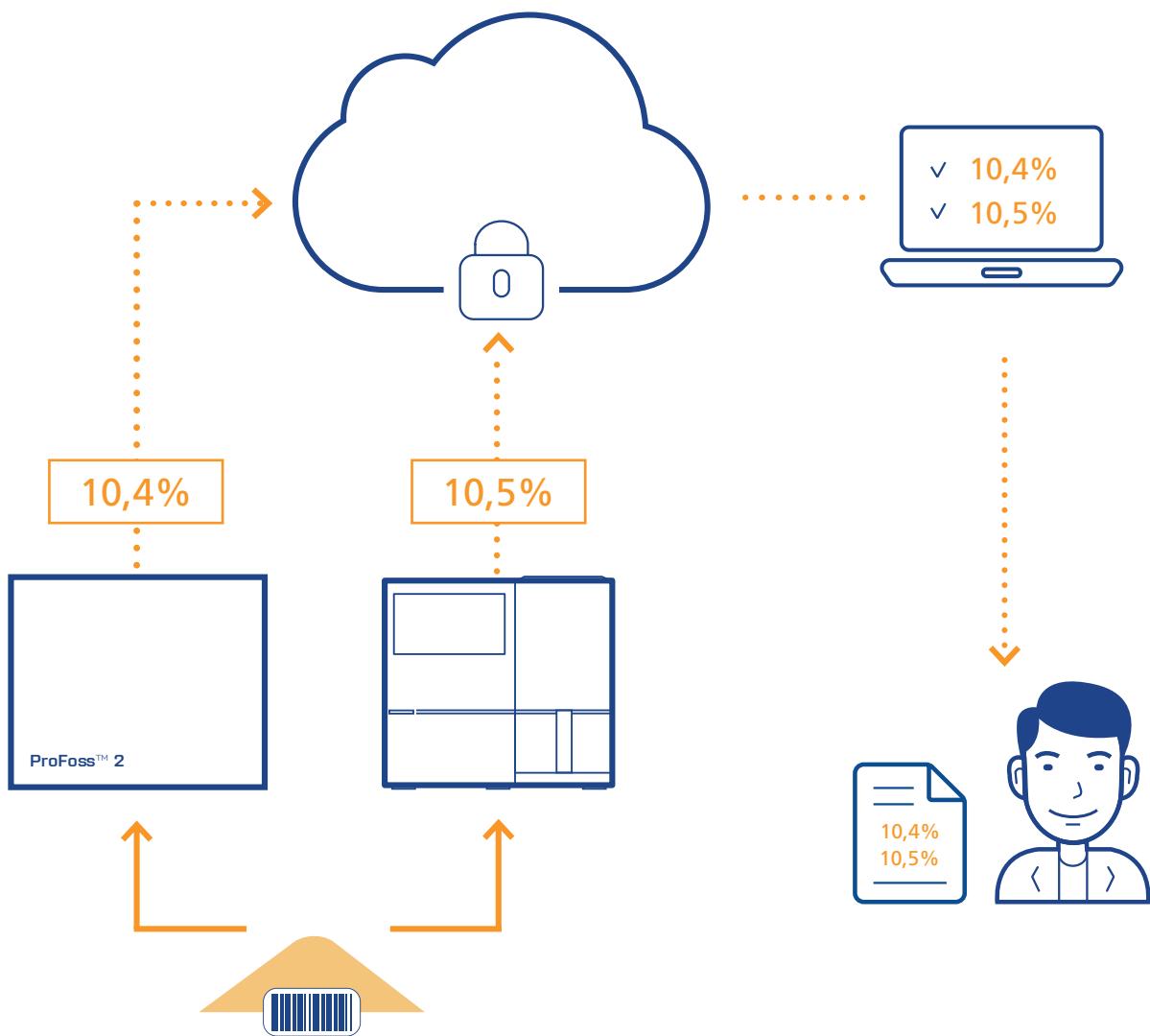
Connected instruments for data sharing and efficient analytical operations

Digital connectivity allows remote management, resulting in reliable performance across your entire fleet of FOSS in-line and benchtop grain analyzers.

- Manage your fleet of instruments with efficiency and minimal use of in-house resources
- Advanced software and connectivity features for just-in-time performance reports
- Maintain uptime through automated system monitoring and alerts
- Peace of mind through remote access to service support



From grain handling to flour milling and malting, continuous in-line analysis delivers the data required to improve yield and quality.



Automated performance validation against the Infratec™

Because the underlying detection technology is the same as the Infratec benchtop analyzers, the ProFoss™ 2 for whole grain analytical models (also known as calibrations) are compatible across both solutions.

As a result, the proven rock-solid performance of the Infratec™ can be used to monitor the results provided by ProFoss 2. This is done automatically with the help of the latest connectivity and software technology that makes up an integral part of the solution. You will gain a clear overview for sample identification as results from both benchtop and in-line sources are seamlessly integrated for analytical performance surveillance.

DEDICATED SAMPLE INTERFACE

ProFoss™ 2 whole grain has a specially designed process interface known as the lateral transmittance probe. The probe is located directly in the production process line where it provides continuous in-line analysis data on whole grains flowing through the pipe. NIR transmittance is the optimal form of near infrared analysis for whole grain because it penetrates deep into the sample to give a highly representative spectrum of the sample for measurement of parameters such as protein and moisture. The probe is positioned flush with the wall of the transport pipe. This ensures a reliable sample interface without obstructing the flow.



The ProFoss™ 2 process interfaces can be installed in a range of production line flows such as chain conveyor or screw conveyor in pipes/transport systems or such like.

STANDARDS AND APPROVALS

ProFoss™ 2 is CE labeled and complies with the following directives:

- ATEX & IECEx rating
- Low Voltage Directive 2014/35/EU
- EMC (Electro Magnetic Compatibility) Directive 2014/30/EU
- Packaging and Packaging Waste Directive 94/62/EC
- WEEE Directive 2012/19/EU
- RoHS directive 2011/65/EU
- REACH Regulation (EC) No. 1907/2006
- IP 69

TECHNICAL SPECIFICATIONS

Measuring technology: Lateral Transmittance	
Analysis frequency	Real time: Average analysis time per result 2 - 3 seconds
Wavelength range	850 - 1050 nm
Detector	Si Diode Array
Spectral dispersion Si Diode Array detector	1.0 nm/pixel
Process line interface	Sapphire, 5 mm thick, with food grade FPPM O-ring seal Fits into standard GEA Tuchenhagen Varinline Access Units with Ø68 mm opening or with Ø50 mm opening or FOSS Stainless steel welding flange.
Product temperature	Max 150 °C (302 °F)
Product pressure	Production pressure < 30 bar (< 435 PSI). Shock pressure < 75 bar (< 1088 PSI). Warning! Varinline access units higher than DN 80 permit a maximum pressure of 10 bar (145 PSI).
Optical fiber protection:	Steel armoured (1, 3, 5 or 10 meters)

Technology	NIR technology
Software package	ISIscan NOVA™ for instrument control
Wavelength accuracy	< 0.5 nm
Wavelength precision	< 0.02 nm
Wavelength temperature stability	< 0.01 nm/ °C
Spectral noise	< 60 micro AU
Vibrations - require optical fiber fixation	0.4 Grms
Ambient operating temperature	Basic configuration -5 °C - 40 °C (23 °F - 104 °F), Cooling with a compressed air line allows use up to 65 °C (149 °F) ATEX configuration 0 °C - 50 °C (32 °F - 122 °F)
Pressurised air – cooling (Amb. Temp. 45 - 65°C)	Cooling air Flow rate minimum 5 l/min, >99.9 % water free, >99.9 % free of oil and fine particles down to 0.3 µm
Ambient humidity	< 90% RH
Dimensions (W x D x H)	wxhxd = 420 x 420 x 135 mm (16.5 x 16.5 x 5.3 inches) + brackets to hold the unit
Weight	25 kg (20 kg)
Power supply	1 phase, 100-240 VAC (max ±10 % of the rated voltage), max. 40 VA, 50 - 60 Hz
Cabinet / Housing materials	1.5 mm (lid 2.5mm) Stainless Steel EN 1.4301 (SS2333)
Mechanical environment	Process control equipment
Degree of protection	IP 69*
Approvals	ATEX & IECEEx certified (Dust explosion approved)
Hygiene	3A hygiene certified
Communication	KEPServerEX (Ethernet, Analogue Profibus/Profinet) to PLC/SCADA; FossManager™
Network	High quality, shielded LAN cable; minimum category 5e. RJ 45 (IP 67) LAN connections
Operation	Indoor use or outdoor shielded from rain and direct sunlight

* IP69 is the highest protection for dust entering the unit. IP69 means protected against the effect of high-pressure water and/or steam cleaning high temperature.

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