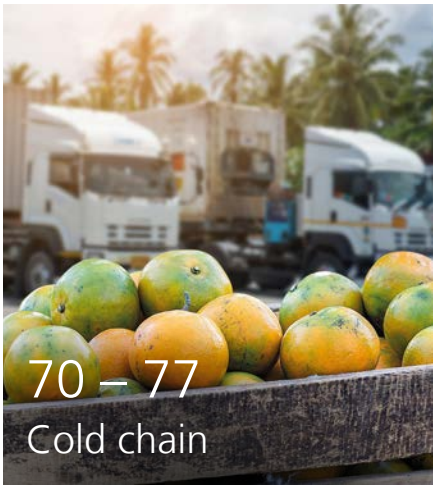
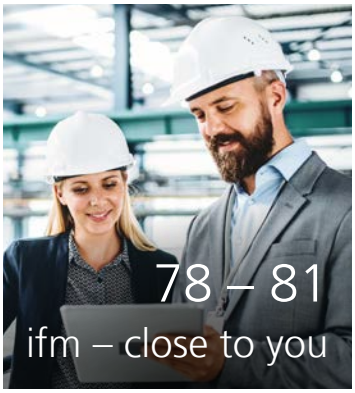
From farm to table

Automation solutions for tomorrow's food supply

ifm.com/en/food

"ifm wants to help to keep and make our world worth living in – not only in the technical sense."





Better together

We know – and care – about the challenges of food and agriculture

Farm-to-fork strategies have taken centre stage in the food industry, emphasising the importance of ethical, healthy and sustainable value chains. To maintain profitability while meeting the challenges, producers are under pressure to improve productivity across various fronts. This includes enhancing food production, ensuring animal welfare, preserving a sustainable environment and reducing energy usage and water waste. To address these pressing issues, the industry requires solutions that bring vital improvements in the following areas:

Sustainability: Sustainability in food production encompasses a holistic approach to harmonising from the field to production and distribution while mitigating environmental impact and promoting long-term well-being. It involves meticulously managing resources and processes to achieve energy efficiency, resource optimisation, waste reduction, innovative production techniques and continuous improvement.

Performance: Efficiency in food production is a strategic and systematic approach that aims to optimise processes, resource use and overall operational efficiency to achieve higher productivity, reduce costs and improve product quality.

PRODUCING

INPUT EQUIPMENT

Preparing:
Seed collection and preparation, packing, fertilisation
Growing / rearing:
Soil preparation, planting, livestock feeding / cleaning

PRODUCTION MACHINERY

Harvesting:
Collecting, separating, sorting, sifting, filtering
Priming:
Washing / cleaning, milling, grinding, soaking

PROCESSING

PROCESSING EQUIPMENT

Preparing (industrial):
Processing, grading, sorting, heating, milling

STORAGE EQUIPMENT

Transporting:
Conveying, lifting, distributing
Warehousing:
Packing / compacting, chilling / freezing

Through better efficiency, food manufacturers can gain a competitive advantage, reduce environmental impact and contribute to a more sustainable and resilient industry.

Food safety: Food safety in food processing means that automated systems, technologies and processes used in food production maintain and even improve the safety and quality of the final products. The sensors used in the process can self-monitor their status to ensure accuracy and reliability in meeting food safety standards. Holistic digitalisation solutions can improve traceability by accurately recording and tracking the flow of ingredients and products.

For over half a century, from the mobile machine to the industrial production plant, ifm has offered the right solution for every step and stage of an automated and digitalised value chain. Sensors in mobile machines and stationary manufacturing plants for production, processing, packaging and cold-chain management provide relevant values and data that ensure efficient and safe processes. Data passes through a reliable infrastructure to the IT systems, where our software solutions convert them into actionable insights. Maintenance requirements and process deviations can be recognised at an early stage, thus enabling an appropriate and planned response and significantly reducing the risk of productivity and quality losses.

PACKAGING

PACKAGING EQUIPMENT
Filling, cartoning / wrapping,
case packing, palletising

COLD CHAIN

COOLING EQUIPMENT
Cold storage:
Warehousing, freezing

ifm.com/en/food

The ifm group of companies
Automation with passion

For more than 50 years, ifm has been developing innovative and reliable automation technology for almost every industry. Today, sensors, data infrastructures and software are installed in a wide variety of machines and systems in almost every country in the world. Outside hygienically sensitive areas, our products are easily recognisable by their orange colour. However, even where stainless steel and grey plastic predominate for good reasons, automation technology made by ifm is still clearly recognisable: in the products' outstanding quality and durability.

An immovable piece of corporate philosophy

Quality, durability, sustainability. Things that are discussed more than ever today were already laid down by the founding fathers of ifm as an unalterable corporate philosophy in 1990. Among other things, it says, 'ifm wants to help to keep and make our world worth living in - not only in the technical sense.'

There is always room for improvement

The logical consequence is to set ourselves the goal of climate-neutral production by 2030 at the latest. We also have the motivation to always strive for the best possible technical solution while minimising the use of resources. This is why we always set ourselves the highest standards from development to production. We make daily tests, improvements and optimisations with the aim of giving our customers the best answers to their challenges at all times. We want to develop automation technology and digitalisation solutions that support you in producing efficiently while conserving resources - permanently and reliably - in other words, sustainably. This work is our passion.

9,550
employees worldwide

1,210
active patents

1,530
employees in research and development

150
in more than
150 countries

23 million
products produced in 2022

29
logistics centres
worldwide

A little more optimism? Here we are.

A constantly positive mindset is firmly anchored in our DNA - and requires us to stay active.

'ifm intends to be an optimistic enterprise. Optimism demands action, pessimism is an easy excuse for being idle.' This is a sentence from our philosophy. Can there be a clearer mandate not to simply accept the given situation, but to actively work towards a more positive development? Water shortages, food shortages, species extinction, global warming and shortage of skilled workers: mega topics like these and the associated consequences can quickly make any of us resign. Because we cannot face challenges like these all by ourselves. Together, however, we can always change things for the better.

Accompanying the pioneers of all industries

And it is often the case that once someone has taken the first step, many will follow and do the same. Pioneers by example are needed more than ever in these times to save the earth from total depletion. As specialists in automation and digitalisation, we are ready to support pioneers in every industry every step of the way. Today, our products help to reduce energy consumption, use water more efficiently, minimise production waste and ensure product quality in many regions of the world.

Step by step towards the goal

However, we also want and need to be pioneers ourselves. We want to use resources of all kinds as efficiently as possible, too, to minimise our ecological footprint as much as possible. This includes the use of green electricity and the construction of green factory buildings. In May 2023, we opened the world's first factory in Romania to be certified according to the gold standard of the German Sustainable Building Council (DGNB e.V.). Thanks to this, another important building block on our path towards climate-neutral production 2030 has become reality.

Until then, many more challenges lie ahead of us. However, we remain optimistic and are sure we will reach our goal. Our DNA would not allow for anything else.

Roadmap 2030
Sustainable Development Goals for orientation

A perfect frame

The global sustainability goals developed by the United Nations as part of the 2030 Agenda, also known as the Sustainable Development Goals (SDGs), provide valuable guidance for our goal of being climate-neutral in our operations by 2030 at the latest. Furthermore, they help us to develop ifm in a holistic - economically, ecologically and socially - sustainable way.

Therefore, as a company, we can directly influence and make an impact on some of the 17 key objectives. In addition, the framework set by the United Nations also helps us to clearly identify the relevant fields of action of our clients and to support them in achieving their own goals with correspondingly tailored solutions.

Andreas Thürer, ifm's sustainability manager, has his sights firmly set on the transformation to an operationally climate-neutral company. As Central Managing Director for Technology, he also ensures that, in the future, more and more ifm products will be able to be evaluated with regard to their ecological footprint.

Learn more about ifm and sustainability at ifm.com

The 'green factory' in Sibiu (Romania)
In future, ifm will combine development, production and sales on an area of 13,000 square metres. The building has been gold-certified by the German Sustainable Building Council (DGNB). In addition to economic and ecological sustainability, the initiative also evaluates the building's subsequent use. For this purpose, ifm generates the electricity for the Green Factory through photovoltaic modules and uses heat pumps to produce the required heat. In addition, materials and technologies of the latest generation were used to create a durable building. The factory in Sibiu is a role model: ifm strives to implement all future buildings according to the high DGNB standards.

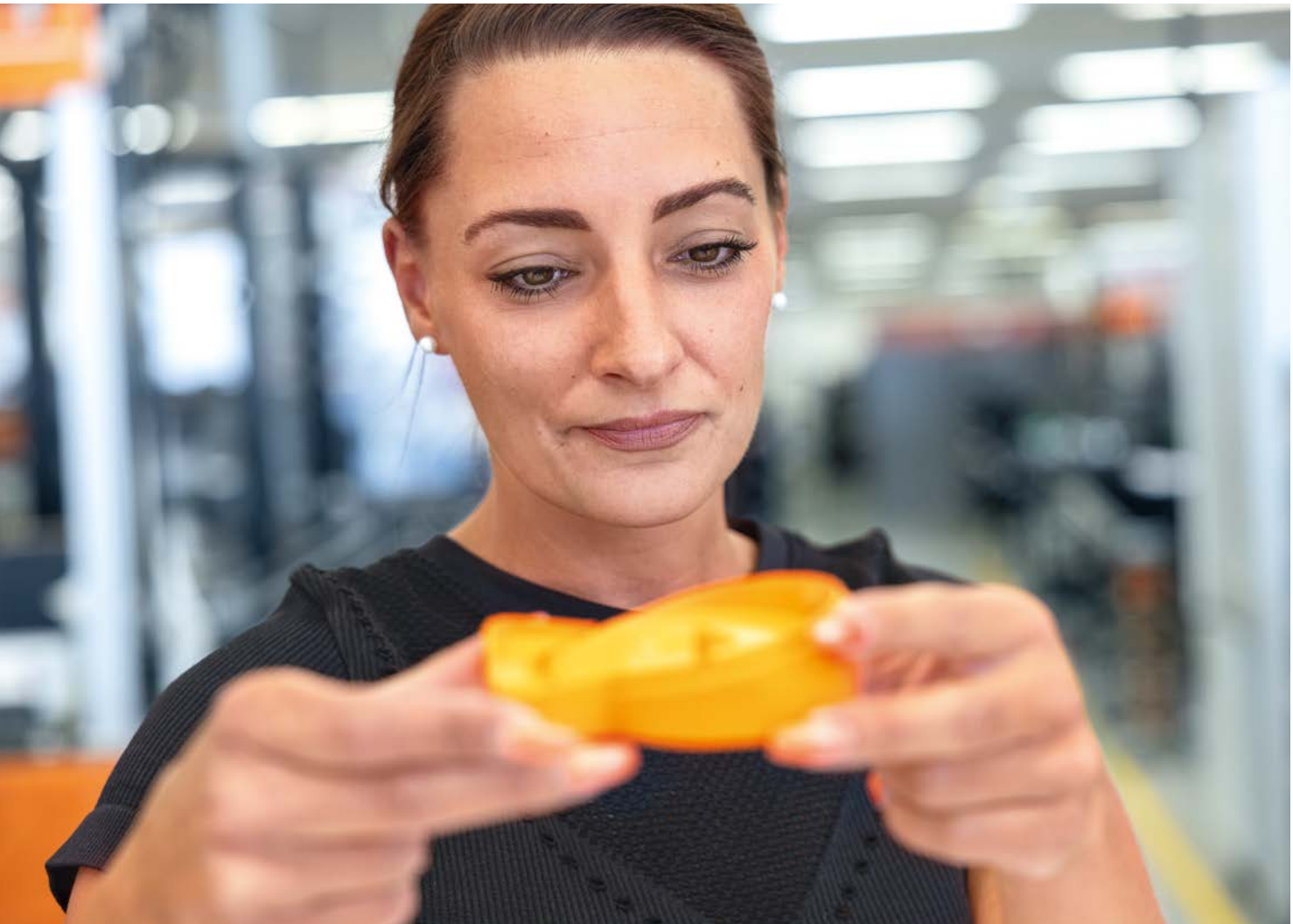
Surpassing the standards

To ensure lasting reliability, our sensors are subjected to rigorous preliminary testing

"High product quality and accurate technical data are unimpeachable values of ifm." All employees put this guiding principle from ifm's corporate philosophy passionately into practice. It manifests itself in the 5-year warranty we offer on all products ifm produces. Does this sound reassuring? Indeed. We are aware of our superior quality assurance that ensures that every product will work the way it should in the long term. Quality management according to ISO 9001? For us, it is a good starting point for our own standards, quality criteria and inspection processes.

To achieve satisfactory end results, it is crucial to comply with these criteria, processes and requirements continuously from beginning to end. It starts with purchasing, continues with incoming goods inspections, long-term stress tests prior to series production, spot checks in the manufacturing process and ends with the final inspection. Our customers' feedback is constantly being incorporated into the quality assessment and continuous improvement.

You cannot create and assure quality half-heartedly. In addition to the best possible production equipment and a state-of-the-art test laboratory, the human factor also plays a decisive role: Our experience, regular exchange and many years of expertise ensure that every single product you buy from ifm will also convince you. From day one. For the entire life of the sensor.

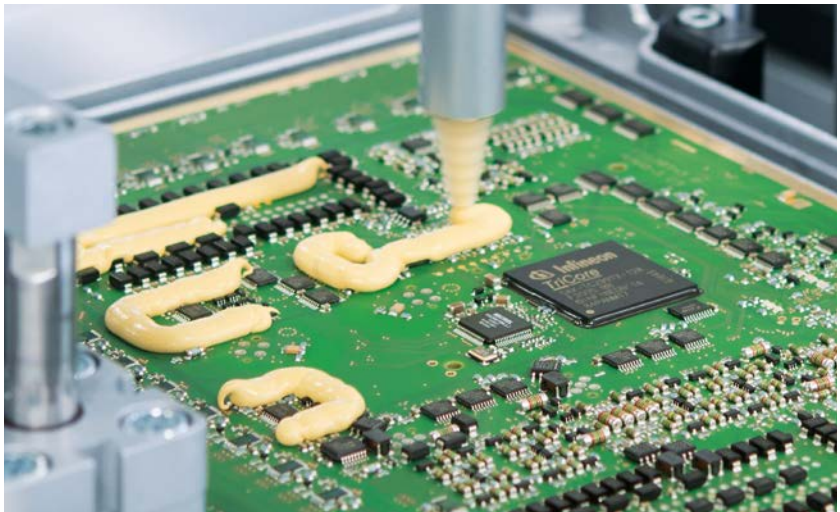


The 1000-hour test
How ifm ensures lasting product quality

What would the world be like without standards? Less comparable, less reliable, less accurate. That's right. But, what if you want to be more than comparable, reliable and accurate? Well, in that case, you will set your own bar quite a bit higher than required by general specifications, and, thus, create a sensor that will deliver peak performances in every conceivable and sometimes even inconceivable application. Permanently.

How we prepare our sensors for this? We begin with an intense stress test. Every newly developed sensor must first survive 1000 hours without any damage in a rollercoaster of temperatures before it even receives the seal of approval for series production. During production, it will be subjected repeatedly to performance tests under regular and extreme conditions. We will test its resistance both inline and randomly, but also more excessively, with special machines. This is how we continuously ensure that our products will successfully fulfil the requirements we impose on them and convince you of their superior properties.

5 YEARS
Warranty
on **ifm products**



Back to normal

ifm's calibration service ensures reliable processes and product quality

One bar is one bar, eleven degrees are eleven degrees and four-point-three litres are four-point-three litres. How nice it would be if it were always that simple. If process sensors measured as accurately and precisely throughout their lives as they did on their first day. But they don't. Over time, they become inaccurate and drift due to the constant stress. The extent to which they do so is determined and documented in the course of calibration. This deviation can then be taken into account in the control system (as long as it is still within the tolerance range), so that the temperature, pressure, flow etc. are correctly maintained until the end of the process and the quality of the product is assured.

True, precise, accurate

What exactly happens during such a calibration? Well, it is determined how true, precisely and accurately a sensor actually still fulfils its original task - measuring. True? Precise? Accurate? Isn't that the same thing? In this case: no. We can explain this in detail if you are interested in the differences between these terms. Or you can take a look at our website. There we have presented the three criteria in a comprehensible way.

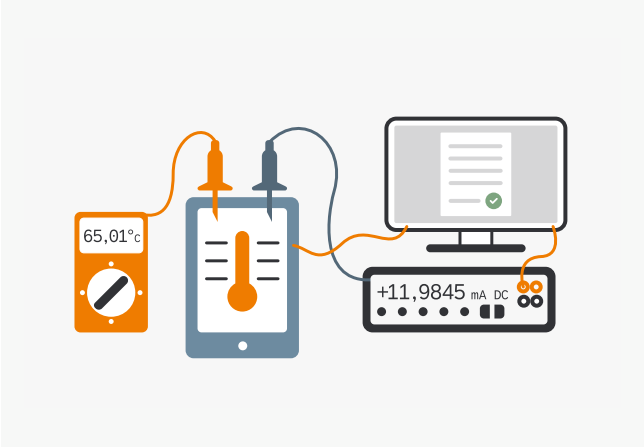
Accredited competence for traceable calibration

Why do we focus so much on these three criteria? Because that is our service for you. In other words: because we calibrate your ifm sensors for you and examine the measuring precision, the measuring trueness and the measuring accuracy very closely. Namely for pressure, temperature, flow and analysis sensors. And, as an accredited laboratory, traceable to the highest standard size in the hierarchy. In Germany, for example, these are guarded by the Physikalisch Technische Bundesanstalt (highest-ranking national authority for metrology). Professional knowledge in passing: the standard sizes are internationally valid and are still being further refined today. (If you are interested, just search the net for the Avogadro project or the Boltzmann constant.)

Out of tolerance? Minimal loss of time!

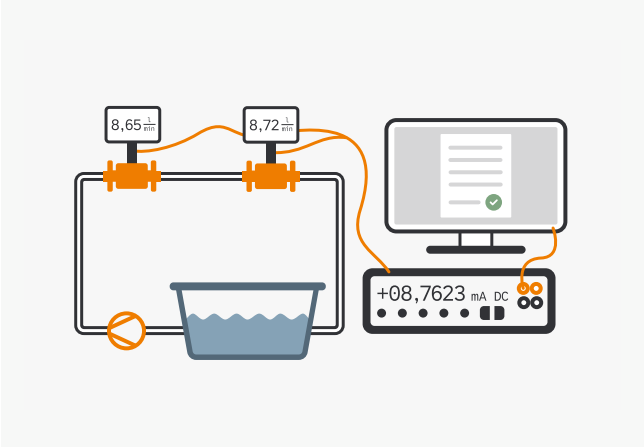
But before we go into further raptures and revelry about standard sizes, let's get back to our offer to you. Whenever you want to calibrate your ifm process sensor: contact us. We have the precise equipment required to accurately calibrate your sensors. Incidentally, we offer a free factory certificate for many of our process sensors even before initial delivery, which shows whether the sensors work within their specified accuracy. So you can use them in your process with peace of mind. What's more, we know our sensors and have a replacement device ready should your sensor fail the recalibration. In such a case, the downtime for you is reduced to a minimum.

Sounds good? We think so, too. That is why we are so pleased to offer you this service.



Liquid bath temperature calibration

Calibration of pressure gauges by using pressure compensators

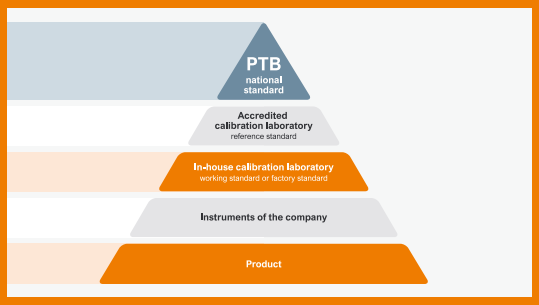


Calibration of water flow sensors

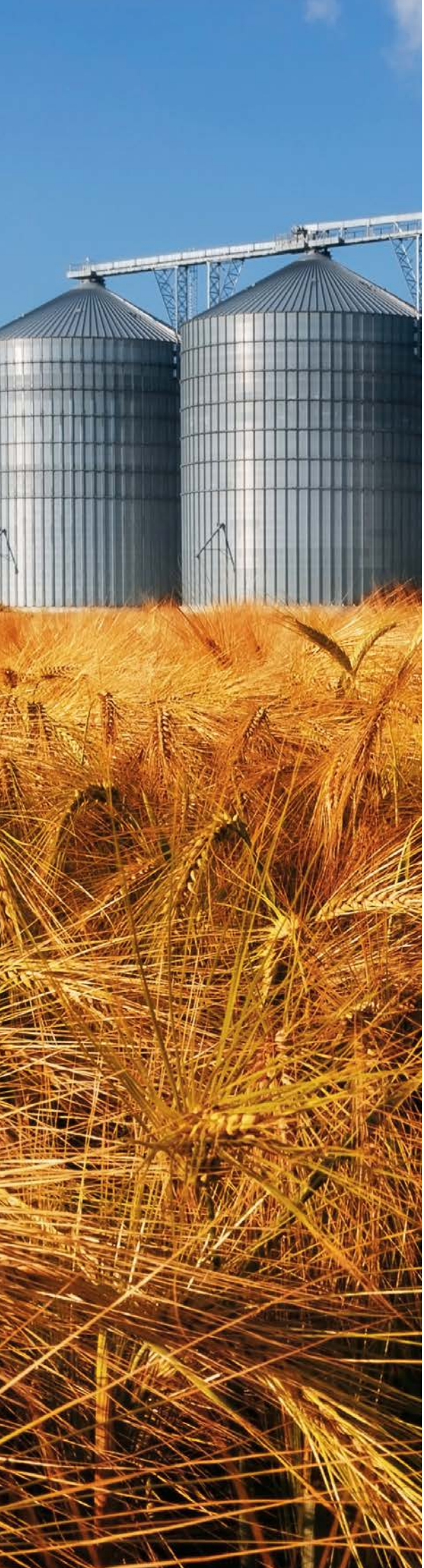
What does "calibration" mean anyway?
Calibration is the act of determining and documenting, in a traceable manner, the deviations between a measuring instrument called device under test (DUT) and a reference device called reference standard.

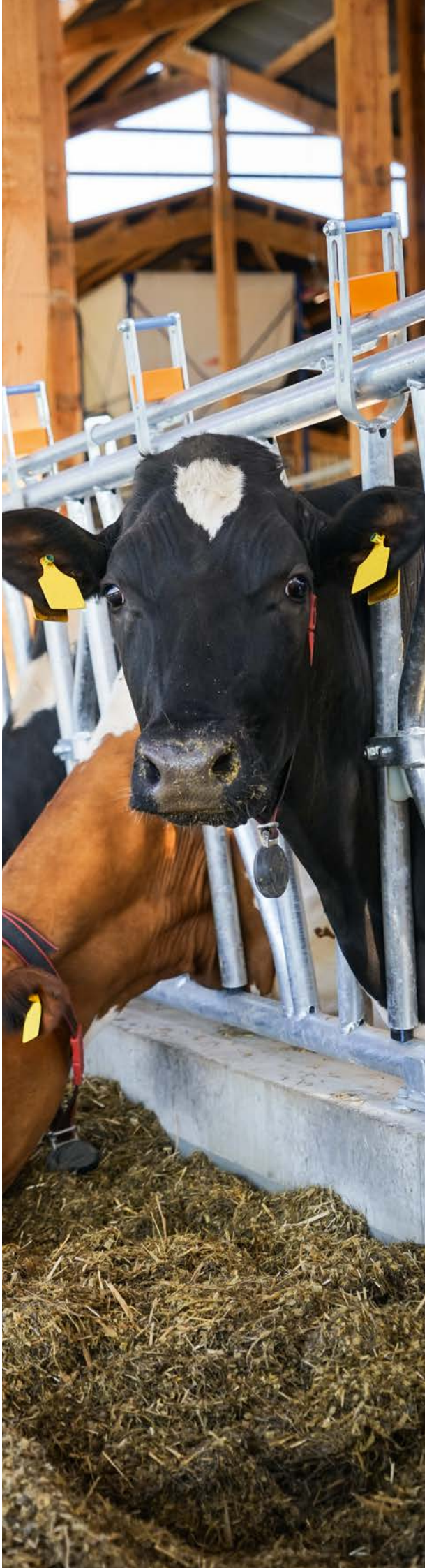
The result of this comparison shows the measuring deviations at different measurement points and can be provided in absolute or relative form. The regular calibration of measurement instruments ensures the precision and reproducibility of the measurement data. The reference measurement is made with a reference device.

Traceability refers to the uninterrupted chain of comparative measurements related to the measuring results of a measuring instrument and the specific, higher-ranking national standard.



Learn more about the calibration service at ifm.com





Producing

For sustainable growth, efficient production and animal welfare

Freshwater is a valuable resource with limited availability. Irrigation of fields and greenhouses still accounts for around 70 percent of water demand. Vertical agriculture and onshore aquacultures achieve water savings greater than 90 percent and allow for efficient distribution and conservation for greater sustainability. Producers are under pressure to improve productivity while maintaining animal welfare, sustainability and profitability. ifm solutions are suitable for outdoor and indoor farming, livestock, aquaculture and the production of alternative proteins. They also include solutions for the production and storage of raw materials. For a water-saving, productive and sustainable future, put your trust in intelligent agriculture with digital solutions from ifm.

Urban Crop Solutions
End-to-end solutions for vertical indoor farming

"We see ourselves as an end-to-end solution provider for vertical indoor farming", says **Maarten Vandecruys**, founder and CTO of Urban Crop Solutions.

What this means in detail is that Urban Crop Solutions offers not only the technical hardware and software for optimised growing of plants, it also identifies in its own research centre each of the parameters that affect the growth of plants: temperature, light conditions, watering and fertilization. For optimum plant growth, the individual requirements must be determined and met exactly.

How to (partially) feed 8 billion people.
Urban Crop Solutions and PLNT are cutting supply chains with indoor farming.

On 15 November 2022 the time had come:
The world population has officially passed the 8-billion mark and the trend is rising. Feeding humanity is a constantly growing challenge.
Also, a challenge that innovative companies are increasingly taking on. Urban Crop Solutions with headquarters in Waregem, Belgium, is one of them.

Only five per cent of conventional water consumption

If this is the case, indoor farming can be carried out extremely efficiently.
"Plants can be grown with water consumption equivalent to five percent of the water consumed when growing plants conventionally. Plants can also be produced close to the end consumer, thereby further reducing stress on the environment. Finally, indoor farming can also be done without using pesticides, which increases the nutritional value of the product considerably", says **Vandecruys**.

Indoor farming - scalable in three dimensions

With the "ModuleX", Urban Crop Solutions offers the technical hardware required for efficient indoor farming.
"The ModuleX is the current development level of our vertical indoor farming solution", says **Vandecruys**.

The basic principle: The plants are moved around in transport benches on two levels by a carousel system under LED lighting and a watering system. A total of 64 of these benches provide space for plants with a growth height of up to 26 centimetres. The conceptual design can be scaled in all three dimensions depending on the need.

"Each unit remains a self-enclosed system by itself", adds the founder of Urban Crop Solutions. *"The advantage of this is that in the event of an infestation, for example, only one unit has to be treated. The rest of the plants would not be affected, and the loss of harvestable plants would thus be greatly reduced."*

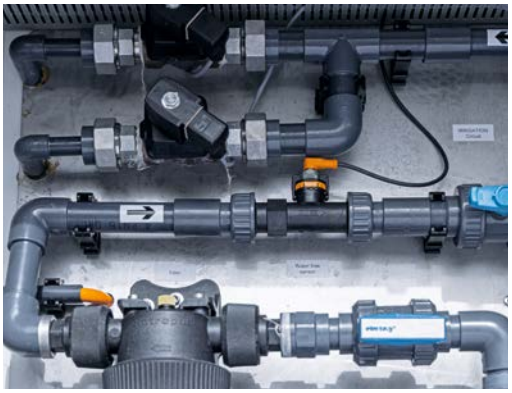
High quality herbs and salads for Antwerp

One company that is successfully implementing the conceptual design of Urban Crop Solutions in a practical application is PLNT. The team working with co-founder Hans Snijder supplies local consumers with fresh salads and herbs from its location on the Antwerp harbour.

"Our commitment is to produce and transport our products with the highest quality and maximum sustainability", explains **Snijder**.

The customers: Antwerp households and restaurants that share exactly the same values. While private customers can receive deliveries of fresh salads with alternating varieties on a subscription plan, PLNT also produces for restaurants, catering to individual needs. Plants are usually selected and grown in close consultation with the restaurant's head chef. Altogether PLNT grows about 35 different types of plants in the ModuleX for its subscribers.

Researchers at Urban Crop Solutions identify the optimum parameters for efficient plant growth.



Fill level, temperature, and flow rate – three factors that determine the quality of the plants – are monitored by ifm sensors.

We made a very conscious decision in choosing ifm as our partner for the sensor system. The sensors have proven themselves in intensive tests and as of today we have never experienced a failure.

Only what is actually in demand is produced

"Besides quality, quantity is also crucial for us. Of course, our zero-waste philosophy also includes our yield. We produce only the amount we know will cover the existing demand and not exceed it."
PLNT currently has one ModuleX in operation.

"Several factors drove our decision to choose the solution from Urban Crop Solutions", explains **Snijder**. *"First, the vertical scalability for us right here in Antwerp, where space is very rare and thus expensive, is an advantage for us. Second, we were impressed by the easy handling and high quality of the solution."*

Added value through quality down to fine details

To develop the ModuleX to the confirmed quality level, Urban Crop Solutions also chooses individual components with maximum quality and reliability, as confirmed by Project Manager **Pieter-Jan Devos**. *"Every single component is selected by ourselves in order to offer our customers the maximum added value with our overall solution."*

This also applies to the sensor technology, the quality of which has a direct impact on the quality of the plants – and thus also on the operator's yield and the profitability of indoor farming.

Process quality ensured by sensor system

A total of five critical points are monitored by the sensor system to guarantee efficient and reliable operation of the system for vertical indoor farming. An inductive sensor determines whether the door of the ModuleX is opened or closed.

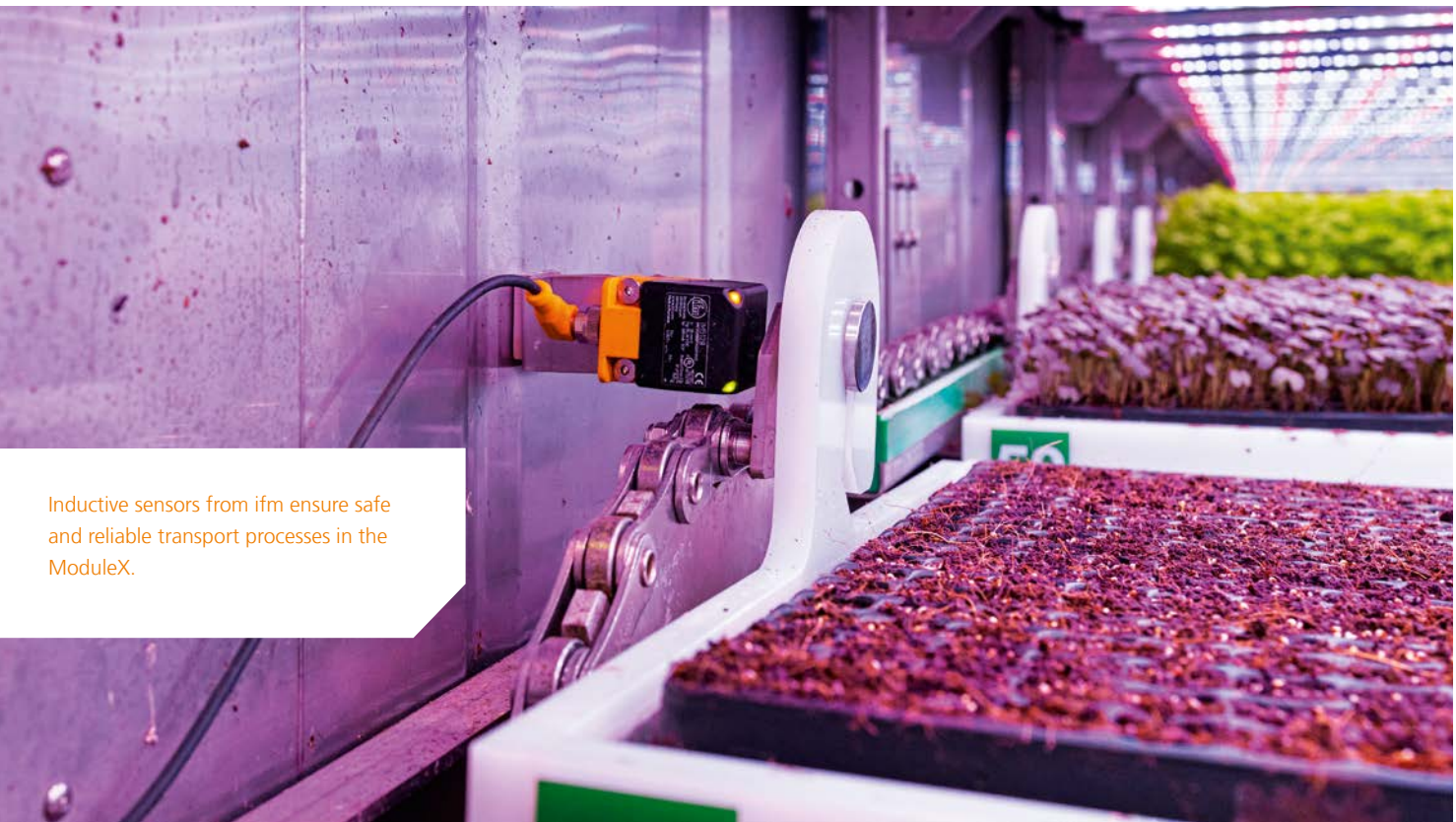
"Of course, the automatic program should not be running as long as the door is open, for example, to harvest plants or place new seedlings in the benches", says **Devos**.

The position of the benches themselves is monitored by the sensor system.

"If a bench is no longer correctly in place in the transport system, the plants and the entire system could be damaged, so it is important to make certain that the carousel is functioning flawlessly."

Factors that determine plant quality: Quantity and temperature of the water

A flow meter measures the flow of water to ensure selective watering of the plants.
"In this manner we can also determine whether the pump is functioning as required or whether maintenance is necessary", explains **Devos**.



Inductive sensors from ifm ensure safe and reliable transport processes in the ModuleX.

Since the water temperature also affects growth and quality, it is continuously monitored by a temperature sensor. A level sensor also measures the water level in the tank.

"We recycle the water to minimize consumption. But of course, we still need to make sure there is enough water available at all times to prevent the plants from drying out."

Conscious decision for ifm

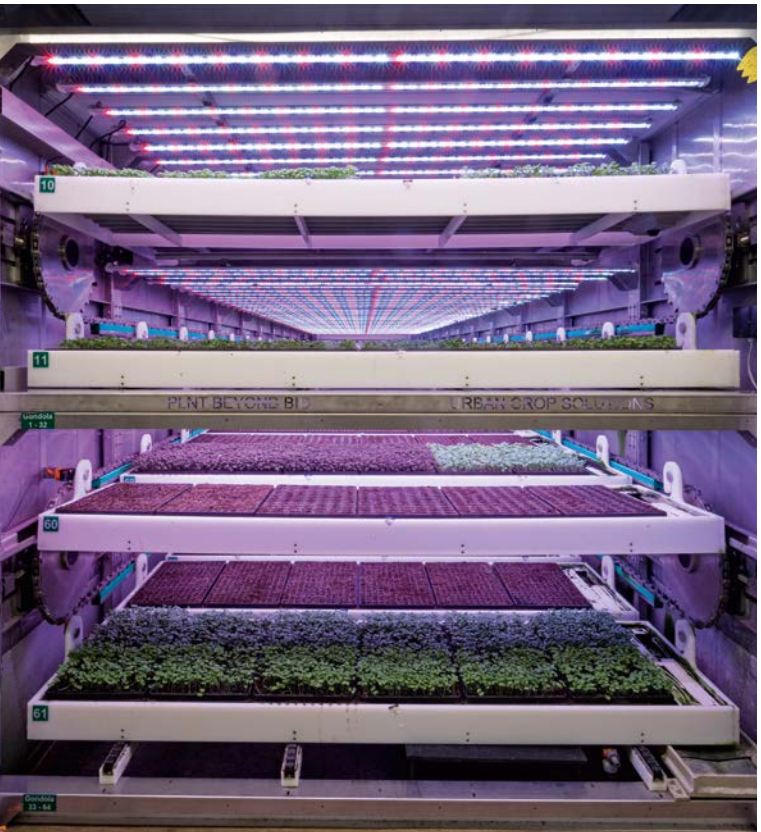
"We made a very conscious decision in choosing ifm as our partner for the sensor system. The sensors have proven themselves in intensive tests and as of today we have never experienced a failure. But if we ever should be in the position of needing to replace a sensor in a customer's system, we know we will receive replacement parts very quickly. And that's not just here in Belgium, but everywhere in the world. We were impressed by this outstanding service in addition to the product quality."

Is vertical farming the future of the agricultural sector?

The product quality of plants grown in indoor farming is right – this is demonstrated by the popularity of PLNT's offer. The company wants to expand and make the locally produced quality goods available in other urban centres as well.

Hans Snijder gives his estimate of the situation: *"Indoor farming in general is just getting started. We see ourselves as pioneers – a role that suits us well. And even if the technology continues to improve, I don't think indoor farming will replace traditional agriculture any time soon. It's not efficient enough for that yet. And at least at our latitudes, the climate is still good enough to ensure successful crops and meet the basic demand using conventional methods."*

Maarten Vandecruys sees it the same way: *"On the one hand, indoor farming will be a key element when it comes to shortening supply chains and producing healthy, nutritious food locally and thus independently of global trends. At the same time, we will also continue to need the traditional agricultural sector to cover the rising demand for food. Indoor farming can play a role here in growing seedlings, which can then be planted in the field. To ensure that plants provide a good yield even under increasingly stressful climatic conditions, we at Urban Crop Solutions are incorporating our know-how in research and development of more robust plant types for outdoor farming."*



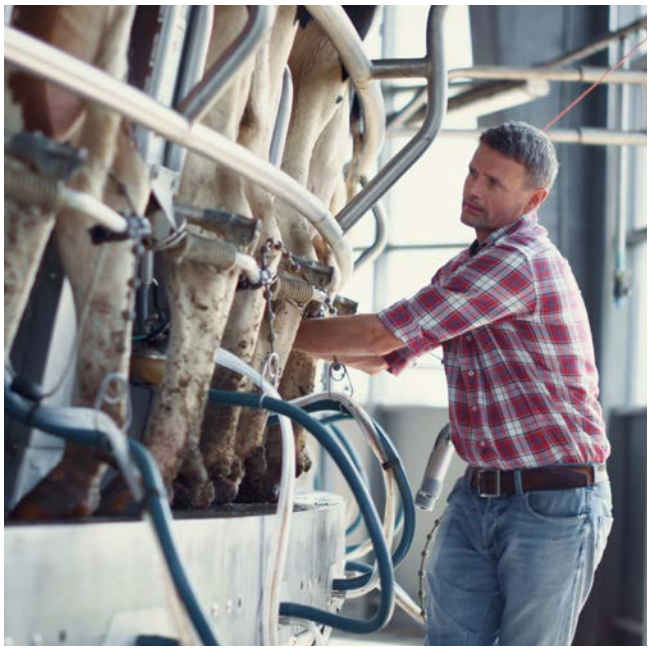
Indoor farming, scalable in three dimensions: made possible by the ModuleX of Urban Crop Solutions.

Conclusion

With reliability and quality, ifm sensors contribute to efficient, economical indoor farming solutions. They show their strengths in sustainable local supply, but in the future, they could also take on an important role in growing seedlings for traditional outdoor farming – and thus also in ensuring nutrition for the global population.

Ensuring optimal milk quantity and quality

3D sensor allows precise and smooth control of automatic milking system



"In addition to productivity, the well-being of the animals is of major importance."

Our customer

An international OEM and plant constructor for the food industry who also produces automatic milking systems. They allow cows to be milked without human interference. This system is being used on many farms worldwide. Traditional businesses that have been in existence for over 100 years are also among the customers.

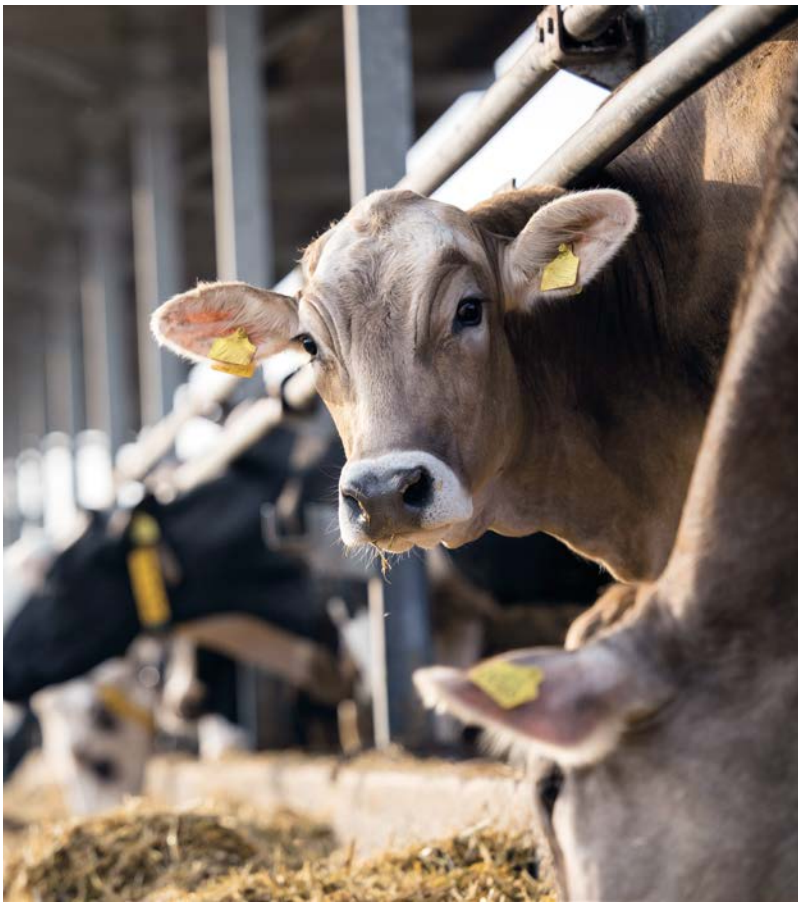
The challenge

The times when farmers would sit on a stool to milk the cows are definitely over. The milk quantity and quality are not only influenced by stress-free milking, but also by timing. If the milking process is not completed promptly, contamination can occur due to inflammation. Therefore, modern dairy farms are highly automatised and nothing is left to chance. However, in addition to productivity, the well-being of the animals is of major importance. Automatic milking systems that serve the herd have to ensure both. What is more, their application in dark, humid and hot or cold places is an additional challenge.

The solution

A sophisticated milking system using modern 3D sensor technology from ifm ensures an animal-friendly milking process. We all know that only happy cows provide the best milk. Observers will not fail to notice that the cows in the barn voluntarily go to the milking station. A radio chip will identify the cow, and the arm of the milking robot will move from the side under the cow toward the udder.The most important element of this milking arm is the "electronic eye", ifm's 3D camera. It is mounted to the milking arm and detects the "scene" under the cow in the fraction of a second, i.e. the exact position of the teats. The four milking cups can be positioned accurately, one after the other, from below onto the four teats. The more precise and gentler this process is, the less stressful it is for the cow. And this has a direct effect on the quantity and the quality of the milk. Before the milking cups are applied, the teats will be cleaned with a disinfecting spray. Here as well, the 3D camera of the controller provides an accurate 3D image with all spatial information to ensure that the cleaning nozzles will

approach the teats with precision. The compact 3D camera detects scenes and objects in their spatial dimensions at a glance and provides them as a 3D image. The operating principle, the time-of-flight measurement (ToF), can be compared to that of a laser scanner. However, instead of only one receiving element, the PMD camera has 23,232 receiving elements that are positioned like a matrix on the chip. Four high powered LEDs illuminate the entire field of view of the O3D over a range of 0.3m to 5m. What is particularly special about the PMD technology: The measurement will work irrespective of the colour and type of the surface. Even ambient light sources, reflective or wet surfaces or very dark objects are no problem.



O3D: 3D sensor

- Reliable function due to time-of-flight measurement
- Illumination, measurement and evaluation in one device
- Up to 23,232 distance values per measurement for the detailed assessment of the application
- Two switching outputs, one of them programmable as analogue output
- Aluminium or stainless steel housing

Use of 3D sensors in the milking robot

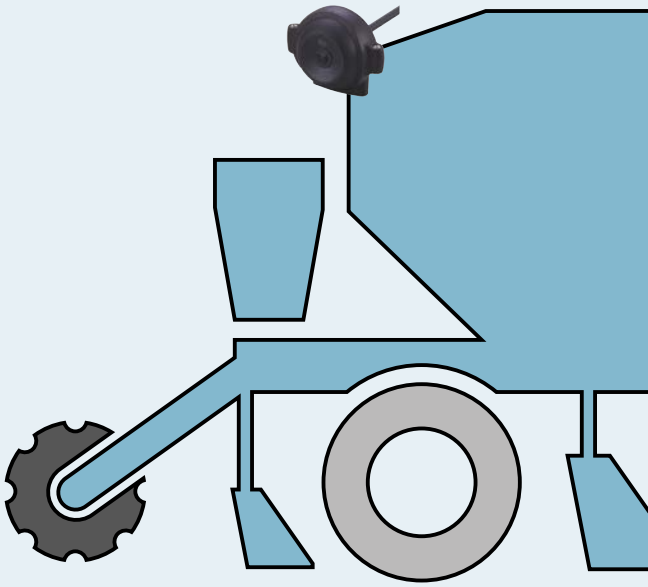
O2M: analogue camera

- analogue video output for rear area monitoring
- encapsulated, weather-proof aluminium housing
- high shock and vibration resistance
- temperature-controlled lens heating
- EC type-approval E4

CR31: mobile IoT CAN gateway

- global data transmission via 4G / LTE mobile network
- detected position data is transferred to the cloud
- secure TLS end-to-end communication
- secure buffering of data even with unstable radio connections
- connection to the machine controller via CAN interface

Learn more about ecomatmobile at ifm.com



CR1: ecomatDisplay

- with modern 64-bit architecture
- RGB backlit function keys with tactile feedback.
- high-performance USB interface for data logging, support for Ethernet cameras
- powerful CAN and Ethernet interfaces for various communication tasks
- programmable to IEC 61131-3 with CODESYS 3.5.

CR20: ioControl

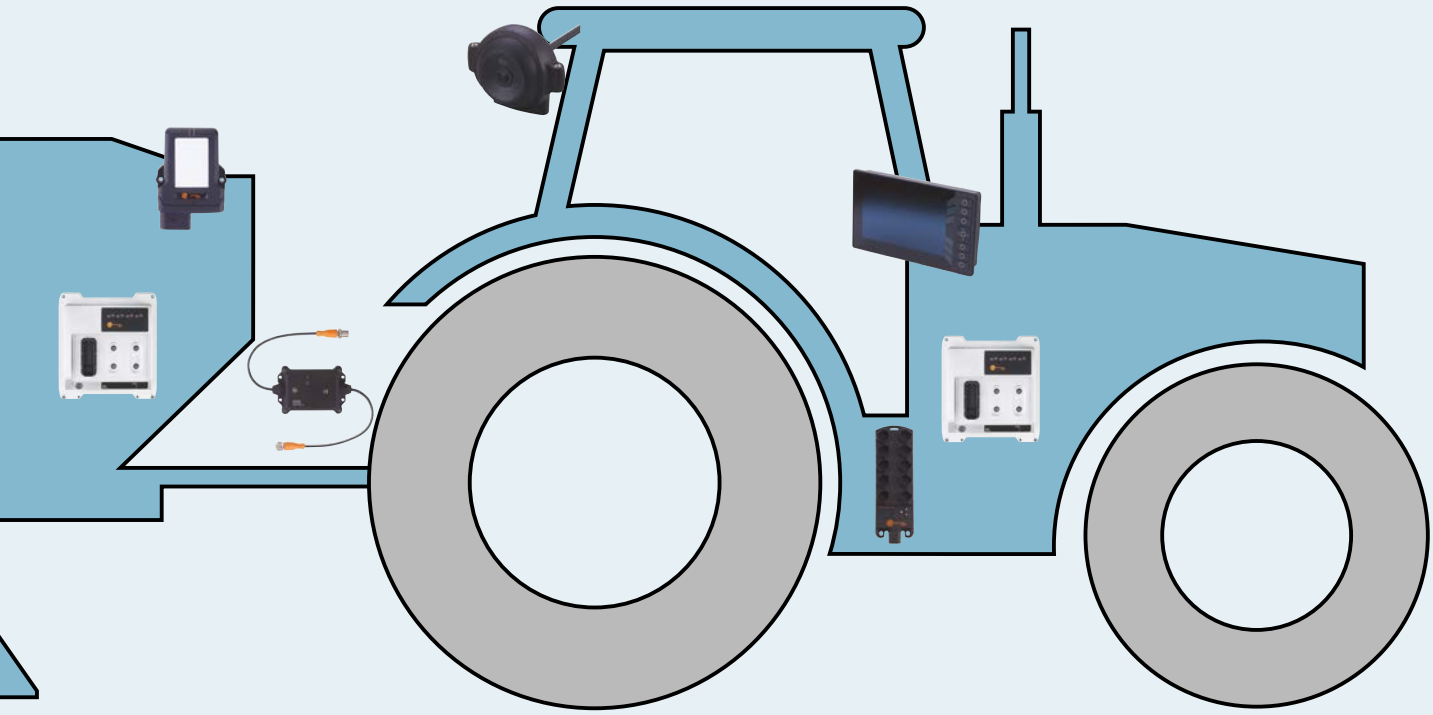
- decentralised connection of sensors and actuators
- with many configurable multifunctional input and output channels
- high-performance CAN interface for various communication tasks
- programmable to IEC 61131-3 with CODESYS
- high protection rating for the requirements of mobile machines

Always the first choice. Robust, flexible, reliable.
ecomatmobile: systems for mobile machines

On the field, mobile machines are exposed to extreme operating conditions and external influences. The ecomatmobile products, such as robust controllers, HMIs, I/O modules, mobile IoT and sensors for mobile machines, were developed for these requirements.

The mechanical design of controllers and modules is especially rated for permanent shock and vibration.

ifm's ecomatmobile components and sensors for mobile applications guarantee reliable economical and ecological operation. This allows efficient and accurate process control and optimum dosage of seeds or fertilisers.



CR312: ISOBUS Gateway:
- reliable communication between add-on unit and tractor unit
- pre-loaded ISOBUS object pool for display on the universal terminal (UT)
- simple configuration via CODESYS using ISOBUS libraries
- fast and easy installation without additional licence costs
- certified by the AEF (Agriculture Industry Electronics Foundation)

CR7: ecomatController
- powerful 32-bit triple-core controller with large application memory
- certified as safety controller (SIL/PL d) with CANopen Safety support.
- scalable inputs and outputs for standard and safety applications
- powerful CAN and Ethernet interfaces for various communication tasks
- programmable to IEC 61131-3 with CODESYS 3.5

Non-contact multi-tools
Let's talk about the development of position sensors

Bernd Bruckmann, General Manager – Product Management – Inductive position sensors

"With position sensors, it's as follows: you fit them and forget them."

ifm's success story began more than 50 years ago with the inductive proximity switch. Over the past decades, however, not only the company itself has achieved a remarkable transformation. Today, the capacity of non-contact position detection is also much higher in comparison to the original switch.

Bernd Bruckmann, these days it's hard to imagine automation without inductive sensors. What was the original idea behind their development?
"The purpose was to offer customers in industrial production a permanently reliable alternative to mechanical switches. The latter have a shorter service life if the working environment is not kept permanently clean and dirt accumulates also on the moving parts, gradually making them immobile. Moreover, the relay contact no longer switches correctly after a certain number of switching operations, leading to malfunctions or process stoppages. Contamination and wear have therefore been the main obstacles to automation in these types of application."

Which have already been overcome with the first inductive sensor. But that's not the end of the story ...
"That's right. Of course, that was just the beginning. If you look at our position sensor portfolio today, you will notice that inductive sensors come in a wide variety of designs and sizes and are made of various materials. The wide range reflects the individual requirements of our customers who need position sensors for every type of application, whether in heavy industry, environments with high hygienic requirements, stationary or mobile systems.

The basic principle of the position sensor still has remained the same to this day: the target object is detected without contact. Yet technical developments have had an impact on the sensing ranges that can be covered and on the accuracy required: objects can now be detected in the range of less than a millimetre and into the centimetre range."

The result is a wide variety of sensors with different characteristics. Couldn't you facilitate the choice for customers by offering sensors with larger detection ranges, for example?
"At first glance, the choice seems to be endless, but of course each sensor has its own merits. By looking closely at the own application, environment and purpose, you quickly get a very clear picture of the options available. Switching frequency, sensing range, installation situation, contact with the medium; these and many other aspects have to be taken into account in order to achieve the right result in the end: reliable object detection. With position sensors, it's as follows: you fit them and forget them."

What does this mean?
"While a sensor with a long sensing range is perfect at detecting large objects at a distance, it may be deficient at detecting smaller targets at close range, for example. In this case, a sensor with different characteristics is required to suit the application. This is what we work on every day. We test at the customers' and with them which sensors work best in specific applications. If we do not find a satisfactory solution in our range, we develop it – and add a new product family to our portfolio."

So much for the original task of the position sensors. Looking at ifm's portfolio, it becomes clear that the sensors are now more than mere non-contact switches.
"I would say they can be more than a switch if the application requires it or the customer wants it. We still have classic sensors that function purely as switches in our range. But there are also versions that are equipped with IO-Link. These still fulfil the task of detecting objects and outputting switching signals to the control system. However, they also provide further information to the IT level, such as ambient temperature, operating hours, switching cycles and the absolute distance to the object. Position sensors have evolved into non-contact multi-tools."

What is the added value of this extra information?
"All this data provides a good picture of the condition of the machine and of the process quality. Switching cycles and operating hours offer an insight into the general running and working time of the machine. An excessively changing ambient temperature can be indicative of increased friction or insufficient cooling – both of which could lead to a plant standstill. Changes in the absolute distance to the object could point to unplanned changes in process sequences. In either case, the plant operator can react quickly to maintain plant availability and process quality. In consequence, and with just a few simple steps, the latest generation of position sensors makes it possible to get started with digitalisation in confined spaces."

Inductive M8 sensors in a carrot peeling machine

Distribution plate in a dairy

Seed shaft monitoring with an inductive sensor



Processing

Ensuring food safety is paramount in food production

Producing safe, high-quality products calls for equally safe, high-quality production processes. IO-Link enables the seamless transfer of process data and plant information. This creates reliability in the process and in maintenance planning and minimises unplanned downtimes. With a comprehensive range of components, from sensors to software, we offer holistic solutions for continuous monitoring of critical production values. This ensures that your food products consistently meet the highest quality standards, preventing losses and maximising raw material utilisation.

Oat drink production: into the future with AS-i and IO-Link

Danone relies on digitalisation solutions from ifm to modernise a production plant

Thierry Pasquet is the director of the Danone plant in Villecomtal-sur-Arros and explains the reasons for converting the plant: *"80 per cent of our customers say they want to change their diet from animal to plant-based proteins. We would, of course, like to take this into account by increasing our capacity for producing oat drinks. The decision also contributes to Danone's global corporate goals of reducing CO_2 emissions and water consumption by 80 per cent."*

The company has invested around 50 million euros in the plant in southwest France. "When modernising the production facilities, we opted for the best technologies available on the market to ensure that this investment and the plant itself will last for decades to come," says **Pasquet**.

Danone is one of the world's leading suppliers of dairy products. The ever-growing consumer demand for plant-based beverages, which Danone also offers to markets worldwide, prompted the company to convert one of its largest plants in France from dairy production to that of oat drinks.

"The IO-Link sensors offer us many more diagnostic options than conventional automation systems, which results in a high level of process transparency.

Digitalising the future with ifm

From storage tanks to pipelines, valve islands and CIP systems, everything was switched from milk to oats – and all within twelve months. *"During this period, all the old equipment had to be dismantled and rebuilt at other locations,"* says **Sébastien Peres**, who is responsible for automation at the plant.

"At the same time, the new plant components for oat drink production, including automation technology, were gradually installed."
It was no coincidence that ifm was chosen as the automation partner for the plant's modernisation. Danone has been working with ifm in Villecomtal-sur-Arros for around twenty years. *"So it was almost logical that we would work together again on this project."* For digitalisation, Peres' team, supported by integrator Boccard, relied on two automation technologies: AS-Interface (AS-i for short) and IO-Link.
"Compared to a conventional wired system, we benefit from simple cabling with AS-i and IO-Link. AS-i enables us to lay the cable over long distances and flexibly connect sensors wherever we need them," says **Peres**.

Danone also uses AS-i Safety for the entire management of safety-related sensors, which monitor, for example, whether manholes or other process access points are correctly closed.

The striking yellow AS-i flat cable runs through the entire process chain. The information from Definox's Sorio valve control heads is also transmitted seamlessly.

AS-i – digital data transmission over long distances

A key characteristic of AS-i is the yellow, two-core flat cable, which can be laid over distances of up to 1,000 metres and in both line and star topologies. By adding fibre optics, distances of up to 3,000 metres can be overcome. Sensors and actuators can be easily connected to the flat cable at any point using AS-i modules and insulation displacement technology. Optionally, actuators with higher power requirements can be supplied with additional energy via an additional 24-volt flat cable that runs parallel to the data cable and through the modules. A further benefit of AS-i technology is the IO-Link connection option. Special field-compatible IO-Link masters bundle the digital signals from the IO-Link sensors and forward them to the AS-i level.

IO-Link – greater transparency and more data per measuring point

"IO-Link technology was new to us. But we were happy to take the step towards digital data transmission for future-proofing and operating the plant as efficiently as possible," says **Peres**. *"The IO-Link sensors offer us many more diagnostic options than conventional automation systems, which results in a high level of process transparency. We also benefit from simple cabling with standardised M12 connectors."*

Many IO-Link sensors transmit additional data and information in addition to the actual measured value. For example, a pressure sensor can also measure the temperature at the measuring point. Flow meters transmit the current flow rate, pressure, temperature of the medium and total flow as digital measured values via IO-Link. Another useful feature of IO-Link is the option to store the parameters of a sensor on the IO-Link master that the sensor is connected to.

AS-i meets IO-Link: The two digital communication technologies can be ideally networked with each other, harnessing the benefits of both. Here for example, flow, pressure and temperature are transmitted to AS-i via IO-Link.

"This makes it very easy for us to replace the sensor if it becomes defective. Thanks to the automatic transmission of the stored setting parameters to the new sensor, sensors can also be replaced by non-specialist colleagues." This relieves the burden on specialists, who can now concentrate on their core tasks thanks to the simple replacement process.

Those responsible at Danone also brought external expertise on board to assist with selecting the initial sensors: *"With our integrator Boccard and ifm as automation specialist, we have set standards for all the necessary sensors for measuring pressure, temperature, flow and conductivity,"* says **Peres**.

"By working closely with ifm, and thanks to the comprehensive range of product variants available, we were able to ensure that we always use exactly the right type of sensor."

Thanks to the many years of close cooperation between Definox and ifm, the seamless integration of Definox's Sorio valve heads, which are also used in the modernised system, via AS-i and IO-Link is ensured.

Digitalisation and conversion to oat products successfully implemented

Production of oat-based drinks has now started. All information can be monitored centrally in real time. *"As a result of the digitalisation, we are kept informed about all processes and key figures. This allows us to react quickly to deviations,"* comments **Peres**. *"This helps us to produce efficiently, safely and, therefore, with the required high quality. Overall, we are very satisfied with the implementation of the digitalisation project. The positive cooperation has met all our expectations and requirements for a project of this scale."*

Interface between OT and IT. The control cabinet contains AS-i power supply, safe AS-i output modules and AS-i Ethernet/IP gateways.

Conclusion

As a long-term automation partner of the plant in Villemcomtal-sur-Arros, ifm was able to use its expertise in food production to support Danone in the modernisation and conversion from dairy production to the that of oat drinks. The close customer contact emphasised in the slogan "ifm – close to you" has also been reflected in this project.

Monitoring centrifuges
Why decanter and separator are in focus

There is more than just one answer to this question. On the one hand, production efficiency, quality, availability and safety are crucially important. On the other hand, the centrifuge is a cost-intensive process component that must be repaired when it fails on site, since extra replacements are not generally kept in reserve – unlike pumps and valves, for example. In addition, a centrifuge depends on an optimally provided supply which is delivered by the upstream process. What this means in essence is that deviations from the normal adversely affect the behaviour of a centrifuge and the quality of the separated product deteriorates.

The centrifuge is not least in focus because it is often used in the important areas of food, life science and the environment. These three segments have always belonged to the basic supply of humanity with its steadily growing world population.

Learn more about centrifuges at ifm.com

Machine availability and performance

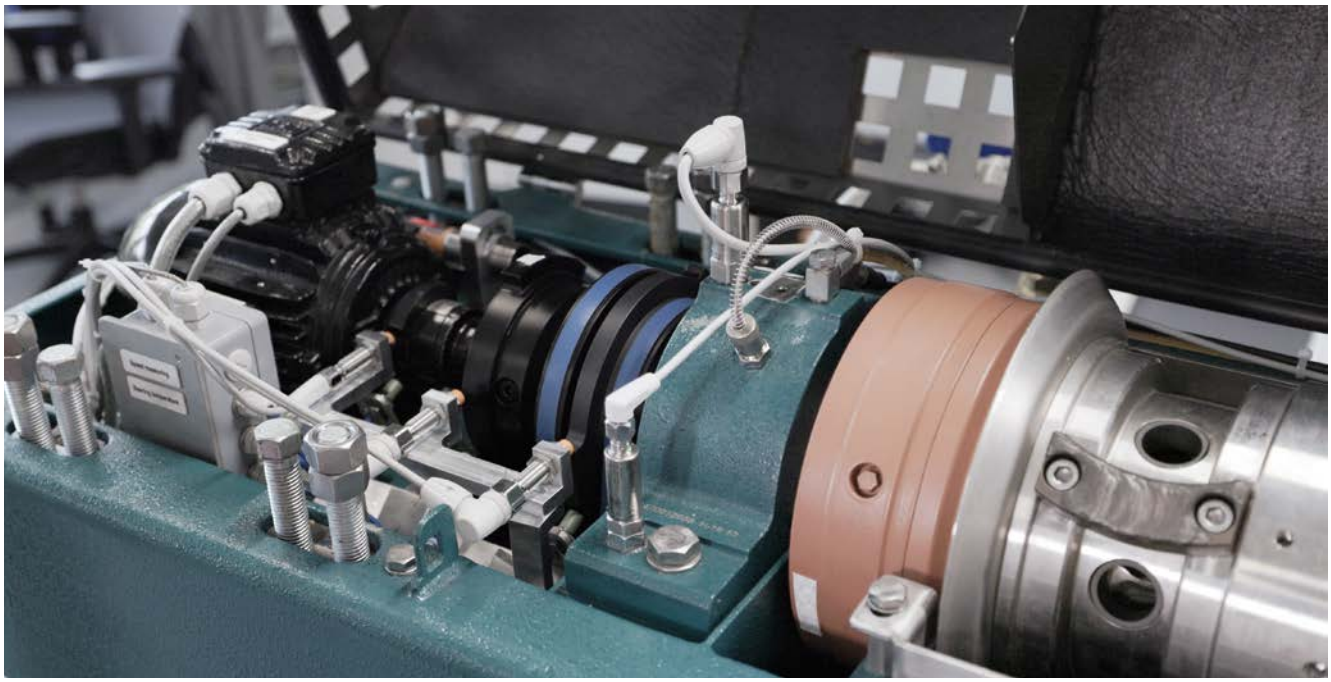
The cost for downtimes of all centrifuges worldwide in recent years comes to more than €32.2 billion a year, or about €1055 per hour.

Machine load and material conservation are the two utilisation aspects that must be carefully considered. Longer usage of components means savings in the need for replacement parts on the one hand, while on the other hand it also makes it possible to optimise maintenance intervals.

This is the only way to be able to plan for repair and maintenance costs and avoid surprise downtimes, thereby maximising system availability.

Based on over 50 years of experience in automation technology, close contact with customers and our own research results, ifm is able to set new standards for continuous diagnostics of centrifuges. With technologies in line with the principles of Industry 4.0, damage can be detected long before it progresses.

Suboptimal operating points are detected so that corrective measures can be taken. That gives system operators the reassuring certainty that they are reliably protected against sudden system failure. ifm – close to you!



Finished diagnostic packages

In ifm's own Competence Centre in Rosenheim, the RTM Academy, ifm has been intensively examining sensor-based monitoring of centrifuges and analysing the resulting data for 20 years. The result is coordinated packages for end-to-end continuous monitoring of decanters.
We are also happy to pass on our accumulated know-how. We answer your questions and support you with training.

Additional sensors for condition monitoring

Monitoring the optimum speed, for example using an inductive sensor, makes it possible to minimise operating points that stimulate vibrations (resonance frequencies) or ideally to avoid them entirely. Temperature sensors monitor the oil temperature on the bearings and gear.

Analysis of measured values

Only a complete analysis of all measured values makes it possible to diagnose the slightest change in the "health status" at an early stage. ifm offers the perfect platform for this, moneo. All measured values transferred via IO-Link are brought together here. A virtual digital twin of the system is modelled. Intelligent algorithms detect the slightest aberrations in operating state and are able to warn the system operator promptly of imminent damage. This makes it possible to carry out maintenance precisely and specifically as needed.

IFS: inductive sensor

- Correction factor 1: Constant sensing range on all metals
- Very high switching frequency
- Vibration and shock resistant

DV25: 5-segment light tower

- First-class visibility
- LED RGB technology, long life, reduced stock-keeping
- Different modes configurable via IO-Link or setting menu

TA1: temperature transmitters

- Also suitable for small nominal pipe diameters and confined spaces
- Very fast response time
- Free 3-point calibration certificate available online
- Precise analogue output and easy communication via IO-Link

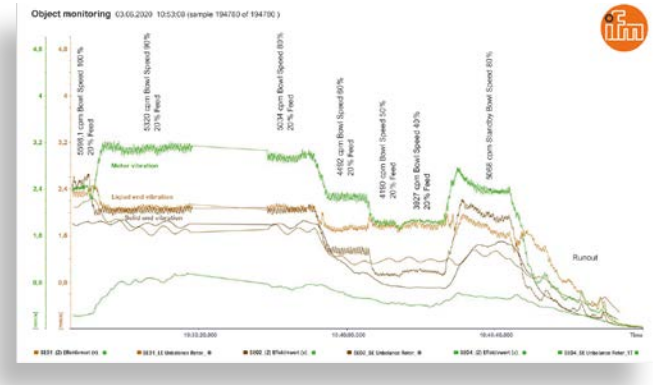
AL13: IO-Link master with PROFINET interface

- Separation between automation and IT network
- Reliable transmission of machine data, process parameters and diagnostic data to the PLC
- With PROFINET interface and separate MQTT JSON interface

Continuous monitoring of vital centrifuge values

Vibration diagnostics on the centrifuge is the key monitoring process, since the "non-critical" operating state must be reliably detected.

There are as many as 80 base frequencies on the decanter – imbalance frequencies, bearing frequencies, gear frequencies, liquid vibrations, process-related vibrations and machine resonances – that are recorded by the sensitive vibration sensors on the machine and are analysed, separated and monitored by the high-resolution VSE diagnostic electronics.



Example of vibrations at different operating speeds – the vibrations of individual components can be separated from the frequency spectrum and independently mapped and evaluated.

VSE: diagnostic electronics for vibration sensors

- Condition-based maintenance thanks to monitoring of unbalance, bearing or gear condition
- Dynamic inputs for simultaneous detection of up to four vibration sensors
- Two switching outputs for pre-alarm and main alarm

VSP: acceleration sensor

- Wide operating temperature range and high protection rating for the requirements of harsh industrial environments
- Compact and robust stainless steel housing with high mechanical overload resistance
- Very good repeatability and low linearity deviation

Sensors optimise processes and the use of resources while ensuring product quality

Decanters are used mainly in processing of raw materials for meat substitutes, starch, proteins and plant-based milk alternatives. It is above all water that plays the crucial role in this future trend, as this resource is used in great quantities. Efficient use of resources (water and electrical power) and optimum product quality can only be ensured if the process parameters on the decanter such as the flow, pressure and temperature of the inlet and outlet are optimally coordinated.

LDL: inductive conductivity sensor

- Reduces inaccuracies associated with a time-based cleaning process
- Improves process performance with flexible measurement points
- Compact, high-quality sensor design prevents failures and unplanned downtime

IO-Link

- Easy installation and set-up
- Loss-free digital transmission of measured values

SA: flow sensor

- Simultaneous measurement of flow and temperature
- Optimised for water, oils and air
- Alternating red/green display for clear indication of acceptable ranges
- With switching outputs, analogue signals and IO-Link
- The process connection can be rotated for optimum alignment

SM: magnetic-inductive flow meter

- Precise measurement of flow, consumption and medium temperature
- High accuracy, repeatability and measurement dynamics
- Precise empty pipe detection
- With switching, analogue and pulse outputs
- Clearly visible 4-digit LED display

“These worries can be quickly dispelled”
About the advantages of digitalisation and why existing obstacles are often no obstacles at all

Gregor Schwarz, Senior Sales Engineer Food & Beverages

Gregor Schwarz, how far has digitalisation already progressed in the food industry?
“What is very clear is: something is happening. More and more companies are becoming aware of the opportunities that digitalisation and the use of IO-Link have for them.”

What are the advantages exactly?
“I can see three relevant advantages. First and foremost, there is the precision in the production and cleaning process. Due to the purely digital transmission path, I no longer have unpredictable deviations of measurement, as EMC influences or conversion losses no longer play a role. This means: I can precisely control the production and cleaning processes continuously and reliably. This saves costs for raw materials, chemicals, water and energy.

Another important point is the transparency gained: if all relevant information and measurement data on manufacturing and cleaning processes are permanently recorded, it is very easy to provide proof that, for example, all hygiene standards have been met, or that the correct temperatures have been maintained for the specified time.

Both together result in the third relevant advantage: the permanent quality assurance. All sensitive measurement data is permanently and precisely available. This way I can monitor every process closely and automatically. Recently even AI-supported. If something goes wrong, I can react quickly and minimise rejects - and in many cases avoid negative recalls.”

“Behind this is a widely used, well-developed standard technology.”

However, this still requires that the sensors are calibrated correctly. What needs to be considered here when using IO-Link sensors?

"Here, too, there is rather less to consider than with analogue sensors. Thanks to the purely digital data transmission, the measured values from the sensor to the PLC or IT level remain unchanged, so the sensors can be easily removed for the calibration process and calibrated elsewhere directly on the computer. The subsequent data infrastructure does not matter. Thus, rolling sensor usage can be applied, production does not have to stop for the calibration."

How complicated is the changeover from analogue to digital sensor data communication?

"I notice time and again that customers cringe at the word 'digitalisation'. Often this step is still associated with high hurdles and new complexities in people's minds. But these worries can often be dispelled quickly."

How?

"By comparing the expected effort with the existing know-how. This is because the technicians often already work on and with complex control systems and integrate new participants there. This means that there is more than enough expertise available to realise digitalisation with IO-Link. To be clear: IO-Link is not a complex proprietary system, but a widely used, well-developed standard technology that can also be combined well with analogue structures. So there is no either-or, but I can enter the world of digitalisation at my own pace, step by step, machine by machine, plant by plant. And we are always there to plan and go through these steps with the clients."

The game changer
Hygienic flow meter with IO-Link

No more blind spots in the digital process
The SM Foodmag magnetic-inductive flow meter takes the flow measurement of liquid and creamy foods to a new level. As the first of its kind, this sensor features IO-Link connectivity, eliminating the last blind spot in the digitalised, transparent production process. On site, an optional display and the all-round visible status LED indicate the current operating status.

Measures what matters
The sensor detects the current flow rate, total volume and flow direction, as well as the presence of the medium. It also transmits conductivity and temperature to the control system and IT level. This can reduce the need for additional measuring points in the system.

Convenience, clarity, safety
Combined with our patented cables, the standard M12 connection ensures a fast, waterproof and error-free connection to the data infrastructure. Standard installation dimensions and a flexible choice of seals and process adapters make it easy to integrate into existing systems.

Flow meter type SMF
- IO-Link connectivity
- App-guided parameter setting simplifies set-up
- Temperature resistant up to 150 °C
- Flexible and standard-compliant configuration of process connections

SM Foodmag has passed the field test
Interview with Product Manager Daniel Dittrich

Daniel, you call the SM Foodmag a 'game changer'. Can you back that statement up with facts? How does the sensor stand out?
"In the food and beverage industry, sensors must withstand strong vibrations and rapidly opening and closing valves or pumps. They also have to put up with large temperature fluctuations as well as cleaning cycles using alkalis, acids and hot steam up to 150 °C all while providing precise measurements. And this is where our sensor really excels with both an unbeatable temperature-independent measurement accuracy and a high vibration and shock resistance. Add to this the transmission of additional process values, its large and easy-to-read display, an LED ring indicating the sensor health and a variety of process adapters and sealing materials. All these features make the SM Foodmag stand out from the competition."

In addition to performance, you have also focused on usability. How does the SM Foodmag compare in this regard?
"Many devices on the market require two separate cables for output signals and voltage supply. The SM Foodmag needs only one cable, which is a real cost advantage. The standard M12 connection minimises wiring expenses and ensures an error-free connection. Set-up is also quick and easy. Unlike other devices that overwhelm users with too many setting options hidden in nested menus, the SM Foodmag guides users through the set-up process. The app-based access level is clear and intuitive. The menu is compact. Initial tests have shown that experienced users can set up the basic functions within minutes completely by themselves."

Precise quantities for the perfect taste experience

For over 85 years, Lagenser Fruchtsäfte has produced and distributed pure juices for direct sale as well as semi-finished goods and basic blends for further processing. The company attaches great importance to the highest quality and perfect taste.

To meet both requirements, the individual components, such as pure juice, water and sugar, are combined in a mixing tank in a defined ratio which depends on the respective juice variety. For precise quantity detection, Lagenser Fruchtsäfte uses the SM Foodmag flow meter, which is accurate to the litre. A minimum conductance value of 5 µs/cm is required to ensure the reliability of the magnetic inductive measuring principle and exact dosing of the sugar.

Before the fruit juice is supplied to the customer, it is transported from the mixing tank to a cooling tank. Just before it is collected, the juice is heated to up to 90 °C for 20 seconds via a flash pasteuriser using heat exchange and then cooled down again to ensure optimum quality and shelf life. Here, too, the SM Foodmag reliably detects the flow rate and signals whether the medium has been heated to the desired temperature using its integrated temperature measurement function.

"Thanks to SM Foodmag's clearly visible display, we can see all the process values at a glance and reliably monitor key parameters, such as the total quantity of the individual components in the mixing process, the flow rate and the temperature."
– **Holger Steiner**, Managing Director

Safe and clean
Solutions for effective, efficient cleaning processes

Quality and safety in food production is also a question of effective cleaning processes. Whether CIP, SIP or manual: Only when all residues from the previous production cycle have been completely removed from pipes, valve manifolds, mixing units and other process equipment before the next production cycle can the final result be right.

High-quality solutions from ifm ensure that efficiency and effectiveness can be combined even in such a sensitive process step. Responsive, precise sensors and systems help to accurately monitor the use of water, heat and cleaning chemicals and limit quantities to what is actually required. This creates production reliability, makes the production of smaller batches more economical and simplifies the documentation of the correct cleaning process.

ECOLAB®

ECOLAB certified.

Ecolab® is a global leader in the development of premium cleaning, sanitizing and hygiene products for the food processing, beverage, dairy and pharmaceutical industries.

The integrity and quality of ifm sensors, connectors and cables for use in washdown environments was tested in accordance with the demanding Ecolab standards.

In independent tests, Ecolab has tested the inductive sensors, the IO-Link masters and modules for hygienic areas, the cables of the EVF family and the AS-i ProcessLine modules from ifm and and certified that they are resistant to the chemicals used in the tests.

SBZ: Accurate detection of high-pressure cleaning

The mechatronic measuring principle is characterised by an extremely fast response time. This means that even short spray bursts during high-pressure cleaning will be detected precisely in terms of quantity.

No inlet and outlet pipe lengths required Turbulence and air bubbles do not impact the measurement. This allows for the sensor to be installed anywhere in the pipework.

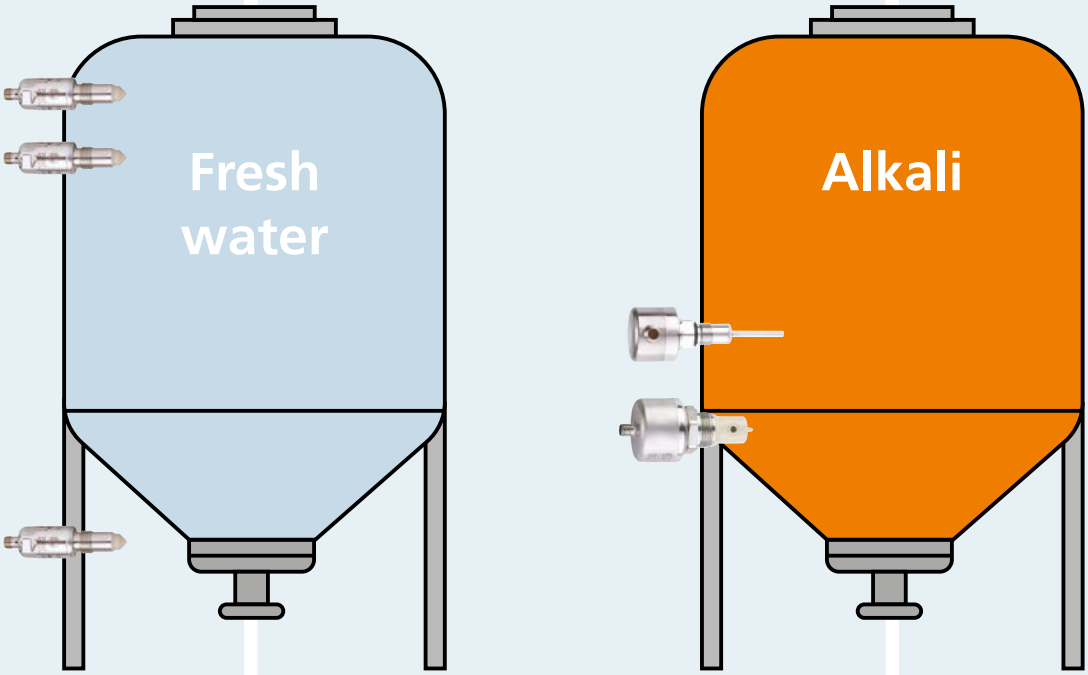
With IO-Link, the monitoring of a high-pressure cleaning system including documentation of the cleaning processes, for example for use in modern slaughterhouses, can be implemented easily and quickly with little hardware requirements. ifm offers all the hardware and software components required for this in order to also offer the required transparency to supermarket chains, for example.

CIP/SIP

Diverse chemistry:
Alkalis
Grease, organic dirt
Acids
Lime, lye stone, beer stone, wine stone
Enzymatic cleaners
Decomposition into more soluble components

Surfactants - Fat solvents (soap)
Bleaching agents
Oxidising and reducing agents (peracetic acid / hydrogen peroxide / hypochlorites)
Disinfectants
Chlorine, ECA water, alcohol, active oxygen

Constantly changing:
Resistance prevention, fewer and fewer chemicals approved, diverse requirements, cost pressure

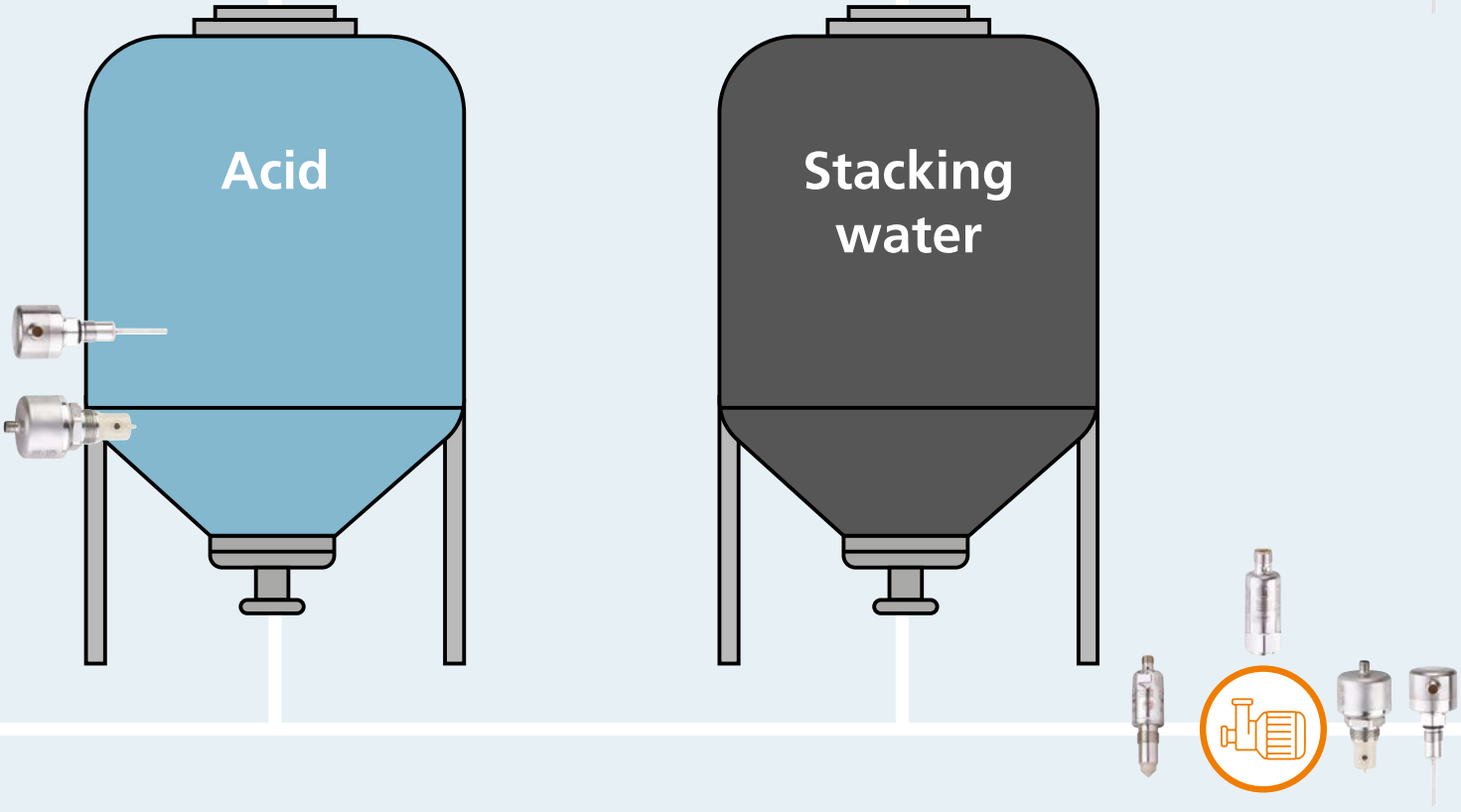


LMT: Level sensor for point level detection
- High adhesion resistance
- Independent of density, viscosity & dielectric constant
- Small surface in the tank
- Foam, gas and liquid detection
- Operation in compliance with the German Federal Water Act (WHG) possible

LDL: Conductivity measurement with integrated evaluation
- Monitoring / controlling the concentration in the tanks
- Media separation / process monitoring in the flow and return lines
- Maximum resolution without switching the measuring range
- Extensive diagnostics
- Easy integration

Efficiently digitalising CIP/SIP systems

Smart measurement technology conserves resources



TD2: Temperature transmitter with display

- Excellent response dynamics and very short power-on delay time
- Clearly visible 4-digit LED display
- Precise analogue output and easy communication via IO-Link
- High protection class and pressure resistance
- Available as type TA2 without display
- Consistent documentation

VVB: Smart pump monitoring with a vibration sensor

- Condition-based maintenance thanks to monitoring of unbalance, bearing or gear condition
- Process monitoring: detection of cavitation and gas formation
- Integration into industrial Ethernet systems, no control cabinet or complex wiring required
- Asynchronous transmission of raw data (BLOB) and integrated operating hours counter

“We will raise the level even more”
Robert Mönnig talks about the advantages of ceramic-capacitive pressure measurement

Robert Mönnig, General Manager – Product Management – Pressure sensors

“We want to develop products that are precisely tailored to our customers’ requirements.”

Robert, you are the General Manager for pressure sensors. What role does the food industry play for this product group at ifm?
“The roots of pressure sensor technology at ifm lie in the automotive industry. The product group grew with applications in this sector, implemented especially for machine tools. It was here that we first used sensors with ceramic-capacitive measuring cells, which still stand out for their very high pressure resistance during pressure peaks. More than 20 years ago, we made this measuring principle available to the food industry. Today it is our largest industry in terms of sales.”

You say that the company provided the measuring system. Did you have to make any industry-specific modifications?
“Not on the measuring cell itself. But we did, for example, revise the sealing concept to make the process connection hygienic. In this way we were able to ensure that the process medium could not get into the thread and adhere to it. In the course of this adaptation, we also decided on a concept without an elastomer seal. Instead, we now use maintenance-free seals.”

A convenient solution, it seems.
“Indeed it is! Although there have been cases where it has taken some persuasion on our part. But in the 20 years that we have been offering this sealing concept, I am not aware of a single case where the seal has not held. It works. It works perfectly – and you don’t have to worry about it once it’s installed.”

Overall, how has the food industry accepted the new measuring principle?
“We have been pushing the issue hard from the beginning, because we were and still are fully convinced of its advantages over conventional principles. Especially customers who have always struggled with the weaknesses of metal diaphragm seal technology have been very happy to have a robust, reliable alternative. But even those who have not experienced these problems in their applications are increasingly turning to the ceramic measuring cell. On the one hand, this is due to a situation in which more and more competitors are offering

corresponding products. On the other hand, the major plant constructors for the food industry in particular appreciate the reliability and durability of this technology and have made it their first choice."

So is the ceramic measuring cell virtually indestructible?
"It is definitely very robust. Much more robust than the diaphragm seals. But that's only to be expected, because the flush metal surface of the diaphragm seal is only a few micrometres thick. If, for example, a cherry stone hits it with sufficient force, at best a dent will occur, which will lead to measurement inaccuracies. At worst, the cover will be torn off, and while the sensor continues to measure, residues can accumulate in the resulting dead space, causing product contamination. In this case, it may take some time for the increased bacteria concentration to be detected. The unsaleable batch will then be correspondingly large.
Any defect in the ceramic cell, however, will be signalled by the sensor immediately, so the reaction time is much shorter. But as I said: it takes much more energy to destroy the ceramic than the metal diaphragm seal."

It sounds like the concept of the capacitive ceramic measuring cell was very mature from the start. Is there, or was there, any room for improvement?
"I believe there are few products, even outside the sensor technology, that are already technically mature when they first hit the market. However, we have actually achieved a very high standard with the pressure sensors for the food industry over the past few years, but we will raise the level even more."

What will be improved?
"We will have two major software updates. One will improve the sensors' response to temperature shocks, the other is for enhanced safety."

Our product families with ceramic-capacitive measuring cell for the food industry

PG27/PG28: Flush pressure sensor with analogue display
Analogue display, pressure switch and transmitter in one device

PI: Flush pressure sensor with display

PM: Electronic pressure sensor

Learn more about the ceramic-capacitive measuring cell at ifm.com

What does this mean in detail?
"For example, with a process stage where milk is passed through at 10 degrees and the subsequent cleaning involves temperatures of 85 degrees, the metal diaphragm seal adapts very quickly to the rapid temperature change. The ceramic measuring cell stabilises after about 3 minutes. By analysing the raw signal from the ceramic, we can quickly detect when the pressure is changing due to temperature alone and can compensate for the deviation within a few milliseconds."

And the second improvement?
"The second optimisation relates to a very unlikely defect in the measuring cell. Previously, our sensors only indicated a defect in general, but not whether this defect was in the ceramic or in another part of the sensor, for example. In the future, there will be a differentiation so that the impact on the product batch can be quickly determined in the event of an incident."

Sensors with ceramic-capacitive measuring cell in use at the Wildberg cheese dairy

The heart of the plant: plate heat exchanger for precise temperature control of the raw milk

Compact and hygienic: pressure sensor of the PM15 series with flush ceramic measuring cell

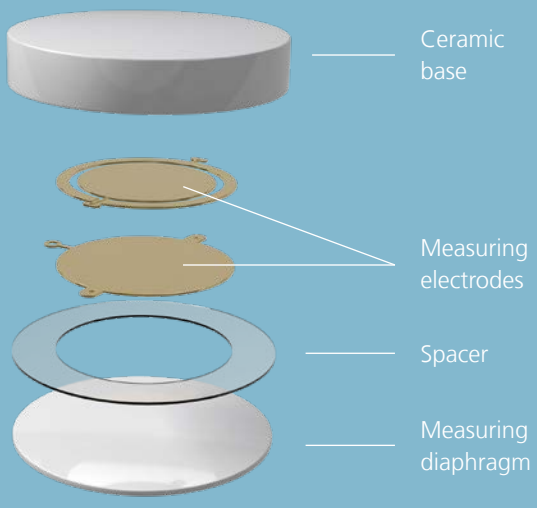
The PM15 pressure sensor monitors the pressure conditions in the heat exchanger. When deposits form on the heat exchanger plate, the pressure increases at an otherwise constant flow rate. The sensors measure this pressure increase and transmit the values to the control system. The system is then readjusted accordingly or a maintenance interval is initiated. The sensor has a unique flush sealing system with PEEK.

The G½ thread allows installation even in small pipes from DN25 without an adapter. This enables a hygiene-certified adaptation that is free of any dead space. Deposits are prevented and optimum cleaning during the CIP process is guaranteed. As no diaphragm seal liquid is used, there is no risk of critical fluids being released into the medium.

How important is communication with customers in such a continuous optimisation process?
"Customer feedback is always of great importance before, during and also after developing a new technology. Our slogan "close to you" is not just an empty phrase. We want to develop products that are precisely tailored to our customer's requirements. If we succeed in this right away, that is very good. But it is by no means unusual for new applications to arise in practice, which may lead us to optimise products further."

Can you give us an example?
"For example, on the new PI pressure sensor, we have offset the position of the vent by 90 degrees to prevent water ingress when the sensor is installed overhead, which can be the case on tanks. We have also provided the vent with a drip edge. Thus, in consultation with the customer and in cooperation with our development department, a small but nevertheless very effective improvement has been achieved, which ultimately benefits all our customers."

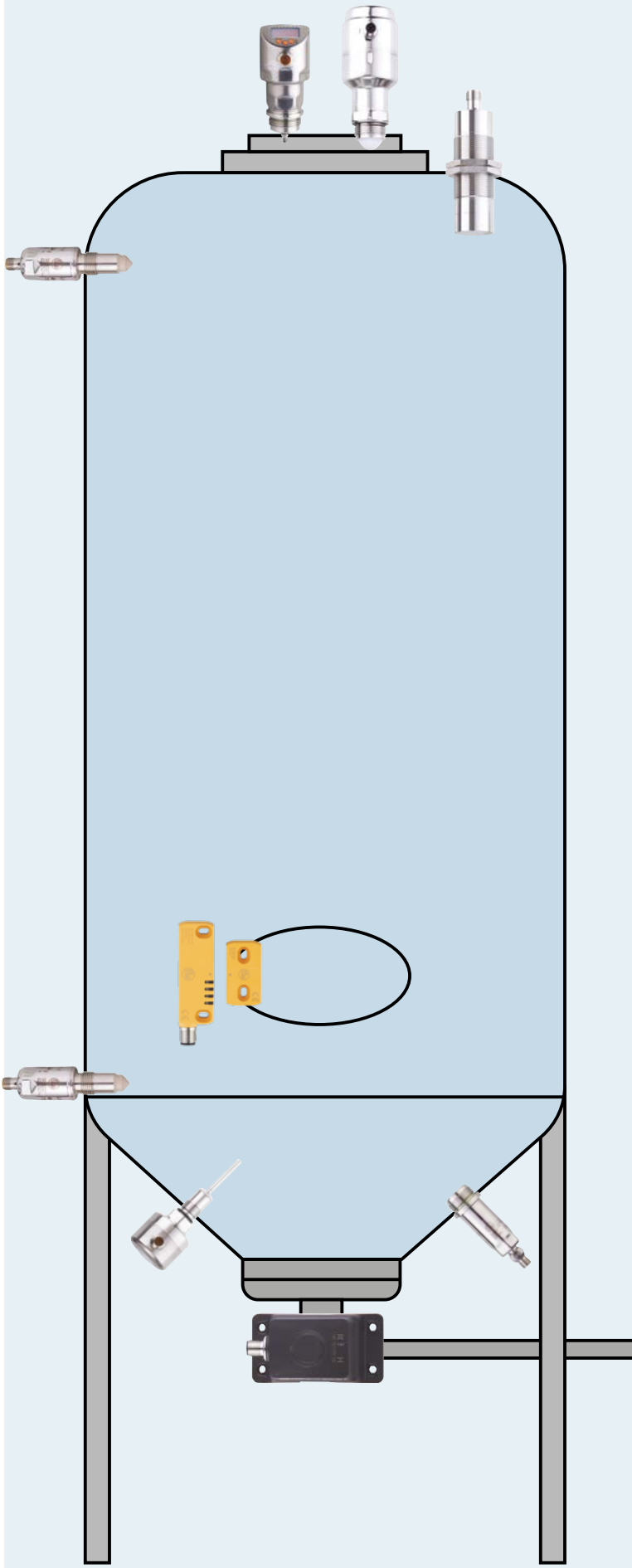
The ceramic-capacitive measuring cell in detail



Many advantages of the ceramic-capacitive measuring cell can be attributed to the main component itself: ceramic. Ceramic is characterised by a high material hardness combined with elasticity, which has a positive effect on robustness and mechanical strength. Neither friction from abrasive media nor pressure peaks pose a challenge. In the event of pressure peaks or overpressure, the measuring diaphragm reliably makes contact with the ceramic base. The result: high overload protection.

Tanks
Inconspicuous all-rounders

Whether large or small, single or as a group, completely made of stainless steel or as an IBC: tanks are used everywhere in the food industry. Even though tanks usually look inconspicuous, a lot can be going on inside. Foam, high temperatures, agitators and cleaning components such as sprayballs present a challenging environment for any sensor. Matched to the different application scenarios, ifm offers suitable measuring and diagnostic solutions.



Connecting the tank

ifm has the know-how and the products for hygienic installation: from the adapter via the welding mandrel to the sealing ring.

LR2: Continuous level sensor (guided wave radar)

- Clearly visible 4-digit LED display
- Modular system consisting of evaluation unit and probe
- Probe can be shortened to adapt to different tank heights

LW2: Continuous level sensor (non-contact, radar)

- Enables level measurement to the nearest millimetre from a distance of up to 10 m
- Non-contact measuring principle: no malfunctions due to deposits or wear
- Easily adjustable via IO-Link
- Maintenance-free operation Remote sensor parameter setting and level monitoring via connection to the IT system

LMT: Level sensor for point level detection

- Use in liquid and viscous media as well as bulk materials
- Differentiation of media via switching output configuration
- Reliable suppression of deposits or foam

UIT: Full-metal ultrasonic sensor

- Continuous non-contact level measurement and object detection regardless of the environment
- Resistant to aggressive media
- Long range of up to 2500 mm
- Digital or analogue measured value output

TCC: Self-monitoring temperature measurement

- Reliable temperature measurement with 24/7 drift monitoring
- Reduced calibration complexity
- Consistent documentation

MN7: RFID-coded safety sensor

- Unique actuator coding prevents tampering on doors and manholes
- Meets highest safety level even in case of series connection of up to 32 sensors
- LED display facilitates visual checking of the sensing range setting

PI1: Flush pressure sensors with display

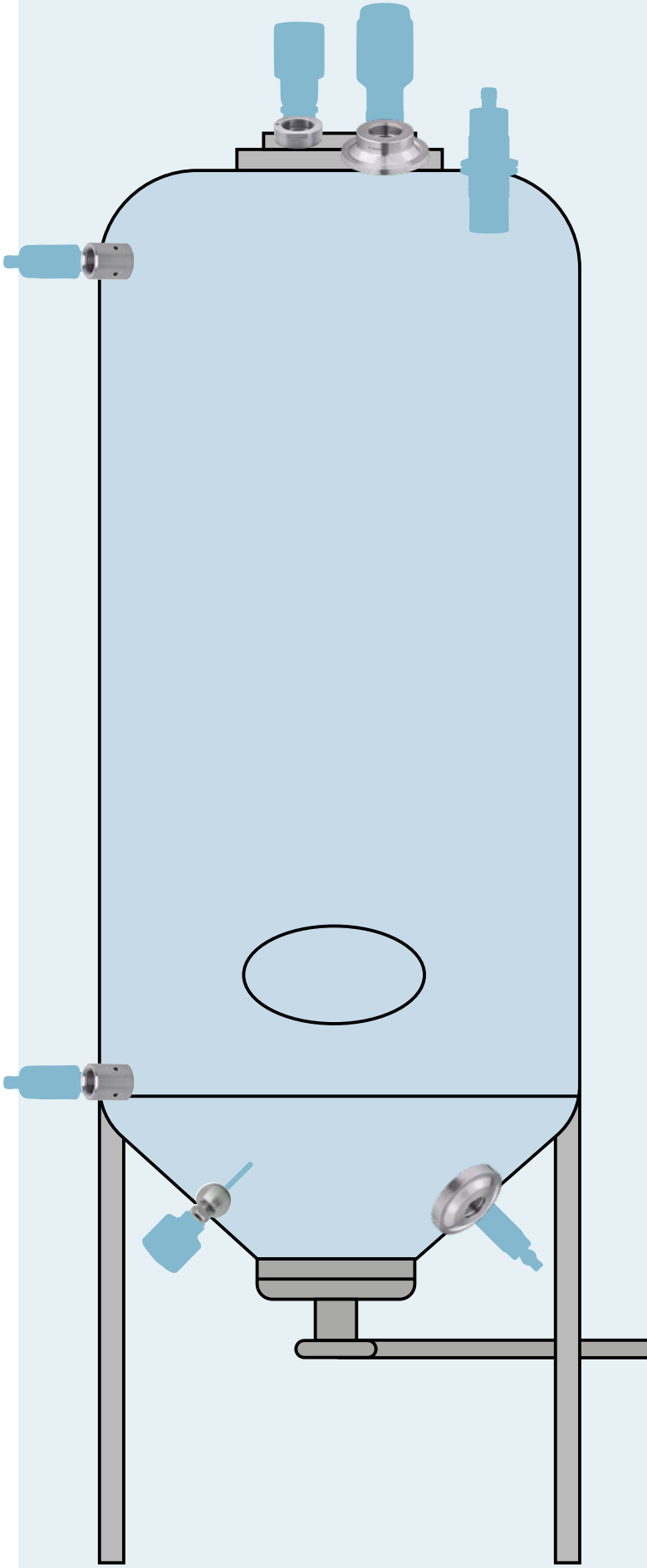
- Resistant to high-pressure cleaning with aggressive cleaning agents
- High temperature resistance and protection rating
- Programmable analogue and switching output
- Also as type PM1 without display

MVQ: Position sensor for valve actuators

- LED flash mode for a fast visual localisation of the sensor
- End position setting with just one click for quick set-up
- Self-diagnostics of wear, blockages or adhesion for preventive maintenance

Adapters
So that the sensor can connect

Our adapters allow installation of process sensors in tanks or piping systems. The range includes a variety of welding and mounting adapters, flange plates, T-pieces, sealing plugs and protective tubes for the common connection and sealing systems.



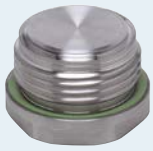
Keep it tight – no matter what

We offer a comprehensive range of accessories for our sensors and adapters for installation, operation and maintenance. For example, sealing rings made of EPDM, PEEK or FKM for the relevant sealing systems in the hygienic area.

E43309: Welding adapter
- G 1/2 sealing cone
- Also without leakage ports

E30452: Welding mandrel
- G 1 Aseptoflex Vario
- Mounting aid for welding adapters to protect the sealing edge
- Reliable heat dissipation during the welding process

E30108: Welding adapter
- For temperature sensors Ø 6 mm
- Easy setting of the immersion depth of the sensor



E30128: Sealing plug
- G 1 Aseptoflex Vario
- Reliable sealing of unused process connections

E30528: Welding adapter
- G 1 Aseptoflex Vario
- For thick wall thicknesses and unfavourable welding conditions
- With integrated leakage ports

E43311: Process adapter Tri-Clamp
- G 1/2 sealing cone
- Simple, quick and secure mounting
- Also without leakage ports

E30531: Welding adapter
- G 1 Aseptoflex Vario
- For thick wall thicknesses and unfavourable welding conditions
- With integrated leakage ports

E33229: Process adapter Varivent
- G 1 Aseptoflex Vario
- Varivent type N, DN40...DN150 (1.5...6"), Ø 68 mm

E30130: Welding adapter
- G 1 Aseptoflex Vario
- Also without leakage ports

E33250: T-piece
- G 1 Aseptoflex Vario
- Welding adapter Ø 29 mm

Digitalisation: with or without cable?

Let's debate about the best way to transmit data – or is it really a debate at all?

Stephan Heide, Senior Manager – Product Management – Ultrasonic sensors / Wireless
Christiane Eckwerth, Senior Manager – Product Management – Connection technology

"This is not really a question of either/or. The answer is and."

Christiane Eckwerth and Stephan Heide offer the networked industry different ways of transmitting data. While she focuses on cables, he tries to do without them. Which way is best? Time to untangle this question.

Stephan, Christiane, can you actually still go for a coffee together, or is there too much rivalry between you two?
Stephan Heide: *"Actually, we like to sit together over a cup of coffee and discuss what the best form of data transmission is. However, this always relates to a specific application and not to the situation as a whole. This is not really a question of either/or. The answer is and."*

If you look at the development in automation, the question of whether or not to use cables has arisen only recently. So why are there wireless solutions at all if wired data transmission has worked so well up to now?
Stephan Heide: *"You're right. For the year 2023, it is assumed that wireless solutions will be used in about eight percent of all applications. So we are still at the beginning. However, the share will continue to increase in the future. Our aim is certainly not to compete with cable applications. Our main reason for using wireless technologies is to solve applications where cables are unsuitable, for example because distance is a problem or moving objects have to be taken into account."*

Christiane, from your point of view: as product manager for connection technology, shouldn't you be worried? After all, the smartphone, too, has finally replaced the classic telephone.
Christiane Eckwerth: *"That is true, and I certainly do not want to deny the reliability of mobile telephony generally. But to this day we know about dead spots or connection problems and loss of quality, sometimes also caused by local overload. In other words: in these cases, data is either delayed, corrupted or, in the worst case, not transmitted at all. This may still be tolerated in a time-uncritical interpersonal conversation. In highly efficient production plants, however, sensor information for controlling processes or protecting people must be available within milliseconds: reliably and at all times. So I agree*

with Stephan: wireless solutions are a useful, helpful addition where wired solutions are not possible or where a certain latency in data transmission can be tolerated."

Speaking of reliability: ifm serves customers in the food and automotive industries. Cables are laid in shafts and drag chains. How does ifm ensure that the data transfer really takes place at all times?

Christiane Eckwerth: *"In fact, we can illustrate the heterogeneity of our customers and their applications by taking a look at our cable range. A food application, which is regularly kept hygienically clean with cleaning agents and a high-pressure cleaner, places different demands on a cable than a welding application or the continuous movement in a drag chain. Choosing the right material for the cable sheath is therefore one of the success factors. Then there is our patented connection technology, which can be screwed securely and tightly without tools. It ensures, for example, that the seal is not squeezed too hard and destroyed. In short: we now have the right cabling for almost any application. And if an existing solution doesn't fit, we get down to developing one."*

Let's talk about potential use cases for wireless solutions: ifm currently offers data transmission via Bluetooth, for example. Adapters can e.g. be used to query the sensor data of an IO-Link master. Does ifm rely therefore on Bluetooth as a wireless standard?

Stephan Heide: *"Bluetooth certainly has a potential for local applications. But the same applies to wireless as to cables: one single technology is not enough. For example, we also need solutions that can bridge distances of several kilometres. Or that are even able to communicate data to the cloud completely autonomously. We are already making the latter possible the io-key, which transmits data from IO-Link sensors via GSM. We are also working hard on other promising technologies, such as 5G and mioty. Taken together, all this will result in a mix that should ultimately cover all of our customers' wireless application needs."*

So the customer has a wide range of options to choose from. How do you ensure that the customer does not get confused and is able to pick the right product?

Stephan Heide: *"Back to the smartphone example: I use the device to make phone calls, listen to music and, if necessary, to access online content when I am at home or on the move. Distinguishing here between mobile networks, Bluetooth and WLAN is not rocket science. In the long term, the situation for industrial wireless solutions is likely to be similar. As a supplier, we will of course always advise our customers on the choice of the appropriate technology."*

Christiane Eckwerth: *"The same applies to cables. Many customers exactly know their requirements and can choose the right cables themselves – or we can advise them. And if one form of data transmission reaches its limits in an application, we will recommend the other. The important thing is that we can offer the customer the best possible and most sensible solution for each application, across all technologies."*

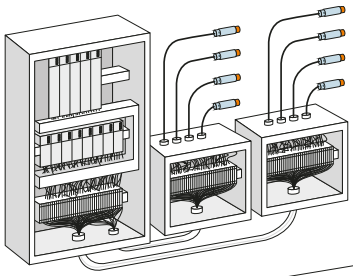
For those who take it very seriously
Precise data thanks to digital sensor communication

Conversion losses during transmission of analogue measured values

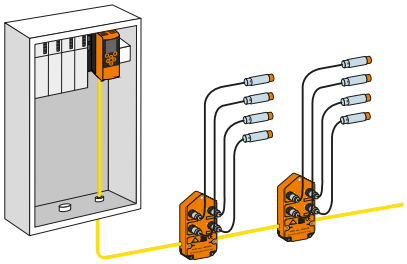
More precise measured values with digital data transmission

Error-proof transmission of exact measured values

The measured value of an analogue sensor must be converted at least twice before the final evaluation in the PLC - once from digital to analogue and once from analogue to digital. We don't want to dive too much into technical detail at this point, but: each of these conversions introduces a further inaccuracy into the actual measurement result. In addition, there are electromagnetic or ambient climatic influences on the cable, which can also have a detrimental effect on the accuracy of the measured value. Once the measured value is finally in the PLC, the PLC programmer must first scale the raw value before it becomes a usable process variable.
However, if the measured value is transmitted digitally from the beginning (sensor) to the end (PLC, IT level), it remains constant, exact and highly precise. No conversion, no losses. In addition, the signal transmission itself is particularly insensitive to external influence. Screened cables and associated grounding are no longer necessary. Expensive analogue input cards are also obsolete with the use of digital data communication.



Control cabinets with parallel wiring



Simplification through digital data transmission such as AS-Interface and IO-Link

Intelligent wiring

The connections between the sensors and the control represent a challenge to wiring due to their complexity and length. The use of standardised cables and the bundling of sensor signals via masters and modules directly in the field drastically reduces the wiring effort. While others are still sweating over pulling, marking and measuring individual cable pairs, the digitizer has long since been pleased with the flawlessly implemented data infrastructure.
Digital data communication is therefore much more precise compared to the analogue structure and saves a lot of time and nerves. And this already during the initial installation.

AS-Interface
Industrial communication made simple

What does AS-Interface offer you?
- A globally standardised system according to IEC 62026-2
- It replaces the complex, conventional parallel wiring
- The cabling optimally complements control systems with different fieldbus systems (such as EtherNet/IP, Profibus-DP, Profinet, EtherCat etc.)

How do you benefit from AS-Interface?
- Easy-to-implement, unshielded wiring and voltage concept
- Safe and non-safe data can be processed via the same system
- Less complex set-up and reduced input for documentation as well as diverse diagnostic capabilities

Learn more about AS-Interface at ifm.com

AC29: AS-Interface module
- Hygienic design without corners and edges
- Resistant to high-pressure cleaning with aggressive cleaning agents
- Clearly visible, powerful LEDs for operation, switching status and fault indication
- AS-i and 24 V supply via common M12 connector

E74: AS-Interface flat cable
- For reliable signal transmission in AS-i networks
- Connection of components by means of insulation displacement technology
- Reverse polarity protected due to special shape
- Wide operating temperature range

E70: AS-Interface flat cable insulation displacement connector
- For the transition of AS-i / AUX flat cable to M12 connector
- Hygienic design for the requirements of the food and beverage industry
- Simple and quick connection using insulation displacement technology
- Resistant to high-pressure cleaning with aggressive cleaning agents
- Wide operating temperature range and high protection rating

AC14: AS-Interface Gateway
- With integrated fieldbus interface
- Reliable and fast data exchange with the sensor/actuator level
- Colour display showing the status of all AS-i slaves on site
- Integrated web interface for diagnostics and configuration beyond the control cabinet
- Intuitive quick setup menu

Founding Fathers

Leading manufacturers of sensors, actuators and control technology have jointly developed AS-Interface and IO-Link. As a founding member, ifm was significantly involved in the development of both systems.

IO-Link
Worldwide open communication standard

What does IO-Link offer you?
- An IEC 61131-9 global standard digital communication protocol
- An easy-to-set-up point-to-point communication
- A technology that can be connected to control systems with Ethernet-based fieldbus systems (such as EtherNet/IP, PROFINET)

How do you benefit from IO-Link?
- Use standard, unshielded M12 cables of up to 20 metres
- Transmit significantly more process data from sensors and actuators
- Parameter setting and monitoring via software
- Reading and logging of event and diagnostic data

Learn more about IO-Link at ifm.com

AL: IO-Link masters and modules
- Voltage supply via standard sensor cable, M12 A-coded, or via M12 L-coded power cable with daisy chain
- Ethernet ports 10/100 MBit/s with switch for PROFINET, EtherNet/IP, EtherCAT, POWERLINK and Modbus TCP
- Separation between automation and IT network possible

EVF: connection cable
- Perfect connection for hygienic and wet areas
- Optimum sealing even when fastened by hand
- Vibration-resistant fitting, mechanical end stop protects O-ring against destruction
- Cable sheath made of halogen-free and flame-retardant material

DP: IO-Link converter
- Conversion of analogue signals into IO-Link or vice versa (depending on the version)
- Supports analogue values as current or voltage signals (4...20 mA or 0...10 V)
- An Industry 4.0 connection for conventional analogue sensors
- Also with LED display

AS-i or IO-Link? Both!

AC6: IO-Link master with AS-i interface
Connects AS-Interface and IO-Link

DN4: Switched-mode power supply 24 V DC
- Installation without control cabinet
- Energy-efficient generation of extra-low voltage without power loss
- Configurable, electronic circuit breakers that can be reset via IO-Link
- Output voltage, load currents, output circuit states and trigger cause are communicated via IO-Link

moneo|blue
The app for the Bluetooth adapter EIO330

EIO330: Bluetooth-Adapter

- Mobile parameter setting and diagnostics of IO-Link devices in production
- Informative and efficient: while on the move, check process values and events of all IO-Link devices connected to an ifm master and set the parameters of sensors with the help of a free app (iOS and Android)
- Easy: convenient parameter setting of many sensors thanks to graphic representation


Boston
Selección
Valor nutritivo por 100 ml.
(valores medios aproximados)
Valor energético
47kcal. (199
Proteínas
0,3 g
Hidratos de carbono
11,4 g
Grasas
0,0 g
Contenido en fruta
Fruit content
Teneur en fruit
50 %
Vol. 1L
OCOTÓN

Packaging

Transparency leads to efficiency – from simple position monitoring to quality control

Automation significantly impacts the food packaging line, revolutionising how products are packaged, labelled, inspected and prepared for distribution. Adopting automation technologies in food packaging lines offers several benefits, such as increased efficiency to increased throughput, reduced bottlenecks and improved production efficiency. Precision, consistency, real-time monitoring and data collection can be used for quality control and identifying areas for continuous improvement. By offering holistic solutions that include IO-Link, intelligent sensors and software, ifm allows customers to future-proof product packaging.

Increased efficiency in crisps production

More transparency in manufacturing with flow meters and code readers

Our customer

An internationally operating producer of snack foods is one of the leading manufacturers of potato crisps.

While the market requirements in this segment are constantly increasing, the industry also sees a steady rise in sales. As a result, manufacturers need to adapt their production methods, making them more efficient in order to remain competitive. Sensors and measuring instruments are used in the process.

The challenge

One essential requirement in the food industry is to ensure product traceability. Our customer uses barcode readers for this purpose. They can seamlessly track and trace the products from production to end user via codes printed on the packaging. A scalable and easy to integrate solution was sought to meet this requirement.

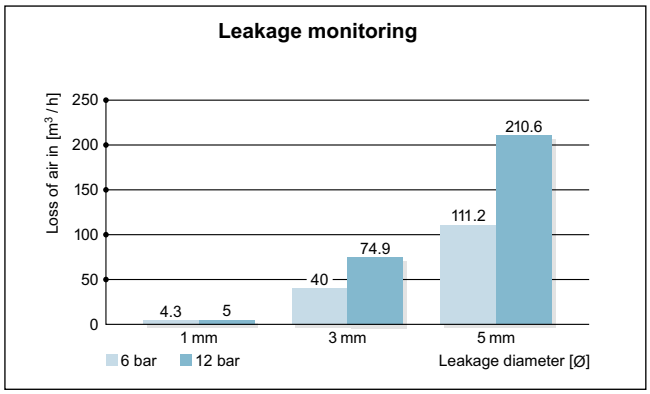
Another application for sensors in production is energy monitoring. The aim here is to increase the overall equipment efficiency (OEE) in order to reduce unit costs. From a cost perspective, compressed air and nitrogen, which are used as media, are of great importance in this context. Compressed air is used for the pneumatic system of machines, nitrogen is filled into the packages before sealing to extend the shelf life of the products. With the aim to incorporate these two media into the energy monitoring system, the customer was looking for suitable flow sensors.

The solution

As for the flow sensors, the company has opted for ifm devices from the SDX5/X6 series which meet the required specifications, are cost-effective and can easily be integrated. With the integrated IO-Link interface, their connection via the AI1920 IO-Link masters used and also supplied by ifm, is also easy. Thanks to the digital connection, the measured values are directly available in the production plant's network and can be processed both in the PLC and in the higher-level energy management system. The simple digital integration via IO-Link was one of the main reasons to choose this solution.

> "The simple digital integration via IO-Link was one of the main reasons to choose this solution."

O2I5XX code readers are now used for product tracking in the production plants. Here, the simple connection via IO-Link also plays an essential role. What is more, the price of the code readers is very attractive compared to previously used products. Last but not least, the responsible decision-makers have been impressed with the technical support provided by ifm's application engineers, who were able to present a technically optimal solution in each case. The result is an enhanced energy management system and improved production traceability. Given the positive experience, other locations will follow.



The SD's precise flow monitoring allows for leakage detection and energy cost savings.

O2I5: 1D/2D code readers

- Orientation-independent reading of 1D and 2D codes
- Detection of more than 20 different types of code
- Integrated code comparator system in the sensor
- Adjustable by means of integrated laser pointer
- Segmented lighting for applications with problematic surfaces

SD: Compressed air meters

- Precise measurement of flow, consumption, pressure and medium temperature
- High accuracy, repeatability and measurement dynamics
- Alternating red/green display for clear indication of acceptable ranges
- The display can be rotated for optimum alignment
- Versions for the detection of argon (Ar), carbon dioxide (CO_2), nitrogen (N_2) are also available

Simply safe and clean.

Cleaning system manufacturer Boos places its trust in ifm's fail-safe sensor technology. For good reasons.

German firm Boos Reinigungsanlagenbau GmbH specialises in the fabrication of such systems, including a unique crate system designed to clean up to 3,600 recyclable beverage crates per hour on a 42-metre-long cleaning line. The means of choice: The crates are scrubbed thoroughly by rotating high-pressure brushes and a powerful jet of water, complemented by immersion baths to effectively eliminate stubborn dirt.

To ensure the crates emerge from the system looking like new, it employs not only water but also an alkaline lye. Anti-static wetting agents are subsequently applied to the freshly cleaned plastic parts, ensuring they stay cleaner for longer.

90 °C showers at up to 400 bar?
Obviously not the most favourable conditions for us humans. But ideal for recycled beverage crates, beer kegs or other containers to ensure they are perfectly clean and ready for a new lease of life.
When it comes to a deposit return system, paramount importance is placed on hygiene, cleanliness and the safety of both the actual system and those who use it. An obvious task for ifm's fail-safe sensors.

The entire cleaning system is a closed one. To facilitate full access for troubleshooting or maintenance purposes, the machine is equipped with doors on both sides. However, it must be ensured that the system stops immediately when one of the two doors is opened – given the aforesaid water temperatures and high pressure involved, failure to do so would pose a significant potential hazard to operators.

Switches, keys and locks are so yesterday.

To guarantee the safety of both individuals and the machine, fail-safe inductive sensors are employed to continuously monitor all the door positions. These sensors ensure the system comes to a prompt and safe stop whenever a door is opened. The system only resumes operation when all the doors and flaps have been closed securely. For many years, such safety requirements were met using the "switch-key-lock" principle. Disadvantage: Mechanical safety switches are prone to wear and tear, while open systems are susceptible to contamination. Aggressive cleaning agents damage the contacts in the course of time. Often plastic rollers, which can get stuck, are still used. The safe functioning of the switch can no longer be ensured. A principle that can be readily described as outdated, considering the availability of more reliable and cutting-edge solutions.

Advantage of sensor technology: No wear and tear and very robust

For these reasons, Boos has been placing its trust in ifm's electronic fail-safe sensors for many years. These sensors monitor all the doors and flaps of the systems.
Due to the inductive operating principle, the sensors do not require any mechanical parts. They are absolutely wear-free. A simple metal target is sufficient; a special target like a magnet or coded actuator is not necessary.
The fail-safe inductive sensor detects metals such as VA or ST37, in other words materials that are used in the machine anyway. With a sensing range for stainless steel of between 7.5 and 15 millimetres, there is ample mechanical clearance for seamless integration of the door sensors. The encapsulated sensor housing features protection rating IP69K and is, therefore, resistant to almost all external influences.

The sensor operates with an enable zone which is monitored for target position and dwell time. Therefore, the sensors are more or less tamper-proof and meet the strict safety directives.

Maximum safety:
The electronics of the fail-safe sensor is designed to continuously monitor itself and the wires connected to the outputs for faults.

And another advantage: Self-monitoring

No driver would deliberately drive into a brick wall to see if their airbag actually works. Here the principle of hope applies. This is different with safety-related components in machine construction.

Standard IEC 61508 specifies a regular check of the safety switches. Mechanical safety switches can only be checked by opening the door or flap being monitored. When the machine switches off, safe function is ensured. These checks involve a considerable amount of effort: Depending on the actual installation site, accessing the doors at the rear of the system might pose a challenge.

Moreover, the machines that operate continuously around the clock need to be stopped to inspect correct functioning of the safety switches.

Here the electronic sensors play their biggest trump card: The sensor's electronics is designed to monitor itself and the wires connected to the outputs for faults. This is yet another advantage over mechanical systems, which lack the capability for continuous self-monitoring. For instance, there is a risk of an unnoticed failure occurring a day after inspection due to a defect.

A sensing range for stainless steel of between 7.5 and 15 millimetres offers ample mechanical clearance.

In contrast, continuous self-monitoring would promptly identify any defects and trigger a system shutdown or move it into a safe state. This ensures the utmost safety for the system operator, while providing the sensors with certification according to standards ISO 13849-1, Performance Level "e", and IEC 61508, SIL 3.

Transparent safety: Individual monitoring of doors

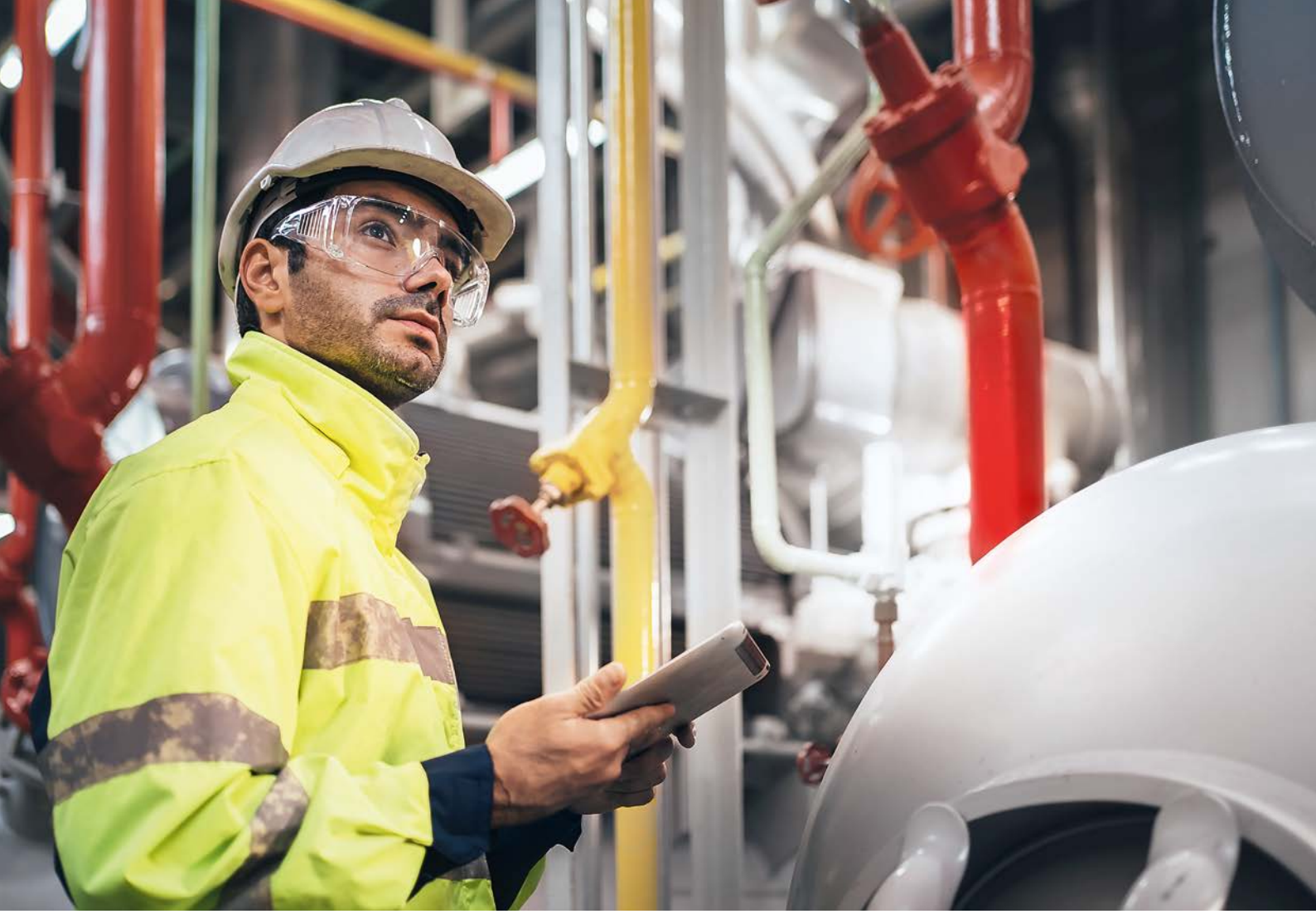
Back to Boos, where the signals from all 17 fail-safe sensors are transmitted separately to a central control system. This is where the condition of all the system components is visualised. The system operator can immediately localise an incoming alarm.

In theory, a conventional series connection would be feasible, but then the operator would only be able to identify that a door or flap is currently open without being able to determine which one exactly. In the event of a fault, the operator would then have to check all the doors within the monitoring chain. This would be a very time-consuming process, especially in difficult-to-access areas of the system.

Conclusion

With the dependable and transparent safeguarding provided by ifm's fail-safe sensors, the operator can confidently and securely operate the Boos crate cleaning system, efficiently cleaning any quantity of beverage crates without hesitation.

The doors of the system are monitored by fail-safe inductive sensors.



Safety is more than just a feeling
ifm's safety service

For us, safety is not an end product, but a process. When assessing the safety of machines and developing a safety concept, we support both machine manufacturers and operators. Our experts carry out plant inspections and hazard or risk assessments just as professionally as holistic, manufacturer-independent system designs to safeguard your machine.

The range of services we offer you along the process is sometimes very complex, depending on the support you require and the size of the plant.

That is why we attach great importance to a transparent exchange from the first consultation meeting through all project steps to the final closing meeting. This is how we create a common understanding of safety that is the basis for a successful completion of the process.

Include our know-how, with which we have been continuously optimising our solutions for automation and digitalisation for over 50 years, in your value creation. We are happy to support you with our expertise in developing and implementing a state-of-the-art safety system. Right from the start. The earlier safety is considered as an integral part of automation, the easier it is to reconcile it with the equally important plant effectiveness. A sophisticated integrated plant safety system has a positive effect on machine uptime, and, thus, also on productivity.

ifm safety engineering

The path to a safe plant

Operator

Preliminary plant inspection
We determine and document the current state of your machine or plant in view of potential safety risks for your employees.

Hazard assessment
During the hazard assessment, identified risks are evaluated and functional corrective measures are systematically defined.

Original equipment manufacturer

Research on directives and standards
We establish the machine category for you in accordance with the EU Machinery Directive and determine the applicable directives and standards.

Risk assessment
Early on in the planning and design phase, we identify potential risks that a machine could pose and determine measures to reduce danger.

Control system design
We develop and document the system as a block-circuit diagram and set up technology schemes. The supplementary parts list of all required components and cables simplifies implementation.

Documentation of control-technology protection devices
We create the documentation of your control-system protection device for you with the SISTEMA tool. This includes an equivalent safety-related circuit diagram and an overview of the safety circuit.

Benefit from our services for operators or manufacturers of machinery that can be commissioned separately:

Savings potential by out-sourcing time-consuming processes

Legal certainty through compliance with statutory requirements

TÜV Rhineland certified technicians and engineers

Risk assessment with proven tools

Safety first
Our safety construction kit

There are situations where standard products will do. Safety requires more. For safety equipment to be fully effective, it must be adapted to the specific situation. This is why we offer a wide range of safety products, from sensors and the necessary infrastructure to safety-related controllers.

To achieve a perfect, seamless solution with these products, we offer you our expertise on top. Together, we can analyse your challenges and then set up a customised complete package. Would you like to browse through the product range? We have compiled some of our highlight products for you here. You can find the whole range in our webshop.

GF7: Fail-safe inductive sensor
- To ensure machine safety
- Certified to the following standards: EN 60947-5-3, IEC 61508 and ISO 13849
- No coded target required for electronic fail-safe sensors
- Connection to safety PLC, safe AS-i modules or safe evaluation units

AC4: AS-Interface EtherNet/IP gateway with fail-safe PLC
- With integrated fieldbus interface and fail-safe PLC
- Reliable and fast data exchange with the sensor/actuator level
- Colour display showing the status of all AS-i slaves on site
- Convenient and simple configuration, setup and diagnostics
- Intuitive quick setup menu

MN2: Magnetically coded sensor

- Operation is possible from different directions
- Concealed installation behind stainless steel possible for enhanced tamper prevention
- Meets the new interface description CB24I from ZVEI
- Highest safety levels to ISO 13849-1 and SILCL 3 to IEC 62061

G15: safety relay

- Signal output via potential-free relay contacts
- Safety relay with cross-monitoring and possible simultaneity monitoring
- Connection of mechanical safety switches and electronic fail-safe sensors
- Relay for two-hand control devices with mechanical or electronic switching sensors
- Monitored or automatic start can be set

AC01: fail-safe AS-Interface e-stop operating unit

- With AS-i interface.
- Certified to EN 13849 / PL e and IEC 61508 / SIL3
- For detection of safety-related switching states
- Evaluation through AS-i safety monitor

AC9: AS-Interface safety switch with guard locking

- Reliable guard locking of movable safety guards
- For use in fail-safe AS-i systems (Safety at Work)
- With principle of normally closed operation: release by triggering via AS-i
- Guard locking by spring resistance

Safety light grid on the pallet lift of a brewery.

Protective equipment on a packaging robot in a large bakery.

Safety monitoring of a chamber filter press.



Cold chain

Reduce food waste

More than 1,600 million tons of food are lost and therefore wasted every year. A seamless cold chain ensures the edibility and quality of perishable goods such as food and pharmaceuticals during transportation and storage. A transparent and continuous cold chain also strengthens consumer confidence in the products, enables compliance with statutory regulations and prevents vital goods going to waste.

Energy-efficient deep-freezing of food
moneo|RTM optimises maintenance and servicing by providing a transparent plant condition

"The interval between maintenance appointments could be increased by 8,000 operating hours."

Our customer
One of the leading companies in the production and distribution of frozen products such as vegetables, legumes, rice, pasta and cereals for retail, catering and industry since 1984. To ensure that food safety and environmental protection can be guaranteed at all times, the company is constantly working to optimise processes.

A special freezing system ensures that the colour, smell, taste and texture of the food are preserved. From cultivation and harvesting, cleaning and deep-freezing to packaging and logistics processes, the company takes care of everything itself, so that the products always arrive at the customer with optimum quality.

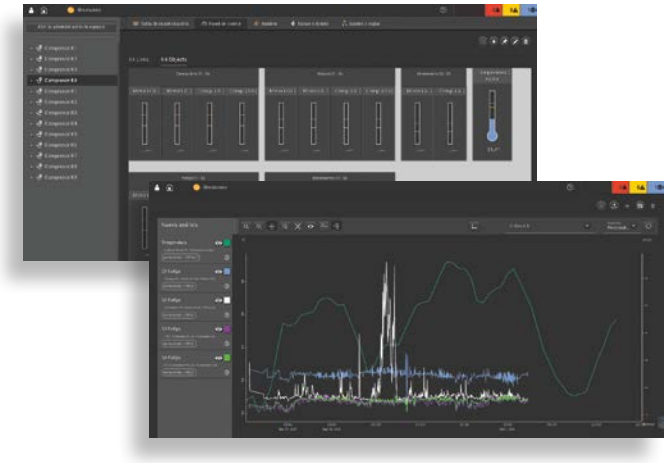
The challenge
The ammonia compressors used for deep-freezing are the company's biggest energy consumers. Correct maintenance and operation can avoid unnecessarily high energy consumption. Maintenance and servicing had to be carried out by the plant manufacturers, as the operator had no reliable indicator to assess maintenance requirements and quality. Therefore, there was a maintenance contract based on preventive maintenance with maintenance scheduled every 25,000 operating hours.

Since the coordination of maintenance appointments was not based on the actual condition and maintenance requirements of the plants, in the worst case plant downtime could occur in the time between two appointments. A damaged bearing can cause high costs in energy consumption and repair. Even the replacement of small spare parts, such as a screw, can quickly cause €75,000 in damage due to long downtimes caused by defrosting and cooling down the plant. In addition, cooling down the plant after a standstill is very energy-intensive. To solve this problem, the company carried out a proof of concept on a compressor together with ifm.

The solution
In contrast to the previous maintenance plan, the interval between maintenance appointments could be increased by 8,000 operating hours with the condition monitoring proof of concept using vibration diagnostics on the compressors.

Besides, it can be checked at any time via **moneo|RTM,** the real-time maintenance module of ifm's IIoT software, whether the plant is in good condition. The company quickly recovered the costs for monitoring the system through the longer intervals between costly maintenance. In addition, an unbalance was detected in a compressor that was not older than one year and for which there was still a warranty claim. This saved follow-up costs of more than €40,000 for repairs, energy consumption and maintenance.

Besides, a compressor that was not optimally installed and would also have led to increased costs over time was detected. Since the new acquisition of such a compressor costs more than €1,000,000, the monitoring of the plants by means of vibration diagnostics is worth every penny. Meanwhile, the project has been successfully extended to all 15 locations, and further applications, such as pumps and gearboxes, will follow.



QMR: licence for the condition monitoring software

- Plant monitoring via condition monitoring app for cost-optimised maintenance and servicing
- Transparent processes thanks to comprehensive data analyses
- Early detection of damage and alarm function
- Extension possible with the add-on licence for recording raw vibration data for IO-Link VVB sensors

Learn more about moneo|RTM at ifm.com

Cool chain!
Close gaps, reduce costs, increase trust

In order for food to reach the consumer in perfect quality and with the best possible shelf life, it must in many cases be constantly cooled during transport and storage. It is not only a matter of keeping the temperature permanently low. Humidity and air circulation also play a significant role in quality assurance.

Profitable for companies, attractive for customers
With sensitive sensor technology, it is nowadays easy to permanently monitor, maintain and document compliance with optimum storage and transport conditions. Even complex, global cold chains can be conveniently controlled and tracked in this way. The result: Less food has to be disposed of due to cooling gaps, and the cooling processes themselves can be operated with maximum efficiency. In addition to the economically attractive aspects of lower product losses and falling energy costs, there is also the added security that the customer experiences thanks to the transparent cold chain. Confidence in product quality increases - and with it the willingness to buy.

Your advantages with ifm
We offer numerous solutions to help you ensure an unbroken cold chain. Sensors, RFID systems and gateways for mobile applications that transmit information to the cloud from almost anywhere in the world will help you to clearly identify every movement of goods and permanently keep an eye on temperature air humidity.

IGS2: inductive sensor
- Large operating temperature range from -40...85 °C for greater flexibility
- Reliable detection thanks to high sensing range and low sensor tolerances
- Reduced storage costs due to wide range of applications

TM54: temperature sensor with process connection
- Precise temperature measurement in tanks and pipes
- For connection to an evaluation unit
- Very short response time for use in processes with rapid temperature changes
- Variable process connection via adapters

PV8: pressure sensor with IO-Link

- Compact design for use where space is limited
- Very high overload pressure and vacuum resistance
- Robust stainless steel housing with high shock and vibration resistance
- Two programmable switching outputs, one of which with an IO-Link communication interface
- Integrated temperature measurement via IO-Link

OY4: safety light curtain

- Resistant to steam and high-pressure cleaning thanks to protective tube
- Reliable protection of hazardous areas and accesses
- Meets the requirements of type 4 according to IEC 61496
- High range, selectable on the device
- Also available as safety light grid

SA5: flow sensor

- Simultaneous measurement of flow and temperature
- Reliable air flow monitoring
- Alternating red/green display for clear indication of acceptable ranges
- With switching outputs, analogue signals and IO-Link
- The process connection can be rotated for optimum alignment

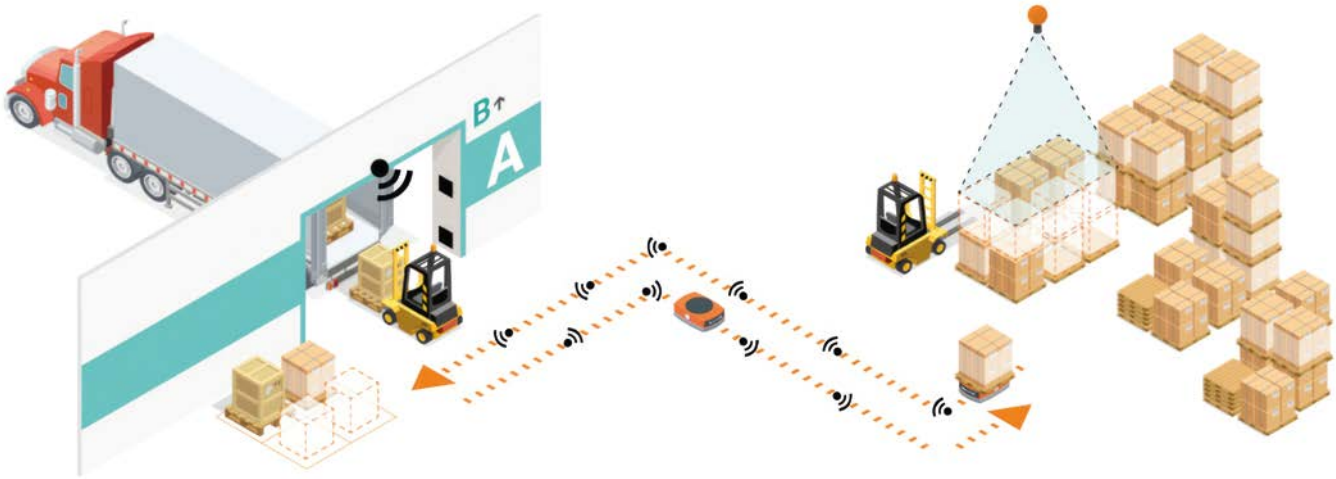
LDH29: air humidity sensor

- Easy temperature and air humidity monitoring for protection of electrical systems, control cabinets or production processes
- Plug & play thanks to screw or DIN rail mounting and M12 connector
- Data output via IO-Link
- Easy sensor replacement thanks to automatic parameter setting when connected to an IO-Link master

Track and trace gates:
Effective overview of the flow of goods
Security & transparency in the flow of goods

The ifm track and trace gate is the complete solution for your automated and transparent logistics for incoming and outgoing goods. By directly transferring all goods flows to the IT level, you can organise the interlocking of production, inventory and suppliers more efficiently than ever before.
The cost saving comes on top of this: Goods that are not picked properly generate consequential errors. Thanks to the new, digital transparency, errors can be avoided, the process speed, especially the order throughput time, can be increased and thus the fulfilment quality can be improved. This not only relieves internal resources, but also increases customer satisfaction. You can call it Logistics 4.0, or Smart Distribution. The decisive factors are the advantages that the ifm track and trace gate offers you from the very first moment.

How does the ifm track and trace gate work?
The ifm track and trace gate supports product tracking in your incoming and outgoing goods. It detects objects equipped with a UHF ID tag according to EPC Class1 GEN2/ISO 18000-6C. The solution connects all the required components to a controller in which the data is pre-processed and made available for further processing by third-party programmes. If, for example, a comparison is made in the ERP with the order or delivery note to be assigned, the controller can display the proper loading/unloading of the goods in the form of status and signals via a feedback file received from there.



Learn more about track and trace gates at ifm.com

There are three typical mistakes in order picking:

- Wrong goods
- No goods
- Too many goods

According to studies, the average error rate during order picking is between 0.3% and 3%.
Average costs vary extremely depending on industry, product and company. The loss of image is not quantifiable.

ZZ08: track and trace gate packages

By using a smart RFID incoming and outgoing goods inspection, the flow of goods can be shown transparently and processed on an IT basis. This allows optimising loading times, avoiding picking errors and saving costs. The quality increased in this way can also improve the supplier rating in the long term.

Turning the dream of clockwork into reality

How the IIoT can help you achieve a perfectly synchronised supply chain

Reference 57260, Aeternitas Mega 4, Calibre 89. If this name gets you excited, then you are definitely someone who is fascinated by the art of watchmaking. And that is totally understandable. It really is incredible to see how countless complications – as a horologist calls the different functions of a watch – can be implemented in such a small space. It's all down to precise interaction of cogs, springs, levers and shafts. Of course, a work of art like this doesn't come about overnight. It took around eight years for the 2,826 components of the Reference 57260 to be conceived, developed, produced and assembled, resulting in no less than 31 hands that provide 57 different functions. Sorry, we mean complications.

Complicated? It doesn't have to be that way.

The issue of time (and unfortunately sometimes also the issue of complications) plays a crucial role in supply chain management. Every unused or wasted unit of time costs money. Efficiency is to a supply chain manager what perfection is to a watchmaker. And they are essentially one and the same thing. To achieve maximum efficiency, all the units involved need to engage perfectly with one another, like clockwork, at all times. That is the only way to deliver the best possible results across all functions – ideally without any complications getting in the way. It sounds complicated but it's not really. At least not if you look for experienced supply chain specialists to perform the task, just like a watchmaker. They have perfected the craft of composing and synchronising all the cogs in the supply chain over many decades.

The first bit of good news is that you've already found these experts. The second bit of good news is that our seamless combination of sensors and software can turn your dream of perfectly clean, well-oiled and pleasantly whirring clockwork into a reality much more quickly than the example we talked about earlier.

Bringing two worlds together: GIB SCX meets Industry 4.0

How does it work? Very easy: We bring the production and IT levels closer together, ideally using existing frameworks. No matter whether we are talking about machine maintenance requirements, production capacity or intralogistic material flows: in Industry 4.0 they are all recorded using sensors, forwarded to the IT level and converted into readable information, for example using the moneo IIoT software. Our native "Shop Floor Integration" interface sends the information to SAP in real time. There, thanks to our "GIB SCX" supply chain solution, which also has native SAP integration and certification, all of the operational and strategic units involved access the exact same standardised data. This creates transparency and ensures that all subprocesses are perfectly synchronised. This means that everyone from purchasing to shipping can respond very quickly to even unscheduled maintenance requirements or spur-of-the-moment large orders. Everything is integrated and coordinated.

One cog engages with the other. Complex operations that were previously carried out manually run automatically in the background. Like the delicate work of art behind a clock face. An onlooker only sees the information displayed. But they know that the clockwork is running.

Precisely, cleanly and reliably. We turn the dream into a reality.

Everything the automation heart desires.

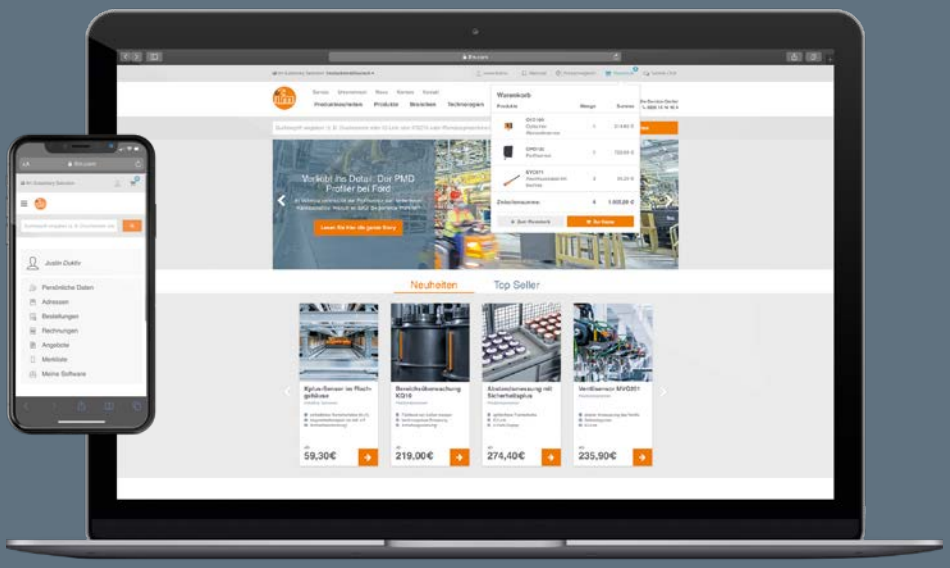
The online shop: Find more, search less.

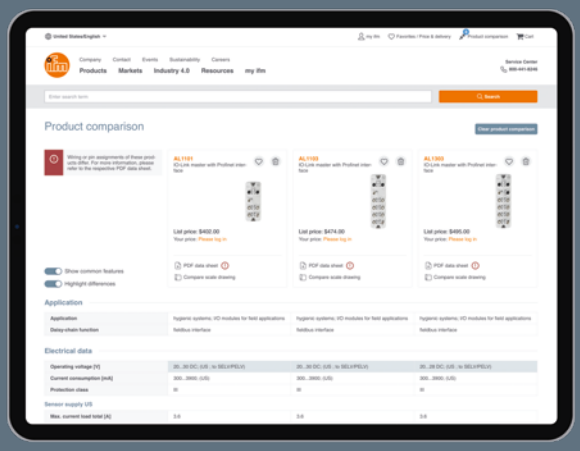
Where does efficient plant automation start? We think: when shopping! And that's why our online shop is designed to guide you to your desired product as quickly as possible. At the same time, we also want to offer you maximum service when shopping online. For example, the selectors help you to narrow down the search to the suitable product versions. In your personal my ifm account you can easily import comprehensive order lists, create your own offers in no time and convert them into an order with just one click.

Products, accessories and interesting facts

Are you looking for the suitable accessories for your product? No problem! We have compiled everything you need to know about installation, parameter setting and set-up and added it to the respective product page. Of course, in our online shop you will also find lots of interesting information about the technologies in our sensors, inspiration in the form of application reports, factory certificates for free download, and, and, and...

So if you are thinking about how to shop more efficiently, a visit to ifm.com is definitely worthwhile!





More transparency: Search for products, select, compare, get a support opinion, choose – and buy at your individual price.

More efficiency: Import order lists, create favourites, place previous orders again.

More flexibility: You decide how you pay and when we deliver.
If you are in a hurry: use our express shipping.

More you: Create offers yourself, convert them into orders with one click, track shipments and status, save and retrieve invoices.
my ifm – it's yours!

More future: Digitisation, Industry 4.0, finding solutions, downloading software, managing licences – all in one place.

More time: No closing times, no nasty surprises, shopping at any time, always up-to-date availability – and a reassuring 6 weeks' right of return.

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