



# APPLICATION REPORTS2023

Automation solutions from ifm







# A passion for automation

ifm is synonymous for automation and digitalisation with a passion. It makes us happy and proud to see this passion spread from us to our customers and witness how it advances them. In this eighth edition of "Application Reports", you will once more learn first-hand exactly what this means. Because again, our customers have permitted us a look behind the scenes and shared with us how they have overcome challenges and taken innovative approaches successfully with the help of our automation and digitalisation solutions.

So you can look forward to yet more exciting reports, this time on topics such as safe treatment of ultra-pure water, digitalisation of silo vehicles or new ways of growing plants using vertical indoor farming.

Enjoy reading!

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## AQUACHEM

Fully automatic filter presses





# Cleanly pressed!

Sensor technology on the automatic filter unit ensures fully automatic 24/7 operation



**James Babbé,**  
Managing Director of AQUACHEM:  
*"The presence of an operator is not  
required as we can guarantee machine  
availability of up to 98 percent."*

For almost 30 years, the company AQUACHEM GmbH Separationstechnik from Senden near Ulm in Southern Germany has specialised in the manufacture of fully automatically operated membrane filter presses. With the help of these filter presses, filter ash containing heavy metals from industrial plants is pressed into recyclable filter cakes. AQUACHEM relies on sensor technology from ifm for reliable operation of the fully automatic plants.

Chiresa AG uses no less than four of these AF1200 membrane filter presses in Switzerland. They specialise in the ecological and economic recycling of hazardous waste as it arises in industry, trade, commerce and municipalities in a wide variety of forms. Approximately 95,500 tonnes of suspension are conveyed through the four filter presses every year. That is almost 37 tankers per day.



” On the automatic filter unit, numerous ifm sensors support both the optimum process flow and the energy management.

“The filter presses used at Chiresa AG produce and empty compact filter cakes continuously, literally around the clock,” says **James Babbé**, Managing Director of AQUACHEM. “The presence of an operator is not required as we can guarantee up to 98 percent machine availability. By using chamber and membrane plates the operating parameters can be optimally set to cover the span between economic efficiency and ecological requirements. The system also helps us to prevent the suspension from leaking during the filter cycle as all filter presses in our portfolio are completely sealed. We are very proud of these features.”

Chiresa AG uses filter systems to process filter ash containing heavy metals from incineration plants in Switzerland. For this purpose, it is first dissolved in hydrochloric acid. With

*Capacitive sensors from ifm detect various limit levels on the tanks without being affected by the medium.*



*A pressure sensor of the PQ series monitors the compressed air needed to switch the valves.*

the subsequent so-called precipitation reaction, the dissolved components are separated into water and settling hydroxide sludge. The sludge is neutralised and then either disposed of or recycled as a solid filter cake using fully automatic filter presses from Aquachem. The water collected from filtration is then returned to the cycle.

#### **Process monitoring by means of sensors**


On the automatic filter unit, numerous ifm sensors support both the optimum process flow and the energy management. The inductive sensors monitor, for example, the end position of the filter press. This means that when the panel pack is approached, the motor is operated until the preset end position is reached.



A large industrial facility with a high ceiling and brick walls. In the foreground, there are numerous white bags labeled 'KALK' (lime) stacked on the floor. In the background, there are two large, vertical, cylindrical storage tanks. To the left of the tanks, there is a concrete structure with a staircase and various pipes and valves. The facility appears to be used for processing filter ash containing heavy metals.

*Chiresa AG in Switzerland uses the plants for ecological and economical processing of filter ash containing heavy metals.*





*An adjustable rocker beneath the filter press makes sure that the container is filled evenly.*



” *AQUACHEM relies on sensor technology from ifm for reliable operation of the fully automatic plants.*

### Capacitive sensors

Capacitive sensors, on the other hand, are used for limit value monitoring at the washing and rinsing station. The 700-litre rinsing station is used to clean the filter press. Filling it with acid dissolves suspension residues, regenerates the filter cloths and thus increases their service life. Two sensors for limit level monitoring and one sensor for fill level monitoring are installed on the rinsing station. The sensor at the bottom of the tank prevents the pump from running dry if it is underfilled. Overflowing of the acid in the tank is prevented by an additional sensor at the top of the tank. If the level falls below or exceeds the respective limits, a signal is sent to the control station. Normal filling is monitored with a third sensor.

The washing station with a volume of 3,000 litres is used for cake washing and cleaning the press from acid residues. Cake washing takes place after filtration to wash out the chlorides contained in the filter cake before it is sent to landfill. After acidification, water is used to rinse all acid residues out of the filter press. Thus the press is neutralised and the filter cycle can start again. Only two sensors are installed on the washing station to monitor the minimum and maximum levels.

In addition, the entire rinsing and washing station is located in a tub which is also equipped with an ifm leakage sensor. This immediately indicates if the tanks are leaking or if there are any faults in the two feed pumps.

### PQ pressure sensor

In addition to an analogue pressure sensor that detects the closing pressure (up to 350 bar) of the hydraulics, another digital pressure sensor monitors the compressed air supply within the filter press to ensure functional and safety-relevant operation. This ensures that the air supply is within the specifications and that the valves installed on the filter press also switch correctly. The so-called pressure switches are installed both on the rinsing and washing station and on each individual filter press. The air flow sensor type SD6500 measures the current air flow as well as the total consumed air flow, temperature and pressure. This enables the sensor to undertake several tasks at once: Documenting the air consumption benefits energy management. In addition, the sensor can also be used to determine the level of the filter chambers and thus contributes, among other things, to the longevity of the filter plates.

*As part of the energy management, the SD6500 monitors the compressed air consumption and provides the plant controller with important process-relevant information.*



*A robust ifm inclination sensor detects the angle of the rocker.*





### Controlling and monitoring the filling process of the container

Below the filter presses there are platforms for two containers in which the filter cakes are collected for removal. Laser distance and inclination sensors support an angle-adjustable rocker that ensures that the container is filled evenly. Five laser sensors are installed on each container. Two are used to ensure that a container is available for filling. The other three sensors monitor the level to optimally align the rocker. In addition, an IO-Link master with Modbus interface was installed via which the parameter setting of the laser sensors can be carried out. Especially during commissioning and later remote maintenance or troubleshooting, these masters are fundamentally helpful.

### Cooperation between AQUACHEM and ifm

AQUACHEM and ifm have been working together as partners for many years. AQUACHEM supports a wide variety of customers with different requirements. A special challenge in the project implemented for Chiresa AG was to establish the cake discharge by means of a rocker, and to safeguard the container room in order to avoid endangering the employees at all costs. AQUACHEM has been represented with its filter presses in flue gas scrubbing for many years and supports a large number of waste incineration plants. Setting the ideal positions, both of the rocker and the containers, was a task they were happy to solve. In cooperation with ifm and its sensors, AQUACHEM was able to master the challenge.

*IO-Link master AL1940 with Modbus TCP interface for space-saving mounting in the control cabinet.*





## EnviroFALK

Pure and ultra-pure  
water systems





# Not just clean, but absolutely pure

## Pure and ultra-pure water treatment systems

For more than 30 years, EnviroFALK GmbH has been designing, manufacturing and selling pure and ultra-pure water systems for a wide range of industries worldwide. Fundamentally, water as it comes out of the tap does not present a challenge for process sensors. Ultra-pure water, however, is a whole different story. The sensors used in these treatment processes have to be much more efficient and robust.

”With IO-Link, I have full transparency right down to each individual sensor via the HMI and the controller.

Everyone who has tried to clean a surface with tap water is familiar with the effect: You might find that unsightly stains appear. On window panes or drinking glasses, this effect may only disturb our aesthetical perception, but in industrial processes, it can seriously compromise the quality of products. For example, where treated water is used to rinse processed metal parts to remove oils and coolants, in order to prepare them for subsequent coating or electroplating. Or in the optics industry and in medical technology, where rinsing water must not leave any residue after drying. The solution: pure water. This water contains no dissolved minerals, salts, or bacteria. Depending on the quality grade, the term pure or ultra-pure water is used.

### Ultra-pure water systems

The company EnviroFALK based in Westerburg, Germany, has established itself as a specialist in this field. Founded in 1989, the company is now one of the market leaders for ultra-pure water systems.

**Peter Leyendecker**, co-founder and Managing Director, explains: “We develop concepts from the different water treatment technologies available on the market: reverse osmosis systems, ultrafiltration, nanofiltration, or ion exchange systems. Often, our systems use a combination of various technologies. We offer our customers complete concepts for water reduction, recirculation, and in particular for pure water treatment.”

**Maximilian Meurer**, Measurement and Control Engineer at EnviroFALK, explains how it works: “In this process water treatment system, we inject normal water as it comes out of the tap. In the first step, it is softened. With this soft water, all solids are filtered out by means of reverse osmosis. In the next purification step, the water passes through an ion exchange cartridge. It is filled with a special granulate, or mixed bed resin, which removes all minerals from the water. To check the quality of this fully desalinated water, we use conductivity sensors from ifm. Based on the process value it provides, we can immediately recognise an increase in conductivity once the cartridge is exhausted and needs to be replaced. The pure water is pumped into a tank for intermediate storage and also partially heated to allow for flexible use in various applications. The desalinated water is additionally subjected to UV radiation to combat germs and maintain a high degree of purity.”

### Sensors and requirements

Various sensors of the automation specialist ifm are used to monitor the complex treatment process and ensure a permanently high quality of the ultra-pure water. Even the smallest contamination or remineralisation could reduce the quality and must be avoided at all costs. This is why EnviroFALK uses flush mount sensors in their pipes and tanks. The advantage: There are no dead spaces causing static water, which could lead to unwanted enrichment.



Insulated downstream tanks for heating and storing pure water.

Another challenge is that demineralised water will constantly try to compensate for the unnatural desalinated state by dissolving minerals from the surrounding materials, e.g. from conventional stainless steel walls, which will lead to pitting over time. This is why the pipes in this system are made from plastic or stainless steel of a particularly high quality. The same applies to the sensors that come into contact with the media. ifm provides special sensors for ultra-pure water applications. The contacting parts of the sensing face consist of high-grade stainless steel or other materials from which ultra-pure water cannot extract any molecules.

#### Key measurement: the conductivity value

The LDL101 conductivity sensor is the right choice where the purity of water is crucial for product quality or process reliability. The conductivity value is the reciprocal of the electrical resistivity value of water. The purer the water, the higher its resistance and the lower the conductivity.

**Maximilian Meurer**, Measurement and Control Engineer at EnviroFALK, adds: *"We use the IO-Link sensor for conductivity measurement, which is key to assuring the quality of highly purified water. The conductivity indicates the concentration of ions in the water. The smaller the number of free ions, the lower the conductivity. The LDL101 conductivity sensor impressed us with its very large measuring span from 0.04 to 1,000 microsiemens per centimetre. This is ideal because it allows us to cover all system stages with one type of sensor, from normal 'municipal' water at the inlet to ultra-pure water at the outlet. Using only one sensor type reduces our storage costs. And less sensor variety also means less complexity for our service technicians in the field. We have equally been*



*impressed by the compact design of the sensor. We can connect it with standard M12 connection technology and do not need expensive data cables or an external evaluation unit in the cabinet, which saves time, space and costs."*

The high resolution and the loss-free digital transmission of the measured values via IO-Link enable a permanently precise analysis of the water quality, ensuring flawless processes. For example, if the conductivity value rises during ultra-pure water production, this indicates that parts require maintenance.

#### Clean pressure measurement

The pressure in the pipes must be monitored at several points in the system. In the future, the PL15 pressure sensor will be used in a complex water system to fulfil a combination of several tasks.

*"Firstly, we use the PL15 for pump control. Thanks to IO-Link, the sensor possesses excellent resolution across the entire pressure range of 0 to 10 bar. IO-Link allows direct reading of the measured values in a digital format, i.e. without conversion losses, which gives us even more precision. In addition, we no longer need to make any settings on the sensor itself, which facilitates handling."*

Another area of application where the pressure sensor can really unleash its strengths is the tank.

*"The PL15 is also suited for level monitoring. Its flush design prevents dead spaces causing static water, and thus, unwanted enrichment. Another benefit of the pressure sensor is that it provides the medium temperature as an additional process value, which further enhances process transparency and control," says Maximilian Meurer.*

*The LDL101 sensor from ifm performs conductivity measurements to monitor water purity, and signals in time when ion exchanger cartridges need to be replaced.*



” *The main advantages of IO-Link for us are the reduced sensor variety and storage costs.*



*The specially compact and flush pressure sensors of the PL15 series, which can be freely configured via IO-Link, offer maximum flexibility.*



#### **Precise flow rate measurement of ultra-pure water**

Also relevant to the customer is the quantity of pure water available at the end of the treatment process. During reverse osmosis, the feed stream is separated into a pure water stream, referred to as permeate, and a concentrate stream, which contains the particles. For example, by comparing both quantities, the plant operator can see that filters require maintenance or that the feed stream is heavily contaminated with foreign substances. To obtain an exact result, the flow rate must be precisely measured at several points in the system.

For this purpose, sensor specialist ifm has developed the SU-type ultrasonic flow meter for ultra-pure water applications, which can detect flow rates of up to 1,000 l/min with high precision. Thanks to ultrasound technology, this also applies to ultra-pure water with low conductivity as it is produced in the plants at EnviroFALK. In combination with the conductivity sensors of the LDL family, reliable control of the quality and quantity can be established in the filtration process.

The measuring pipe of the flow meter is made of higher-grade stainless steel and is free of measuring elements, seals and moving parts. This means that faults caused by deposits, damage, leaks or blockages, which



can occur in mechanical systems such as impellers or turbines, or design-related pressure drops as they occur with other measuring principles, are excluded from the outset. The measuring pipe made entirely of stainless steel eliminates the need for material compatibility tests of electrodes or seals and allows easy, complete and residue-free cleaning. The LED, which can symbolise the signal strength, serves as an additional visual indicator of a stable process. A dropping value can be an indicator of particles, air bubbles or deposits on the inner wall of the pipe.

#### Non-contact radar measurement in tanks

The IO-Link-capable LW2120 radar level sensor is ideally suited for non-contact level monitoring in tanks. It can detect levels up to a height of 10 metres without blind zones and at a millimetre resolution. The 80 GHz frequency used ensures stable and precise measurement results even in confined spaces. With the antenna extension, available as an accessory, the sensor can also be used outside closed metal tanks, for example on open tubs or plastic tanks.

*"For certain applications, we use the radar sensor instead of hydrostatic level measurement. For example, end customers request this in the ultra-pure field, where every screw connection and every measuring point represents a potential source of contamination. In such applications, level measurement using a radar sensor is advantageous, as the sensor is installed outside the tank lid and does not come into contact with the medium," explains Maximilian Meurer.*



*The measuring pipe of ifm's ultrasonic flow meter is free of measuring elements or moving parts and thus ideal for use in ultra-pure water applications.*



*The non-contacting LW2120 radar level sensor is installed outside the lid of the pure water tank.*

Standard M12 connection technology ensures error-free installation within minutes, while IO-Link adds the convenience of remote parameter setting and reading. The intelligent algorithm in the unit makes parameter setting via IO-Link seem like child's play: After setting the reference height once, the sensor immediately provides the exact level via IO-Link.

#### **Added value with IO-Link**

Speaking of IO-Link: Inspired by the technology, EnviroFALK has chosen to rely on sensors using this digital communication protocol.

**Maximilian Meurer** explains the benefits: *"With IO-Link, I have full transparency right down to each individual sensor via the HMI and the controller. If abnormal conditions arise, the diagnostic data of each sensor helps me to quickly identify and eliminate the problem. Passing the sensor data into the controller is also very simple. Thanks to cyclic data queries, the measured values are directly provided as numerical values. Previously, with analogue measured values, this was not possible. IO-Link also allows me to query and digitise other data, such*





*The IO-Link communication protocol provides access down to each individual sensor. This creates maximum transparency and facilitates troubleshooting.*



as serial numbers or calibration data. I can even specify the output unit of the measured values, e.g. for flow sensors litres per minute or cubic metres per hour. Moreover, IO-Link lets me transmit several measured values of a sensor. An example of this would be the conductivity sensor, but also the pressure sensors we use on the tanks and the pump: We measure the pressure to determine the level in the tank, while at the same time reading the temperature value the sensor provides in order to know the medium temperature in the tank. This saves us the effort of installing additional temperature sensors and adding the corresponding screw connections in the tank. The SU-type flow meter also transmits several measured values through one data line: In addition to the flow rate and the sensor status, the total flow rate and the temperature are also available via IO-Link. And thanks to the data storage function, we, and the end customer notice immediately if a wrong sensor is used or if there are wiring errors. With this function and the simple connection of prewired M12 cables on both the master and the unit, you no longer necessarily need a qualified electrician to just quickly replace a sensor."

IO-Link supports comprehensive parameter setting. Output functions, measuring ranges, switch points and other parameters can be freely selected within the characteristic values of the sensor. Where many different sensors were required before, one IO-Link unit is often all that is needed today.

**Maximilian Meurer:** "The main advantages of IO-Link for us are the reduced sensor variety and storage costs. Our service technicians no longer need so many different sensors when replacing devices. This saves time and money."

### Conclusion

In pure and ultra-pure water systems, ifm sensors allow streamlined yet precise process monitoring. IO-Link reduces the storage costs and mounting complexity, which results in significant costs savings, while also creating complete transparency of all processes as companies move into the digital age. In a nutshell: a clean solution!

*Decentralised IO-Link masters save space in the control cabinet and offer the possibility to connect sensors and actuators. Connection to the plant controller is made via Profinet.*



## Feldbinder

Digitalisation of silo trucks





# Silo 4.0: unload more efficiently

Feldbinder brings bulk transportation into the digital age

The shortage of skilled workers continues to impact the transportation industry. Employers wanting to win over the much-in-demand truck drivers can definitely benefit from offering a comfortable workplace. This includes a well-equipped tractor unit but also extends to easy handling of the transported goods. This approach to innovations was also adopted by the German company Feldbinder, headquartered in Winsen an der Luhe. Feldbinder has been manufacturing silo and tank trailers since 1975 and in 2018 they launched the Silo 4.0 project, which aims to systematically take them into the digital age.

## Facilitate the daily life of companies and drivers

*"At that point in time, also after receiving corresponding feedback from the market, we concentrated on asking ourselves how we, with our vehicles, would be able to provide the transport companies with more comfort and support during the unloading process,"* remembers Michel Jörn, who, as a designer of new vehicles, is responsible for the silo semi-trailers and the Silo 4.0 project at Feldbinder. *"Of course, this was also about supporting the drivers as best as possible in their everyday work and make things a little easier for them."*

The idea to digitalise the silo trucks and silo trailers was born – and it was implemented with the support of the automation expert ifm. *"As we had already been in close contact with ifm due to other projects, we have made sure to also benefit from their expertise when implementing Silo 4.0,"* says Michel Jörn. *"In addition to the hardware itself, we were convinced in particular by the extensive testing procedure applied by ifm to its components in order to ensure suitability for mobility applications and to obtain the required certifications."*

## Central control of the unloading process

So what exactly is the advantage that Silo 4.0 has over conventional semi-trailers and silo trailers? *"Until now, the driver had to walk up and down along the vehicle during the unloading process, to open or close each shut-off device of the material conveyance or the air distribution system,"* says Michel Jörn. *"Our digitalised vehicles can be centrally controlled from a single location. To do so, the driver can either use the touch display or the additional control panel mounted below it."*



*Digitalised silo trucks provide drivers and companies with more comfort, safety and efficiency during unloading.*

Very comprehensible display and robust input device: the ecomatmobile hardware is designed for demanding outdoor conditions during daily use.





”Our digitalised vehicles can be centrally controlled from a single location. To do so, the driver can either use the touch display or the additional control panel mounted below it.



The ecomatDisplay with a capacitive 12 inch touch screen and freely configurable keys is designed for mobile use both in the cab as well as in the outdoor environment. It integrates a powerful controller, which can be individually programmed through CODESYS. To the display, Feldbinder added the ecomatPanel.

*“By using the control knob, fine adjustments can be made quickly, for example when valves only need to be opened to a certain degree for mixed unloading operations,” explains Michel Jörn. “In addition, all the other operating actions that can be performed using the touch display can also be carried out by using the panel. This is advantageous especially when the user wears working gloves.”*

### The future: transparent and efficient

Whether opening and closing the valves, starting or shutting off the main engine and the secondary drive, speed control – with a silo trailer 4.0, the driver can do all of this in a digital manner. And thus, in an extremely comfortable and efficient way.

The same holds true for the integration of the hardware and software into the silo trailer. “We can connect up to four CAN circuits to the controller integrated into the display, which enables us to select each individual element of the silo trailer 4.0 in a structured way,” says Michel Jörn. One CAN circuit is used for the linear drives and the remote control, the second circuit is the one for the type CR2042 ioControl modules. The ioControl modules decentrally collect data from the sensors – for monitoring the pressure and fill level, for example, and forward this data to the controller via a pre-fabricated CAN Bus cable. In the same way, the modules can forward commands of the controller to the connected actuators; with Feldbinder’s solution, the valves are controlled via the ioControl modules. In smaller applications, the modules can even be used as small controllers thanks to their programmability.

### M12 connector reduces effort and sources of error

Depending on the type and design in question, Feldbinder equips its trailers with up to five ioControls, which are available as versions with either DEUTSCH or M12 connector.

*“Currently, we are using modules with DEUTSCH connector, but we will switch over to the version with M12 connector in future,” says Michel Jörn. “This makes cabling significantly easier as wiring errors are eliminated right from the start thanks to the standardised design. Thus, even employees without the relevant electrotechnical knowledge are able to wire the sensors, which allows our specialists to invest their time and expertise into more demanding tasks.”*



” When implementing the project, we also used the software libraries that ifm offers for its controllers.

*ioControl modules, here in the Deutsch design:*

*They provide the controller with information and forward commands to the actuators but can also be used as small controllers if needed.*

### **Integrator knows and values ifm's range of software**

Regarding the development of the software, Feldbinder relied on the external expertise of system integrator Reinholz Software and Technology.

*“We have been working closely with ifm for many years and know the hardware very well,”* says Pascal Kaufmann, head of Mobile Automation at Reinholz.

His colleague, software developer Thorben Oltmann, adds:

*“The special requirement in the context of Feldbinder's Silo 4.0 project was to develop a modular software that would enable Feldbinder to define the specific equipment and configuration of each silo trailer by themselves by means of a CSV import. When implementing the project, we also used the software libraries that ifm offers for its controllers. The software blocks help accelerate the overall programming of the software considerably. First, the need to invest resources into the programming of sometimes complex functionalities is eliminated, second, there is a certainty that these software elements have been tested comprehensively and that the communication between the hardware components works seamlessly.”*

### **The first step towards the future has been taken**

Hassle-free comfort, efficient processes – has digitalisation arrived in the transportation industry? *“The customers that use our modern vehicles will never want to do without the new options again. Drivers and companies equally value the easy handling and quicker unloading times.”*

So, the first step towards the future has been taken. But Michel Jörn does not yet want to leave it at that. *“Feldbinder has recognised the potential of the new possibilities; we want to make things for our customers even easier and offer them support regarding qualitative optimisation.”*

For example, already today the CR3158 GPS module can be integrated, which helps determine the exact position of the vehicle. *“This is useful to avoid costly and time-consuming faulty loading and unloading operations when customers have multiple unloading points, for example.”* In future, the process data from the silo trailer is intended to be used for the further support of quality assurance procedures. *“Recording the unloading pressure, centrally defining unloading quantities, the electronic closure of manlids and valves, all of which assigned with positional data and time stamp.”*

### **Conclusion**

A suitable combination of hardware and software enables unambiguous data recording – and via the cloud, the records can even be shared with all parties involved. All in all, this leads to transparent and more efficient transportation and unloading processes. And from this, all sides benefit in the end: transport companies, drivers and customers.



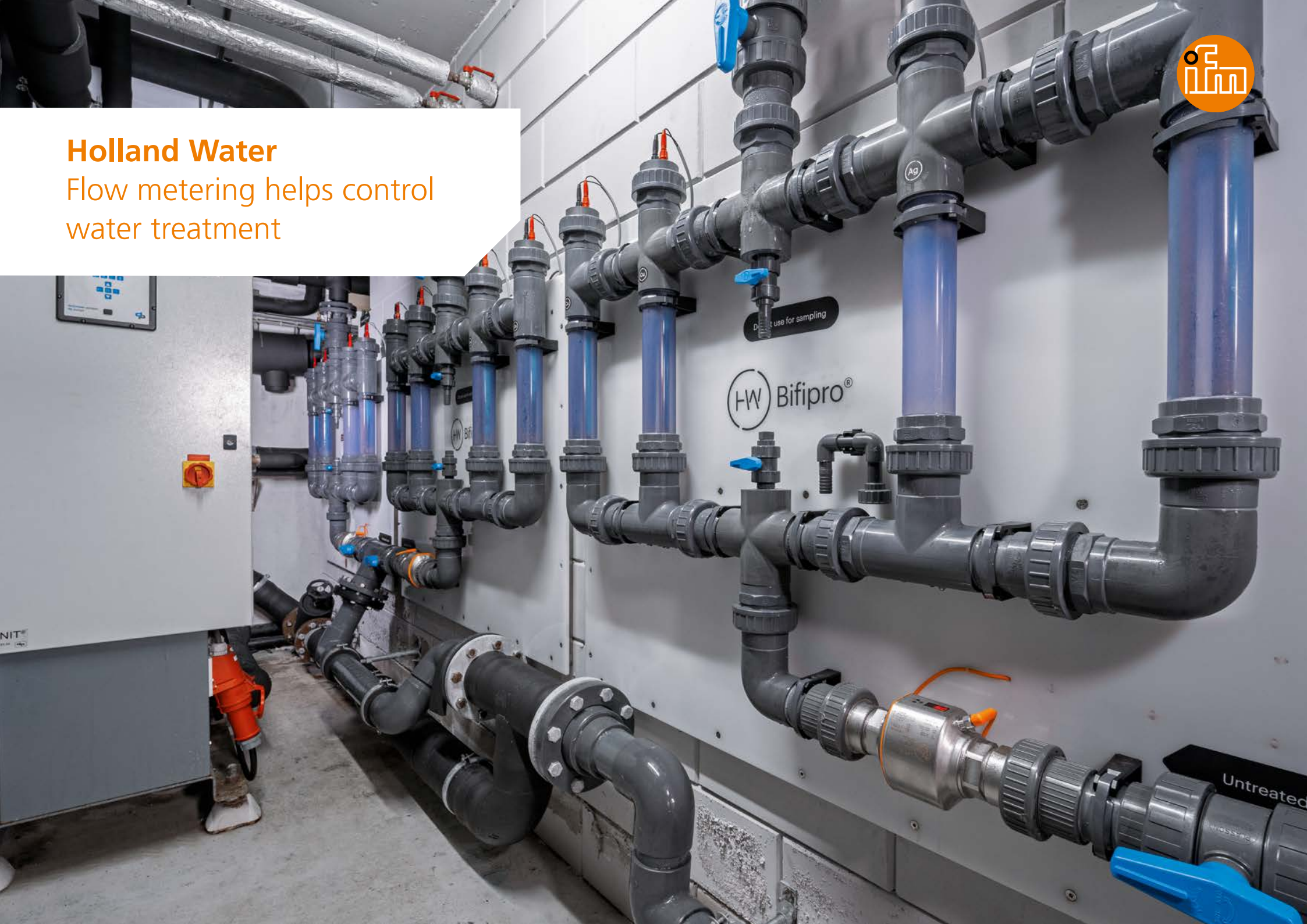
*Last set-up test before delivery:  
In future, the information from  
digitalised silo trailers could contribute  
to quality assurance in the goods  
transport industry.*





## Holland Water

Flow metering helps control  
water treatment





# No chance for legionella

## Automated water treatment for perfect water quality

The importance of safe water is clear in regard to buildings such as an apartment complex, a hospital or a hotel. Bacteria, including legionella, can be life-threatening following an outbreak.

Legionella bacteria find their way into the respiratory system through the inhalation of small, contaminated water droplets or water spray.

### Patented system for legionella control

Holland Water, based in Driebergen-Rijsenburg in the Netherlands, has developed an effective system against the dangers of legionella infestation: HW Bifipro is a patented water treatment system based on copper and silver ionization technology, comprising an easy-to-install water treatment panel and a control unit (HW Tech Control). Placed directly behind the building's water entry point, the system releases precise and miniscule doses of ions into the water, which subsequently spread and treat the entire water installation system. Copper

and silver ions break down and dissolve the biofilm often present in waterpipes, and they prevent the development and colonisation of legionella. Due to the residual effect of ions distributed throughout the water installation, HW Bifipro offers exceptional efficacy against harmful pathogens.

Aside from safe water free from biofilm and legionella, the HW Bifipro system also has other important benefits to offer, including the reduction of the hot water temperature. Holland Water stands for the safety of people and the environment. In addition, the HW Bifipro system is fully certified in compliance with international legislation. Holland Water works together with qualified and professional partners for international distribution.

*Holland Water's patented HW Bifipro system is located directly behind the domestic water supply and uses copper and silver ions to ensure legionella-free water.*

*In the largest hotel in the Benelux countries, the „Van der Valk Hotel Schiphol“, Holland Water was able to solve the legionella problem.*

### Van der Valk Hotel

Basically, water pipes that are not permanently flushed are ideal breeding grounds for legionella. Therefore, it is obvious that hotel operators in particular want to counteract this health risk actively and sensitively. Where individual rooms are not used for several days, biofilm develops in their hot water pipes, which is a breeding ground for legionella and other pathogens. Special precautionary measures are required to prevent these from entering the lungs via the water vapour when the shower is used again.



**”** ifm is a partner with whom we have been working since the foundation of our company twenty years ago.

*Important for the system: The ifm flow sensor provides the measured value for the exact dosing of the copper and silver ions.*



*Maximum transparency:  
the process parameters are clearly  
shown on the display of the unit.*



Amsterdam Airport is home to the largest hotel in the Benelux countries with 750 rooms: the Van der Valk Hotel Schiphol. In recent years, the building complex has been renovated and expanded – and the water infrastructure has also been modernised, as hotel manager Bill van der Valk explains: *„Our hotel has been around for 30 years. We have detected elevated levels of legionella in the pipes of some of the older rooms, but were unable to achieve a significant reduction with the measures we had taken so far. Then we became aware of Holland Water’s solution, contacted the company and got to work together. With their system, we solved the legionella problem quickly and sustainably.”*

### Spaarne Gasthuis

Change of scene. In Hoofddorp, not too far from Amsterdam, the „Spaarne Gasthuis“ hospital can be found. In relation to legionella, the focus here is on both the cooling tower and the drinking water system.

**Cor Wegman** is the Technical Department’s team leader. With his 15 colleagues, he takes care of maintaining the buildings and facilities and explains:

*„We have particularly vulnerable people here in the hospital and a special duty of care towards them. We have a large cooling system here, which also includes a cooling tower. Good water treatment for the cooling tower is crucial, because this is where water vapour can get into the environment. We need to prevent legionella from multiplying. Holland Water’s Bifipro system was exactly the solution we have been looking for. Because we wanted to contain the formation of legionella in a sustainable and environmentally friendly way. The system saves*

*us the great logistical effort that came with using biosubstrates employed by us for legionella control. With the new system, we can reduce chemical water treatment.”*

The hospital even received an award from the environmental authorities for these optimisations in environmental protection undertaken by Cor Wegman’s team.



*The “Spaarne Gasthuis” hospital near Amsterdam uses HW Bifipro® Cool in their cooling system to prevent water vapour which might be contaminated with legionella from entering the ambient air.*

### ifm successful in the field

These are just two of over 1200 buildings where Holland Water’s legionella protection is already in use. Included in every installation: a magnetic-inductive flow sensor from ifm. And this sensor supplies the measured value that is decisive for the process.

**Mark de Vaal**, Head of Sales – Hospitality & Leisure at Holland Water, explains the special importance of this sensor:

*„We need precise information on the flow in the system. An example: little water is used at night, and in the morning everyone takes a shower, so a lot of water is used. Therefore we have to know exactly what the current flow is so that we can precisely dose the copper and silver ions. In addition to the current flow rate, the ifm sensor also provides peak values as well as the total flow rate, which we can then analyse in our system control on a daily, monthly and annual basis.”*

### Conclusion

No chance for legionella – with the HW Bifipro system, Holland Water has successfully achieved this objective. It is actively supported by the flow sensor from ifm, which provides the central measured value for this purpose. This is how **Mark de Vaal** sums it up:

*„ifm is a partner with whom we have been working since the foundation of our company twenty years ago. We have gone through the entire development process of the HW Bifipro system with ifm. Every time we have questions, we can turn to ifm. And this has been working to our complete satisfaction for years.”*



**Iturri**

Control technology for  
mobile applications





# Through fire and water with ifm

In fire-fighting, Iturri relies on control technology for mobile applications

Whether in the fire engine or in the equipment container: Almost nothing works in firefighting without electrical control technology nowadays. Iturri is a global manufacturer of fire engine chassis. They have been relying on the control solutions for mobile applications provided by the automation specialist ifm for more than 20 years.

When it comes to firefighting, speed is not everything. Equally important is the reliability of the material used. It must function perfectly even under extreme conditions such as heat or water. Always part of the action: modern control technology which is crucial for the functioning of the various fire-fighting vehicles. Iturri is based in Wilnsdorf in the Siegerland region. The manufacturer belongs to the internationally operating group of companies of the same name. The latter have their roots in Spain and specialise in the construction of customised fire-fighting vehicles.

At the German plant, around 80 to 100 fire-fighting and special-purpose vehicles are manufactured and delivered each year. In addition to fire-fighting engines, the portfolio notably includes equipment vehicles, environmental protection vehicles, command vehicles and vehicles for emergency site hygiene. National and international customers include municipalities, the industry sector and airports.

*The "CCFM 3000" forest fire-fighting truck has excellent all-terrain capabilities and is equipped with state-of-the-art control technology.*





*The hygiene station RO/RO container is also equipped with control technology and a graphic operating panel.*



*The self-protection system sprinkles windows and tyres with a water spray jet. This means that the vehicle can even drive through walls of fire to self-evacuate in an emergency.*

” We tested various controllers from different manufacturers and the ifm controller was the best fit for our requirements.

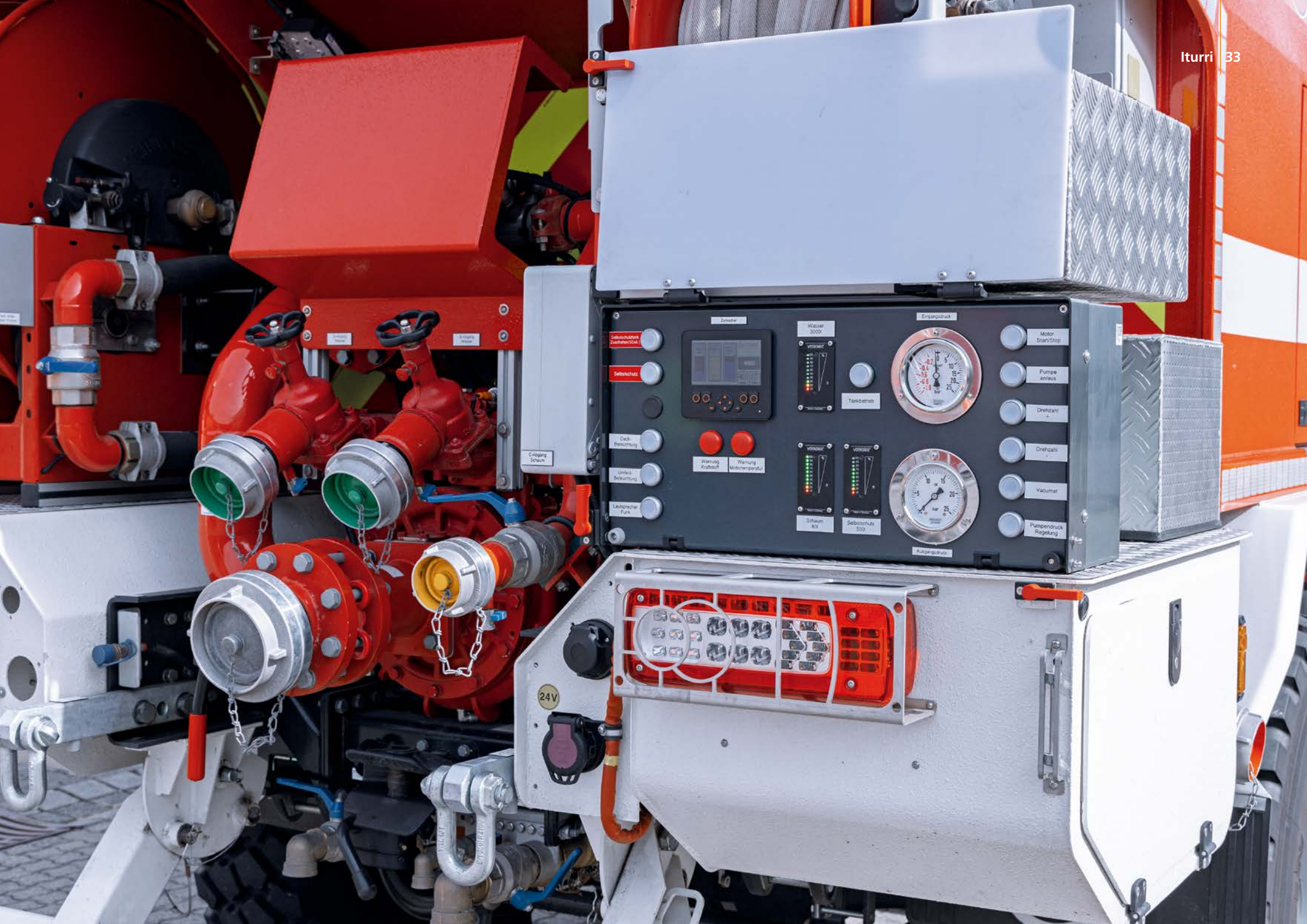
#### Forest fire-fighting truck

At present, there is special focus on the forest fire-fighting truck developed by Iturri. The latter is an extremely all-terrain four-wheel drive vehicle that cannot only master extreme slope angles and gradients but also cross slopes of over 30 degrees. This vehicle combines all the know-how that the originally Spanish company has been able to gather over decades from forest fire-ridden southern Europe. For example, the vehicle is coated with a special paint that is fire-resistant and, due to the special heat insulation, protects the occupants in the driver's cabin from extreme temperatures near the fire. The brake lines and electrical cables are sheathed in heat-resistant material and thus protected against heat and mechanical damage.

A special feature of the vehicle is its self-protection system: water nozzles mounted on the outside of the vehicle sprinkle its windows and tyres with a water spray jet if necessary. This allows the vehicle to escape surrounding walls of fire and self-evacuate, in an emergency situation, simply by driving through the fire. The vehicle has a separate 500-litre water tank and its own pump system for this self-protection system.

Germany's densely forested areas, including for example those in Lower Saxony and Brandenburg, have also increasingly been affected by forest fires in recent years. The federal states in question have therefore also decided to purchase these special forest fire-fighting trucks from Wilnsdorf.





Control panel with various gauges and switches:

- Top Left:** Emergency stop button (Notstopp), Self-protection button (Selbstschutz).
- Top Center:** Digital display (Zusatz), Water flow meter (Wasser 3000), Tank operation button (Tankbetrieb).
- Top Right:** Pressure gauge (Eingangsdruk), Motor start/stop button (Motor Start/Stop), Pump start button (Pumpe anlauf).
- Middle Left:** Discharge pressure gauge (Ausgangsdruk), Foam flow meter (Schaum 800), Self-protection 500i (Selbstschutz 500i).
- Middle Right:** Pressure gauge (Ausgangsdruk), Motor stop button (Motor Stopp), Pump stop button (Pumpe stop), Speed control buttons (Drehzahl +, Drehzahl -), Vacuum button (Vacuum), Pump pressure regulation button (Pumpendruck Regelung).
- Bottom Left:** Discharge pressure gauge (Ausgangsdruk), Foam flow meter (Schaum 800), Self-protection 500i (Selbstschutz 500i).
- Bottom Center:** Warning buttons (Warnung Kraftstoff, Warnung Motortemperatur), Leaking fuel button (Leakender Fuhr), Low level button (Unterw. Bekantheit), Discharge pressure button (Ausgangsdruk).



24V



The vehicle's "brain": ifm's CR711S central controller.





*Important functions can be selected on the CR0452 ecomat display. On this display page, the proportioning of the wetting agent can be set.*



### Central control functions

Modern fire engines cannot manage without comprehensive control technology. A central PLC, supported by numerous sensors, takes care of the various control and regulation tasks on board of the different vehicles.

The extinguishing agent, for example, which consists of water with the addition of a wetting agent, is precisely dosed for the type of fire at hand with the help of flow sensors. The proportioning pump required for this purpose is controlled by the PLC via a CAN signal. Firefighters can set and read the dosage, which has been specifically selected for the particular type of fire via a control panel with graphic display.

Pressure sensors detect the water pressure at the jet pipe and control the pump for the required volume flow and pressure.

This pump is driven by the auxiliary drive of the vehicle engine. The controller regulates the speed of the diesel engine so that the set value for the water pressure remains constant. For this purpose, the CAN interface with J1939 protocol to the vehicle engine is used.

Additional equipment, such as the special signalling system (flashing blue light and siren) or other signal lamps and illuminations for securing the scene of an emergency, are visualised and operated via a monitor and controlled by the central PLC. Doors or roller shutters are monitored by means of inductive sensors, for the vehicle is only allowed to drive off when these are closed.

Logical operations, too, are saved in the controller. Example: when the siren is activated, the blue light must also be switched on automatically. However, the blue light may be illuminated without the siren in return. A rear warning device (yellow LED lights) may only be used when driving slowly, and above a certain speed it must be switched off automatically. The controller receives the speed value directly from the vehicle's control system via CAN bus.

Pressure sensors using the hydrostatic measuring principle monitor the level of the water and extinguishing agent tanks in the vehicle and visualise them on the various displays in the cockpit and at the rear of the vehicle.

An inclination sensor on the vehicle chassis determines the tilting angle in the longitudinal and transverse direction of the vehicle. Depending on the level of the extinguishing agent tanks and the vehicle speed, the controller determines critical angles of inclination and warns the driver in good time - by means of visual and acoustic signals including voice output.

### High demands

These examples show how extensive and complex the requirements for the central controller are. Iturri has been relying for this on solutions from the automation specialist ifm for years.

**Jens Schöler**, programmer at Iturri: *"In the past, control functions were implemented using conventional wiring. Then the vehicle manufacturers switched to CAN bus. The controllers used until then could not handle this. We then tested various controllers from different manufacturers and the ifm controller was the best fit for our requirements. It covered everything we needed, and at a good price. That's how we came to choose ifm."*

Relying on their ecomatmobile product line, ifm offers powerful controllers, displays, operating units and I/O modules for mobile use. Compared to their counterparts for industrial environments, these components are designed for the specific requirements of use on vehicles. For example, the housings are specially sealed, and they can also be mounted outside of driver's cabs. Extreme temperatures such as heat or freezing cold do not affect them any more than shocks and vibration. The enclosures are also EMC-resistant.



*The driver can control all special functions and aggregates via the CR1082 programmable graphic display in the cockpit.*

**Dr.-Ing. Klaus Kutzner**, management representative at Iturri: *"EMC is an important requirement for our vehicles. All electrical devices that are installed in a vehicle must have this E Mark, for example radios, blue lights and also the electronic controller. And ifm is one of the few manufacturers to offer control components and sensors with this E Mark".*

#### **Performant controller**

Modern vehicles and mobile machines need very powerful control electronics to be able to process the high number of input and output signals. The new third generation ecomatController was developed specifically for this purpose. It has two independent internal PLCs – one of them a certified safety controller.

The control electronics are integrated into a compact metal housing with front-mounted, coded central plugs for mobile use, providing all the necessary connections for inputs, outputs, communication and programming. RGB status LEDs indicate the most important system messages. The core of the controller, which has been designed according to the applicable standards for electronics in mobile applications, is one of the most advanced multi-core 32-bit processors with 300 MHz clock frequency. Its 6 MByte application memory includes a 1 MByte file storage system. The ecomatmobile controller comes with CAN interfaces for communication. The latter are used for communication with the vehicle units via the J1939 protocol. Other components in the vehicle chassis such as signal horns, lights, environmental sensors or reversing cameras communicate via the second CAN interface via the CANopen protocol.

The CR711S controller used here offers 60 input / output ports. The entries can be configured as digital, frequency or analogue inputs with diagnostic function or as inputs for resistance measurement. The analogue inputs enable both current and voltage measurement. The outputs can be configured as digital or PWM outputs with diagnostic capabilities, with or without current control. More ports are available via CAN I/O modules. Programming is done by means of the standardised IEC 61131-3 languages. Programme creation is facilitated by the fact that ifm offers free function libraries, for example manufacturer-specific function blocks to address the diesel engine via J1939 protocol.

#### **Visualisation and operation**

The forest fire-fighting truck has three HMIs (Human Machine Interfaces) from ifm, two of them in the driver's cab and one at the rear of the vehicle. Relevant vehicle and extinguishing agent parameters are displayed to the firefighters via customised visualisations with clear symbols. By means of easily accessible pushbuttons, the operator can switch the displays or change process values.

The CR0452 and CR1082 displays and operating units from ifm used here also have an integrated PLC with input / output ports and CAN interface. Iturri uses these decentralised controllers in the HMIs for data pre-processing. For example, the measured values from the environmental sensors (including outside temperature, air quality, wind direction and speed) are pre-processed in the display controller and transmitted to the main controller as a finished data set. This not only simplifies the programme creation at this point, but also ensures a lean process flow.



### ifm Partnership

Iturri has been working closely and in partnership with ifm in the field of control technology for more than 20 years.

Jens Schöler explains what he appreciates about ifm: *"One of the great advantages of working with ifm is that ifm offers ready-made software modules for many functions, for example for the connection to the chassis of various well-known vehicle manufacturers. These modules can be downloaded free of charge from the ifm website. That helps us a lot. We write all the control programmes ourselves. Here too we can count on ifm's support, for example when new displays are used, and the programme has to be created or adapted in the process. ifm has provided dedicated contacts who also come to us and help us with the implementation on site. This is a huge asset of ifm. There are also other renowned manufacturers. If I call there, I can wait a long time in vain for support. But with ifm, I get quick help, either over the telephone or through a visit from their service staff".*

### Conclusion

Extensive control functions in the background, including comprehensive sensor technology and intuitive input displays ensure that the firefighters can concentrate on their actual task in the field: the effective extinguishing of fires. With ifm as a long-standing partner, Iturri can fully meet this requirement.



Pressure sensor with E1 type approval for detecting the water pressure at the jet pipe.





**Kettec**  
Special machines  
for the energy transition





# With delicate precision against hurricane forces

Fully automated machinery produces components for wind turbines.

Wind power plays a key role in the transition from fossil-based to renewable energy production. It ranks second or third behind photovoltaics, depending on whether or not hydropower is considered a renewable energy resource and the production of electricity from wind is continuously increasing. In 2021, the capacity of all wind turbines worldwide increased by 94 gigawatts to almost 840 gigawatts.

The companies Kettec and Tiskens contribute to the expansion of this segment of renewable energies by building plants that are as efficient as possible.


Modern wind turbines are up to 180 meters high and can produce up to six megawatts of electricity per hour at maximum capacity.

For the turbines to be able to convert the wind energy into electrical energy with long-term and maximum efficiency, loss-free power transmission must be ensured.

Here, the rolling bearings play a key role. The smoother they run, the lower the energy loss. Accordingly, the components used to manufacture each rolling bearing must be of the highest quality.

One of these components is the rolling bearing cage, which keeps the balls in position and ensures loss-free power transmission.

” *We have been working with ifm for ten years already. Their extensive range and product quality had us convinced right from the start.*



*From the individual components supplied, a precisely dimensioned rolling bearing cage is to be manufactured.*

### **0.2 millimetre tolerance over 19 metres**

"The manufacture of these rolling bearings calls for enormous precision," says **Joachim Schmitz**, Head of Sales and Development Mechanical Engineering at Ketttec GmbH.

The company specialises in the manufacture of automated special machinery. It was precisely this kind of machine a manufacturer of wind turbine bearings was in need for.

"The machine we developed and built can weld together individual components fully automatically to form blanks of up to 19 metres for rolling bearing cages, all with a tolerance of only 0.2 millimetres."

### **Smooth automation of complex processes**

Gripping, conveying, welding, milling: To make sure the entire, complex process runs smoothly and automatically with maximum reliability and precision, the sensors must be just as reliable and precise.

"We have been working with ifm for ten years already," says **Joachim Schmitz**. "Their extensive range and product quality had us convinced right from the start. Accordingly, the current machine contains many components from this provider of automation technology and digitisation solutions. They ensure that the complex, interconnected processes function just as smoothly as the ball bearings in which the rolling bearing rings will be used later."

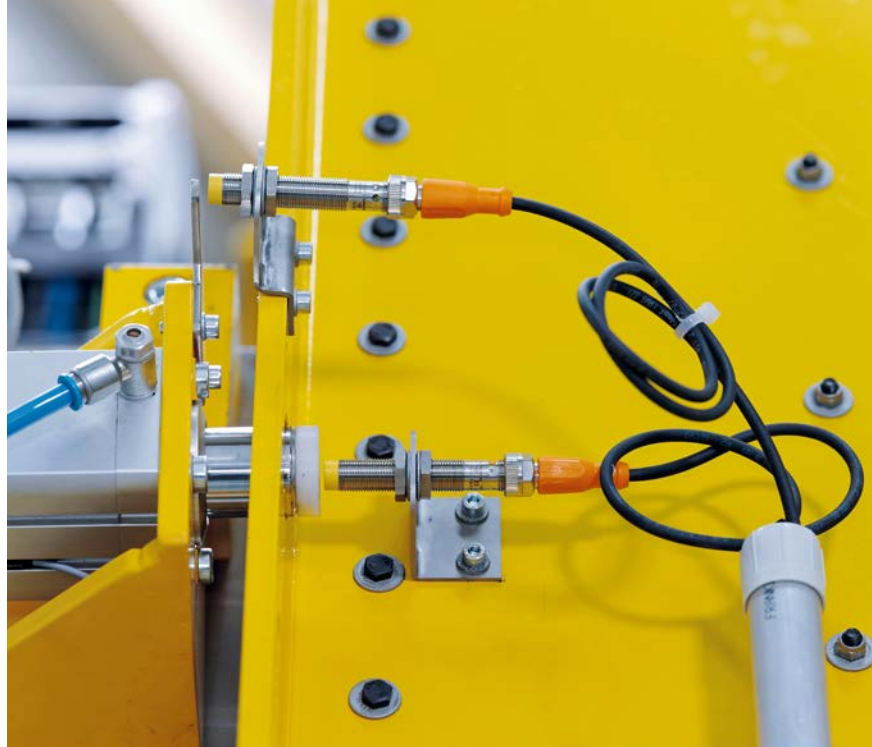


*The fully automated milling and welding unit must work reliably and with highest precision.*





*Besides safety products, such as its inductive safety sensors, ifm also provides advice and support through its Safety Service.*



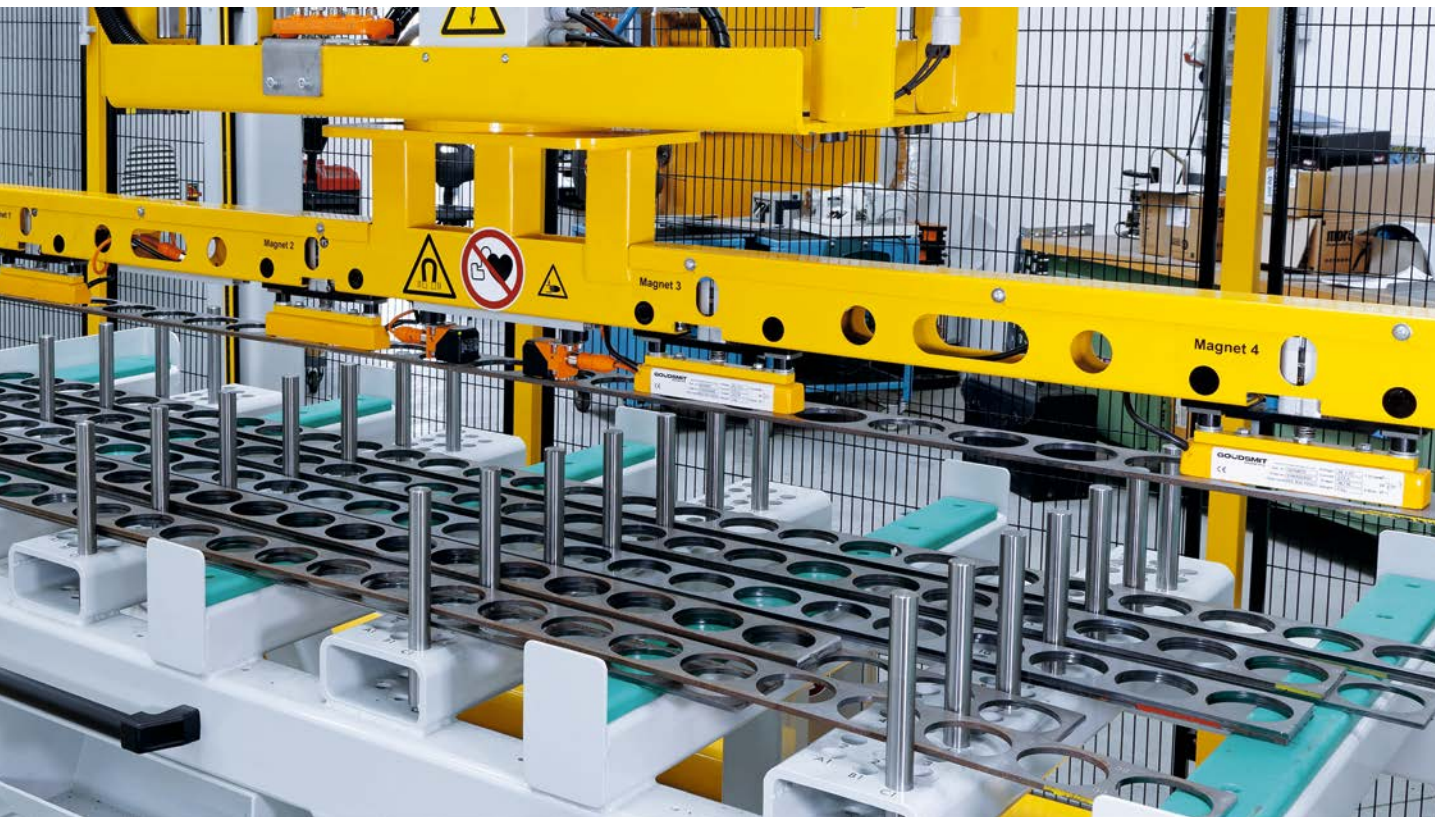
### **Safety solutions from a single source**

The first step, the loading of the individual components into the system, is done manually. For this purpose, a transport trolley is positioned and fixed underneath the gantry robot.

But not only the presence of the trolley is detected with sensors: Safety light grids also prevent the gantry robot from moving while persons are in the danger zone. To allow operators to work safely underneath the gantry robot, two inductive safety sensors detect whether the gantry robot has assumed a safe position and is additionally secured with a bolt.

"In addition to ifm's safety sensors, we will also use their Safety Service in the future – for us as plant developers, it is a great advantage to obtain all automation aspects and components from a single source," says Joachim Schmitz.

The ifm Safety Service assists plant manufacturers in developing and implementing a seamless, legally compliant and state-of-the-art safety system.



*Where manual work meets automated work, operators must be reliably protected by safety precautions.*



### Length detection to the tenth of a millimetre

Once the individual parts have been placed under the gantry and all persons have left the secured area, the system takes over. Presence detection, pick-up and correct orientation of workpieces, completeness check of milling attachments, exact manoeuvring of the gripper on the gantry robot, and precise positioning of the milling and welding unit:

"Everything that can be moved and detected automatically in the system is solved by means of ifm sensors," says **Joachim Schmitz**.

The same applies to the precise length measurement of the rolling bearing blank.

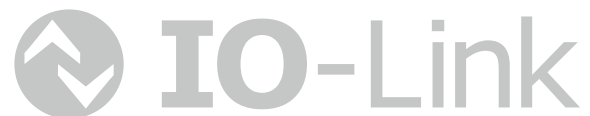
"For this task, we use an absolute multiturn encoder in combination with a measuring wheel. Thanks to the high resolution and the accuracy of 0.1 degrees, we can reliably meet the stringent tolerance specifications."



*Inductive sensors detect the presence of the milling heads (left), a light barrier ensures exact positioning of the workpieces before welding and an absolute multiturn encoder is used for precise length measurement (below): For all these tasks, Kettec relies on sensor technology from ifm.*



” For us as plant developers,  
it is a great advantage to  
obtain all automation aspects  
and components from a single  
source.



#### Permanent and precise position monitoring

The advantage of absolute multiturn encoders such as the RMV300 used here is that they can track the absolute position even in the currentless state and transmit any changes once power is supplied.

“If our workpiece is displaced in the currentless state, we still know the exact length of the bearing cage blank that has been welded so far,” says **Joachim Schmitz**.

#### The many benefits of IO-Link

All sensors of the special machine communicate via IO-Link – a significant advantage, as Jan Tiskens, Technical Sales Engineer at Tiskens Steuerungs- und Antriebstechnik GmbH & Co. KG knows. The company implements the automation for Kettec. “A great benefit for our work is the fast, easy, and error-free wiring,” says **Jan Tiskens**. “It allows us to save up to 20% of the time compared to conventional central wiring. In terms of individual customer solutions, we are also more flexible if we want integrate additional sensors for enhanced functionality which were not originally considered in the planning. All this is much easier to achieve thanks to the decentralised approach. At the same time, we save around 15% of cabling costs because we can connect the field-compatible IO-Link masters in series, minimising the need for long cable runs.”

#### Remote diagnosis can reduce downtime

The decentralised, digital connection of the sensors is not only beneficial for initial implementation of the automation. “Thanks to remote maintenance, we can check the entire system down to the individual sensor for proper function and faults, and do not have to wait with troubleshooting until we get to the customer’s site,” says **Jan Tiskens**. “We can identify the cause in advance from our location. This also drastically reduces any further maintenance work that may be required at the customer’s site. Defective cable sections can be replaced without causing serious downtime, and even sensors can usually be replaced with limited expertise, i.e. by the customer’s own staff, as the IO-Link master will automatically transfer the stored parameters to the new sensor. This can significantly reduce downtime.”

#### Digital quality assurance

And finally, the digital acquisition of all process data leads to a considerable gain in comfort and safety for the end customer, as **Joachim Schmitz** emphasises: “All data is documented with a time stamp. In the event of a recourse claim, it can be verified easily and unequivocally whether actual deviations occurred in the process which affect the quality of the end product.”







*The PerformanceLine IO-Link masters, here with Profinet interface, facilitate and accelerate the connection of sensors and provide sufficient power supply for actuators.*

**Conclusion:**

With its broad range of modern sensors and infrastructure solutions, ifm supports the companies Kettec and Tiskens in automating and digitising even complex and unique production plants. Not only the companies, but also the end customers benefit from the advantages of digital data transmission via IO-Link.





## König brewery

Safety during pallet transport





# Best possible protection at the pallet lift

König brewery relies on safety light grids from ifm.

In the König brewery in Duisburg, up to 55,000 bottles can be filled per hour. They are sorted into the appropriate crates. Picking for orders and preparation for delivery takes place in the intermediate storage area. In the course of this process chain, the crates and pallets have to be taken up several floors. The most important component of internal logistics is thus an appropriately dimensioned and frequented pallet lift system. To ensure best possible protection of employees in the working area of these vertical conveyors, the brewery has upgraded its safety devices to the newest state of the art with safety light grids from ifm.

Coal, steel – and Pilsner: Not only mining and heavy industry have shaped the history of the Ruhr area. In many cities of Europe's largest densely populated area, the tradition of brewing beer was established around the same time. This was also the case in Duisburg, where Theodor König founded his brewery in 1858, and König Pilsener is still brewed and bottled there today. Whereas in the early days the demand could still be met with manual labour, much of the brewery's work is done today with machine support. For example, in the intralogistics: Starting with the filling and sorting of the bottles into the respective beer crates, through transport of the crates to intermediate storage, order picking, and delivery, a lot of processes run automatically here.

*Access for pallets only: The safety light grids prevent employees from entering the goods lifts during operation.*







The integrated muting function ensures that pallets can pass through the light grid without stopping operation.



### Constantly running lifts as a logistics hub

*"The crates are brought to their respective destinations on pallets", explains Roland Schoppmann.*

The master electrician is responsible for the maintenance of the filling plant. Due to structural changes and expansions in the course of the company's more than 160-year history, the individual stations through which the beer passes from bottling to delivery are distributed over several floors. The central hub in this system is a total of five pallet lifts, each of which can transport a pallet with up to 40 crates up and down. These lifts are basically never still: *"55,000 bottles can be filled per hour at peak", says Schoppmann.*

In less than a minute, a pallet is filled and ready for transport to the interim storage facility. Empty crates also have to be delivered at the same rate. In addition, there is the flow of pallets towards the delivery ramp.

*"So we cannot afford a long-term standstill of the lifts", says the master electrician.*

### Safety barriers reduce the risk of accidents

In order to be able to carry out maintenance work on the conveyor system or rectify faults, it is necessary to keep the areas in front of the lifts accessible.

*"Not accessible to people, on the other hand, are the lifts themselves, while they are in operation", Schoppmann emphasises. "The potential danger for the person in the lift would be far too great. That's why all access points to the danger zone of the lifts have been fitted with safety light barriers so that the lift can come to a safe standstill immediately if anyone passes through the protection field."*

The company is now bringing this protective measure up to the current state of the art and is relying on safety products from ifm for the first time.

More precisely: relying on safety light grids which enable unhindered passage of material through the protection field, but bring the hazardous movement to a standstill as soon as a person interrupts the protection field.

This function, also known as muting, is already integrated in the ifm units and ensures that the protection field can only be muted for a short time for pallet transport. The distinction between pallet and person is made possible by specially arranged optoelectronic sensors, so-called muting sensors.

**”** *An initial pilot project showed how easy it actually is to manage the safety grids. For the modernisation of the lift protection, we therefore decided in favour of devices from ifm.*

” *We have already worked together with ifm in other areas of automation and, so far, have always been satisfied with the products and the partnership-based, solution-oriented cooperation.*

These are already fully pre-prepared sensor systems which, depending on the requirements of the material to be transported, monitor the conveyor area in the danger zone either crosswise or with parallel arranged light beams. As necessary, muting can be carried out with two photoelectric sensors aligned crosswise or parallel to each other. In the case of parallel-aligned muting devices, the objects can change their position and width. With cross muting, the position and width of the object is decisive and only if both factors are correct will the light barriers be interrupted simultaneously and the light grid muted.

#### Maximum protection against unauthorised access

Sensor systems for both muting variants are available for ifm safety light grids. Since, in the case of the König brewery, only pallets with a fixed width can be transported in the lifts, a sensor system with cross muting is used.

The sensor system is connected, without much effort, directly to the base unit via pre-prepared plug connectors and is also evaluated there. The advantage here is that the system can also be integrated relatively easily into existing infrastructure. The usual additional expense, that would usually be incurred for laying cables from the muting sensors to the central control cabinet, is thus eliminated.

Additionally, clearly visible LEDs are integrated in both the basic units and the associated sensor systems, which greatly facilitates the alignment of the light grids. Depending on version, the basic unit of a light grid can monitor a protection field with a height of up to 910 millimetres and a maximum area width of up to 12 metres. All technical requirements of currently valid safety standards for area monitoring are met.

#### Cooperation in partnership

*“We have already worked together with ifm in other areas of automation and, so far, have always been satisfied with the products and the partnership-based, solution-oriented cooperation”, says Schoppmann.* “For this reason we decided to also use ifm products for safety-related applications, especially as we were convinced of the expertise and experience of the ifm staff in this field during an appointment at our company. An initial pilot project showed how easy it actually is to manage the safety grids. For the modernisation of the lift protection, we therefore decided in favour of devices from ifm. This is another successful measure for best possible protection of our employees in automated areas at all times.”

#### Conclusion

With its safety products and technical expertise in the field of machine and plant safety, ifm helps König Brewery maintain state of the art safety at their important intralogistics hub in Duisburg – for the benefit of the employees.









**Leffek**

Efficient cooling circuit  
monitoring





# Monitoring cooling circuits with precision.

Sensors in cooling systems for power electronics.


Powerful cooling systems protect energy converters in industrial environments from overheating. In the cooling system, sensors monitor the process and ensure energy-efficient and optimum dissipation of lost heat.

Semiconductors heat up during operation. In the field of small electronics, heat sinks are often sufficient to dissipate the heat. Powerful PCs already use water cooling to protect processors from overheating. The container-sized XXL cooling systems for industrial applications from the Duisburg-based company Leffek Industrie GmbH are in a different league, even though they are based on the same in principle.

**Cengiz Danaci** heads production there and explains: *"We design and build cooling systems for power electronics. They permanently dissipate the heat losses that occur during energy conversion so that the large energy converters can operate continuously. The cooling capacity of our systems ranges from 500 W to 5 megawatts. Thereby, cooling liquids move in a flow range from 3 to up to 800 cubic metres per hour."*

*Various sensors monitor the process.*





The electronic contact manometers combine the advantages of pressure sensors with those of analogue manometers.

### Sensors monitor the cooling circuit

Different sensors from the automation specialist ifm are positioned in the pipes of the cooling circuit. They support the controller regulating the ideal cooling power.

**Cengiz Danaci:** *"The most important parameters in the cooling system are flow, pressure and temperature. These process values must be continuously monitored and processed in the controller. They are also interdependent. If, for example, there is no pressure or no pressure difference, then no coolant will flow. And if no coolant flows, no heat will be dissipated from the power semiconductors. In this case, the systems may overheat and suffer damage. Therefore, the control and monitoring of the cooling system is of particular importance with regard to safe and reliable operation. Many sensors are also double, in some cases triple. This prevents that a failure of a measuring point will lead to a shutdown of the cooling system and thus to a shutdown of the important energy converter that is tempered via this cooling system. The installations are used in very diverse areas, for example in power plants, in mining or in the steel industry. Therefore, the installed sensors must be suitable for the corresponding environmental conditions of these industries in terms of their ambient temperature and robust construction. We rely on sensors from ifm for this."*



” We use the IO-Link parameter setting functions of the ifm sensors intensively during the setup, configuration and documentation stages.

#### Electronic contact manometers with analogue display

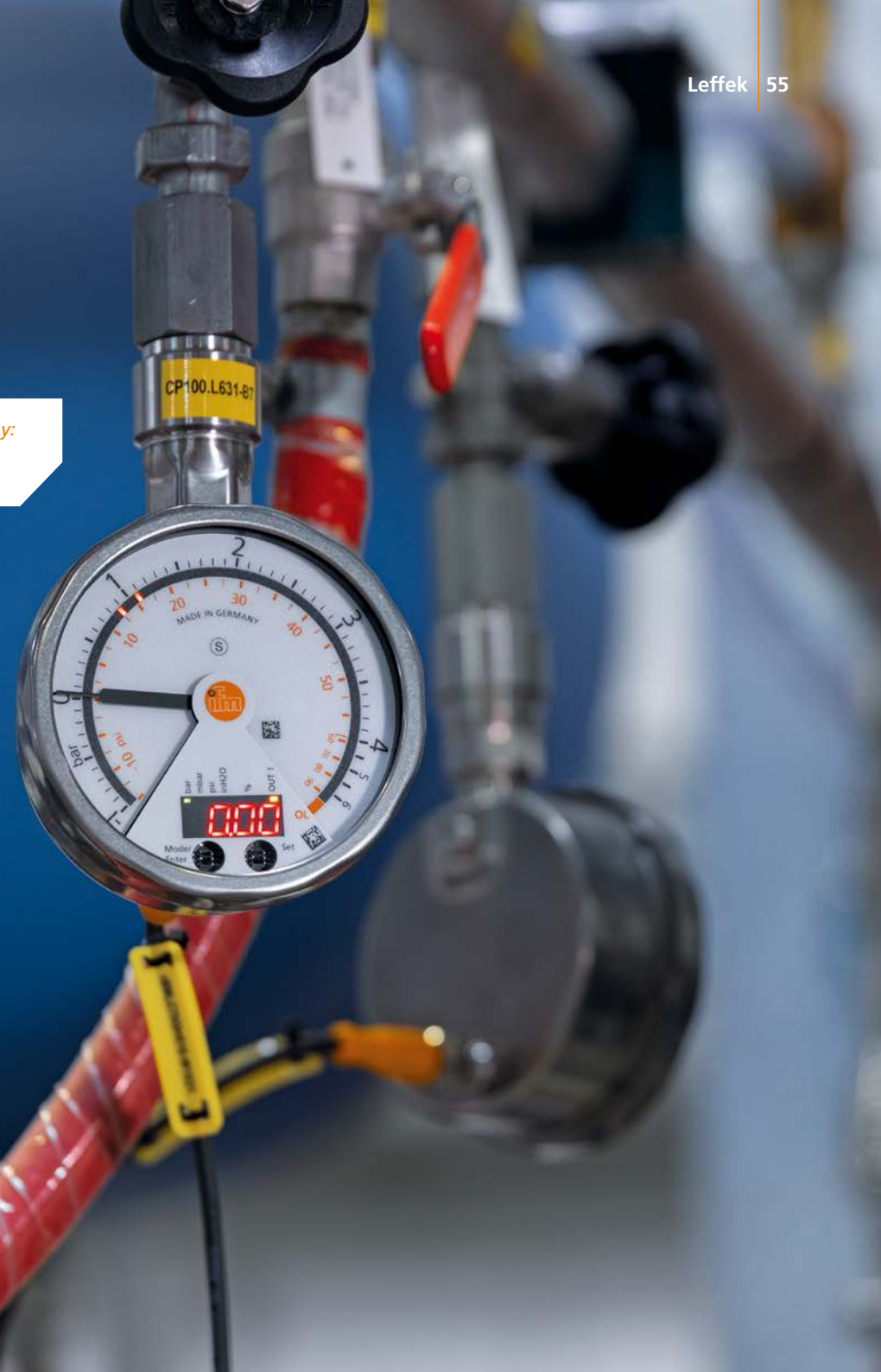
The electronic pressure sensor of the PG series with analogue display combines the good readability of a manometer display with the advantages of an electronic pressure sensor.

**Cengiz Danaci:** “The pressure gauges are used both in the system pressure range upstream of the pumps and in the conveying pressure range downstream of the pumps. We use the ifm pressure sensors of the PG series because they offer digital measurement, transmit the pressure values to the process control system via a current signal and also offer the advantages of an analogue manometer display on site.”

The ifm sensor has both programmable switching outputs and a scalable analogue output. The current system pressure is indicated by a pointer. It is simultaneously shown on the LED display as an alphanumeric value. The LED ring also indicates the set and reset points, trends and, if there are any, limits of dynamic pressure fluctuations. This offers maximum transparency and overview when reading on site.

Thanks to its robust stainless steel housing, the sensor can withstand even harsh industrial environments. The rotatable analogue display can be adapted quickly and conveniently to any given installation situation.

More than just a monometer display: the LED ring here indicates the set switching points.



“We use temperature sensors from ifm because they directly provide us with the process variable by means of a current signal in the process control system.”

*TN series temperature sensors with fast response time and on-site display.*



#### Sensor with temperature probe and display

The temperature sensors of the TN series used on the cooling system serve to reliably detect process temperatures.

*“We use temperature sensors from ifm because they directly provide us with the process variable by means of a current signal in the process control system. In addition, they show the operator the current temperature via an on-site display,”* says **Cengiz Danaci**.

Furthermore, the units are characterised by an excellent response time, high pressure resistance and a large measuring range. Critical process states, e.g. reaching of minimum or maximum limit temperatures, can be directly monitored by means of the switching output.

Set-up, maintenance and operation are facilitated by a 4-digit LED display that is visible from all sides even at greater distances and two switching status LEDs on the sensor head. Parameter setting is performed via the buttons on the sensor. In addition, the sensor can also be configured via IO-Link using a PC, e.g. by means of a USB interface.

#### Compact flow sensors with stainless steel housing

With their calorimetric measuring principle, the flow sensors of the SI5 series ensure reliable monitoring of the coolant in piping systems. Thanks to a great variety of available process adapters, the sensors can be used in almost all industrial applications. Their robust stainless steel housing provides high reliability even in harsh operating conditions.

The flow range and the switch points are adjusted using a pushbutton on the unit. A multicolour LED display indicates the nominal flow range and the switch point. Electronic locking of the settings prevents unintentional maladjustment.

#### IO-Link for sensor parameter setting

All modern sensors have an IO-Link communication interface. This allows digital access to the sensor. Measured values can, for example, be transmitted digitally, which ensures greatest accuracy without any conversion losses. For even greater reliability, the sensor also provides diagnostic data. Leffek uses another advantage of IO-Link.

**Cengiz Danaci:** *“We use the IO-Link parameter setting functions of the ifm sensors intensively during the setup, configuration and documentation stages.”*

Instead of setting switch points, hysteresis or the scaling of the analogue output via the buttons on the sensor, this can be done conveniently via PC using the corresponding adapter and software. A mouse click is all it takes to transfer stored parameter sets to the sensor. This reduces setup complexity significantly. At the same time, the parameter sets stored there serve to document the installation. This is why using IO-Link saves time and costs.



### Bottom line

A wide range of reliable sensors guarantees that the temperatures in Leffek's cooling systems are right. The cooperation with the automation supplier ifm also has the right climate .

Cengiz Danaci says, "We are very satisfied with the performance of the ifm sensors, also with regard to the documentation of the devices, the accuracy and the MTBF analyses. ifm's support is also very satisfactory. We are continuously informed about new developments, equipment replacements and new areas of application for the equipment."

This underlines the claim of customer proximity that ifm's slogan has been expressing for years: **ifm – close to you!**

Flow sensor type SI5 monitors the flow of the cooling liquid in the pipes and displays it on the LED bar graph.







## Lenne workshop

Quality assurance at manual  
workstations using ifm mate





# Perfect bagging process

Lenne workshop relies on the ifm mate worker assistance system

Sozialwerk St. Georg e. V., based in Gelsenkirchen, Germany, is a decentralised social service organisation that operates around 100 locations throughout North Rhine-Westphalia. It also includes the Lenne workshop in Schmallenberg where around 320 people with disabilities are employed.

The fields of activity in which the Lenne-Werkstatt offers work to people with disabilities are diverse. They include carpentry, electrical assembly or metalworking. In addition, there are office services, document shredding and packaging activities.

*"We work together with many companies from the region that operate in different sectors and also globally," says **Benedikt Hanses**, production manager at the Lenne-Werkstatt.*

*"Most production orders are quite extensive while the requirements to implement them properly are high because if the manufactured or packaged end products are faulty or incomplete, our customers will have to deal with costly complaints. Of course, we have to and want to avoid that," says Hanses.*

## Efficient order implementation is becoming increasingly necessary

It is, however, not only the expectation of reliable quality that is continuously increasing: *"The set time frame sometimes requires a high level of efficiency on our part to complete the orders on time."*

For **Benedikt Hanses**, this is the best reason to provide people with disabilities who are employed here with the appropriate tools or even to develop them in-house, especially in the case of permanent or extensive packaging or assembly orders.

*"These tools enable our workers to successfully implement the task. This increases motivation and reduces frustration. At the same time, this assures our quality."*



**”** We chose ifm mate especially because of its ease of use and reduced technology.



*The display guides the worker through the packaging process. The software processes the position, orientation and height of the hand and can thus ensure correct execution of the individual steps. The colour scheme for the worker's visual orientation can be defined as required.*

*In this case, the boxes from which individual parts have already been taken will turn red. White indicates containers from which parts are still to be taken. Green confirms correct placement on the collection surface.*

### **Any packaging error could lead to a standstill**

100 per cent assured quality is also required as part of an order for an internationally active manufacturer of machinery for underground pipe laying.

*"We are contracted by the company to pack sliding bushings and O-rings of various designs in pressure seal bags. They are needed as spare parts for the drilling machines. Accordingly, the aim here is to achieve a failure rate of 0 because every missing part can lead to an expensive machine standstill," says Hanses.*

Depending on the machine, such a bag may contain up to 18 different spare parts.

### **Dramatic reduction of the redundancy of inspection effort**

*"So far, we have implemented 100 per cent batch security through a threefold control system. First, the client packed the required items and checked the product. Afterwards, both the group leader and I manually checked the batch to make sure it was free of defects."*

An immense amount of work that has now been automated and considerably reduced by the ifm mate worker assistance system.

### **ifm mate - easy-to-handle worker assistance system**

The automation specialist ifm originally developed the worker assistance system out of its own needs to support its employees at manual assembly and packaging workstations – both in the daily routine and in the training process for new employees or new work processes. The aim was to keep the system easily manageable without sacrificing performance.

mate is available as a complete solution and its heart is a 2D/3D camera and a box PC with powerful pre-installed software. It detects the exact position, height and orientation of the human hand using artificial intelligence and visually guides the worker at the workstation through the process via a display. Unlike other existing solutions on the market, mate does





*If many individual parts that sometimes look identical have to be packed correctly, mistakes can quickly occur. The ifm mate worker assistance system effectively helps to prevent this.*

not require any additional accessories such as tracking wristbands and is easy to set up for any manual activity. *"We chose ifm mate especially because of its ease of use and reduced technology," says Hanses.*

By tapping the touch screen, for example, the positions of the containers with the individual components can be taught; depending on requirements, it is then possible to specify whether the individual steps are to be processed in a predefined or free sequence. A combination of both options is also possible.

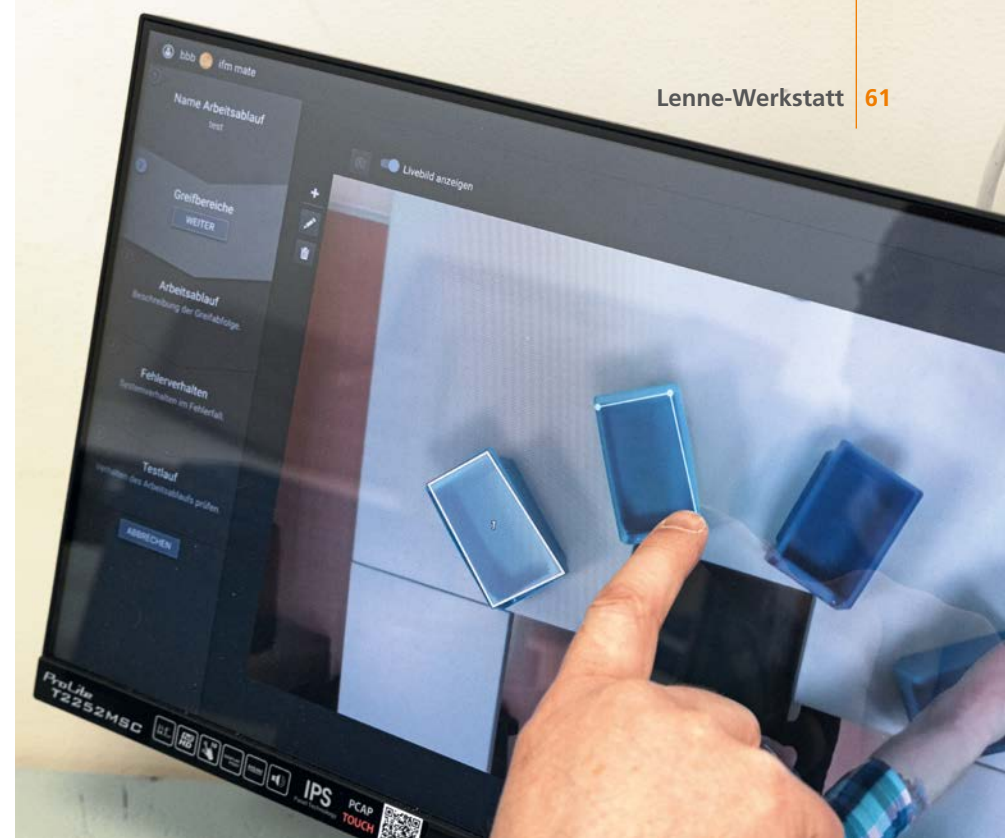
#### **The customer is glad about the quality improvement**

*"The most important argument for us, however, was that we can achieve 100 per cent order processing with efficient time expenditure. Because the software reliably prevents omitted or faulty packaging steps already in the process, redundant testing has become completely unnecessary," says Hanses, who*

can now use the time gained more productively. The increased quality of the deliveries has also already been positively noticed by the commissioning machine manufacturer.

#### **Convinced by the system – and the service**

*"Certainly, such a worker assistance system stands and falls with the acceptance of those who have to deal with it in everyday life," says Hanses. "There is a great demand among our employees to work with mate. And our employees who assist the workers at the workplace are also more than convinced of the added value – not least because of the ease of use. ifm itself has also contributed to this. We received fantastic support at all times from the first contact up to the setup and familiarisation phase at our company. Even now, any queries that may arise can be resolved quickly and without complications. System and service have completely convinced us in this case."*



#### **Bottom line**

The Lenne workshop convinces its customers with reliable and timely order processing. It is open to effective aids that help to support the various manual activities. With its worker ifm mate assistance system, the automation specialist was able to offer the company such a tool. The result: error and complaint free order processing with significantly reduced monitoring effort.



**Pentair**

Condition monitoring  
for pump systems





# Pentair – condition monitoring as a win-win-service

## A precise look at pump health

At Pentair in Winterswijk, the Netherlands, pumps have been manufactured for over 118 years. The company has grown from a family-owned business into a global leader in water solutions. The pumps and pump systems are designed, produced, and tested entirely in-house. By responding effectively to customers' needs and developments in the market, the company already has many innovations attached to its name.

Under the Pentair Fairbanks Nijhuis brand, the global company produces smart and sustainable pumping solutions for municipal and industrial water supply.

"The pumps are used, for example, in drinking water supply, water treatment, firefighting, regional heating water distribution, and in the onshore and offshore industry," says **Jeroen Munnik**, head of the Pentair Service Centre in Zevenbergen, which – together with the Service Centres in Beverwijk and Tynaarlo – ensures that customers receive all the support they need when dealing with pumps: from inspections, preventive

and corrective maintenance, the procurement and replacement of pumps to prompt support in the event of acute maintenance needs. In case of emergency, the experts are ready around the clock.

### Condition monitoring complements on-site service

For the past three years, Pentair has no longer relied solely on manual service by on-site specialists for customer support. "With our condition monitoring solution Pentair CMD19, we also offer our customers the modern possibilities of efficient demand-oriented maintenance based on the evaluation of the vibration behaviour of the system. This can be a pump and an impeller or an industrial fan," says **Jeroen Munnik**. Pentair CMD19 was developed together with the automation solutions provider ifm.

"At the beginning of our development, we looked around the market and identified ifm as the supplier that completely convinced us in terms of their portfolio, technical support, and assistance."



*Jeroen Munnik is also convinced by the clear presentation of the vibration values in ifm's software: "It doesn't get any better than this," says Munnik.*



There is a lot ifm in it:  
the CMD19 condition monitoring  
solution developed by Pentair.

” The bottom line is that  
condition monitoring is an  
investment in the future that  
pays off very quickly.

And so, the complete condition monitoring package includes sensors, diagnostic electronics, and software for vibration monitoring, as well as additional temperature sensors.

“The fact that we have been able to considerably expand our expertise in vibration analysis in the past three years is due on the one hand to ifm’s support, but also to the detailed presentation of the values in ifm’s software. Once configured, the traffic light system provides a transparent view of the current health status of the monitored system. It doesn’t get any better than this,” says Jeroen Munnik.

#### Early detection of maintenance requirements saves money

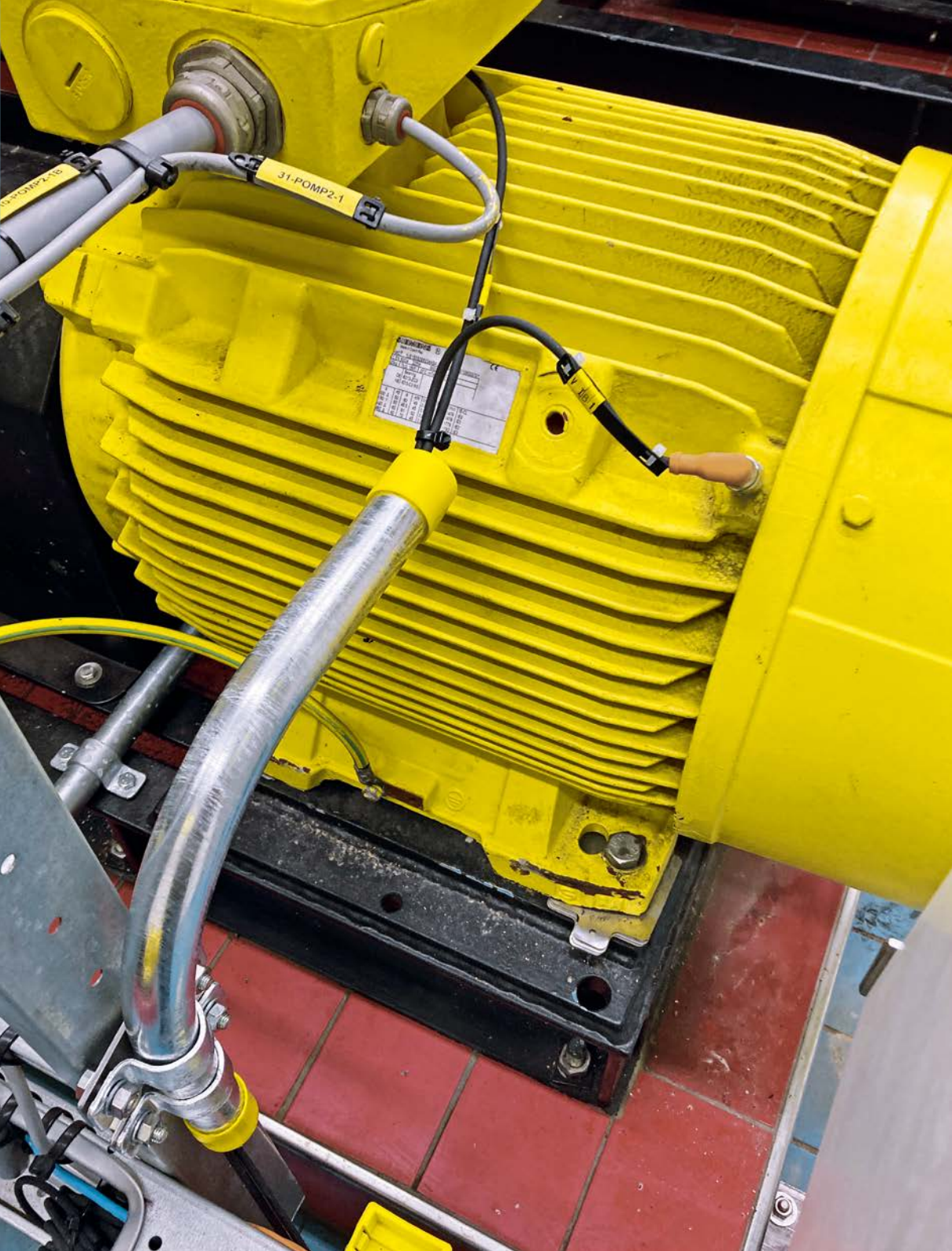
Customers are also convinced of the automated condition monitoring using sensors.

“I remember an incident at a customers’ who installed the modem variant of our solution, the CMD19-M. Through the modem, we directly receive the actual data of the customer’s system. One day we received an alarm and found foreign matter in the pump’s impeller. We informed the maintenance manager, and he was amazed because he had not noticed any change himself. After maintenance and the confirmed findings, he was thrilled that we had saved the company from a more costly repair with possible pump parts replacement.”

This customer saved around 40,000 euros because condition monitoring helped prevent damage to the mechanical seals. Thanks to the expertise gained in vibration analysis, Jeroen Munnik’s team can also forecast error patterns occurring at short notice and take the necessary maintenance measures.

“If we detect foreign matter in the impeller, we can assess whether the blockage will clear up on its own or if the pump needs to be shut down and serviced.”





*For pump monitoring, Pentair relies on vibration sensors, temperature sensors and diagnostic electronics from ifm.*

### Investment in the future pays off quickly

Thanks to all these benefits, Munnik sees the future of pump monitoring in condition monitoring.

“Whether it is operated on-site by the customer, or whether we act remotely as a service provider, the solution is win-win. The customer and our service team can act in time before significant damage to a pump occurs. At the same time, maintenance staff can be deployed where there is a real need. The early alarm and the condition-based replacement of wear parts ultimately lead to low operational costs. Furthermore, vibration behaviour helps us determine the degree of wear and assess whether a component needs replacement at the scheduled time or if it is still functional. The bottom line is that condition monitoring is an investment in the future that pays off very quickly.”

### Conclusion

With the help of ifm’s solution portfolio for condition monitoring, Pentair has developed a solution for its customers that maximizes the maintenance effort’s efficiency for both sides. Thanks to the acquired expertise in vibration analysis, Pentair’s Dutch team can support its customers with precise fault assessments and recommendations for action to lower the total cost of ownership.





**trimatec**

Ventilators for  
challenging environments





# Medical standards and industrial robustness combined

trimatec develops ventilators for use in almost any environment

Founded in 2001, trimatec specializes in the development and manufacture of special machines. The Ingolstadt-based company also offers programming and on-site integration of their systems. Their product range includes solutions for feeding and assembly, welding and laser marking as well as robotics and quality control. Since 2020, trimatec has been offering a new product that stands out from its industrial portfolio: LifesafAIR® – an intensive care ventilator.

LifesafAIR® was developed at the beginning of the Coronavirus pandemic. During the hackathon “#WirVsVirus” initiated by the German Government, the idea was born to develop an easy-to-build ventilator to ensure sufficient ventilator capacities for the increasing number of COVID-19 patients needing breathing support.

“In the process, we quickly realised that the flow diagram of a ventilator is very similar to that of a pneumatics control in industrial machinery,” says trimatec CEO Lothar Schmidmayr. “The only difference being the higher precision of the medical equipment – but we were convinced that we could also design such a device using industrial components.”

## Industry meets medicine – a winning combination

And that is exactly what happened: The industrial components used by trimatec to develop the medical device included controllers, proportional valves, pressure reducers and pressure as well as flow sensors. trimatec initially developed the ventilator alone and later with the support of the Bavarian State Government, which was convinced of the project: It arranged the first contact with the purchasing department of a global company, which from then on supported trimatec with the procurement of the components required to quickly build the devices in case of an emergency.





*Pressure sensors designed for industrial environments are robust while also satisfying the high medical standards in terms of measurement accuracy.*

**”** *With measuring accuracies in the millibar range, ifm’s sensors meet the high requirements imposed on sensors used in the sensitive medical field of ventilation.*

#### **Certified biocompatibility**

In the ventilator, the oxygen passes through two areas: Unused oxygen flows to the patient through the inspiratory block for ventilation. The exhaled oxygen is released through the expiratory block. To ensure reliable ventilation, the pressure of both oxygen flows must be permanently monitored. trimatec chose ifm’s pressure sensors for both blocks. In the inspiratory block, the pressure sensors PN2594 and PN2599 designed for industrial applications are used.

“With measuring accuracies in the millibar range, they meet the high requirements imposed on sensors used in the sensitive medical field of ventilation,” says **Schmidmayr**. “What the sensors did not provide by default was a biocompatibility certificate to ISO18562-2. Specially intended for medical equipment, this certificate ensures that a device or its components, in this case the sensors, do not emit particles into the oxygen during operation.”

Eventually, the certification was issued by a UL accredited testing laboratory following thorough testing.

#### **Autoclave stress test passed**

For the expiratory block, the PM1506 was chosen – a sensor especially designed for the food industry.

“In this section of the ventilator, regular sterilization of the components is paramount, e.g. to reliably eliminate viruses that might be contaminating the device and thus prevent infections. This is particularly necessary when the ventilator is to be used on a new patient,” explains **Lothar Schmidmayr**.



*After each use, the LifesafAIR® must be thoroughly sterilized. Thanks to its simple design, this only requires basic technical knowledge.*

To ensure that the sensor permanently withstands this process without damage, it was thermally sterilized 100 times in an autoclave.

"With the support of ifm, we successfully passed this test as well, which meant that the way for using all three sensors was paved."

### Easy to operate and maintain

Although there was no need to deploy the LifesafAIR® in Germany after the first wave subsided, trimatec continued to drive forward the development of the device and its control software.

"In a short time, we had created a ventilator that, according to one of the anaesthetists supporting us, covers 99% of the typical use cases of a ventilator," says **Schmidmayr**. "And while we were and continue to be fortunate in this country to have sufficient ventilator capacities, the situation is different in other countries."

Especially in developing and emerging countries, where the infrastructure and skills needed to maintain complex medical equipment are often in short supply, trimatec wants to provide a solution.

"The LifesafAIR® is designed in such a way that almost anyone with basic technical knowledge can maintain and prepare it for re-use," says **Schmidmayr**. "In addition, videos of all procedures, from changing the battery to preparing the ventilation components for sterilization, can be accessed from the device display. And, if need be, we can connect remotely and provide support."



### High-performance industrial components

Another crucial feature rooted in the industrial past of the creators: "The LifesafAIR® is extremely robust – this was proven in the mandatory TÜV test."

The device passed the vibration test during operation, thus even exceeding the requirements. The LifesafAIR® also withstood current peaks of up to 2,000 volts and the EMC test without any damage. In addition, it offers protection rating IP 53.

"Our device may not impress with the most sophisticated design, but rather with its high durability, which ensures reliable operation in almost any conceivable application scenario," says **Schmidmayr**. "When designing our ventilator, we consistently followed the principle of Form Follows Function."

### Conclusion:

With its precise pressure sensors that meet the high requirements for use in ventilators, ifm provides relevant components for trimatec's LifesafAIR®. On top of its importance during the coronavirus pandemic, this innovative device based on industrial components could play an important role in patient care – at any location in the world.





## BOSAQ

Self-sufficient drinking and  
process water treatment





# Safe drinking water for everyone!

## Self-sufficient water treatment system

The “Blue Planet” has long since ceased to live up to its name everywhere: Water is in short supply in more and more regions. And in many cases, water that is available is not drinkable. The Belgian company BOSAQ has developed a solution that can generate drinking water from water of any quality anywhere in the world. Self-sufficient, reliable and maintenance-free.

“Safe and clean drinking water is a human right” – this was already recognised by the United Nations in 2010. However, the reality still looks different: Over 2 billion people still drink from contaminated water sources and risk falling ill or even dying.

” Safe and clean drinking water is a human right.

The company BOSAQ from Deinze in Belgium has set itself the goal of actively promoting access to clean water for everyone everywhere in the world. Safe, clean water not only brings economic and social stability and a healthier lifestyle to the countries concerned, it also has a positive impact on the environment.

**Jacob Bossaer**, founder and CEO of BOSAQ explains the goal of his company: *“BOSAQ was created to address one of the biggest challenges we face as a human race. We live in arid areas with a growing world population. We are trying to find a solution to this water shortage by offering recyclable water systems. We provide clean and safe drinking water from any source, be it seawater, river water, lake water or rainwater. We also provide water to the industry. A company uses water from any source, which is often polluted. We upgrade it so that it has the necessary quality to be reintroduced into the process. This way, we ensure the water cycle within a company.”*



*The complete water treatment system is integrated in a compact container.*





*Thanks to the solar panels on the roof, the system requires no energy supply and can be placed directly where the water is needed.*

#### **The idea was born in Antarctica**

The idea started in one of the most remote regions on this planet: on the Princess Elisabeth research station in Antarctica.

**Jacob Bossaer** spent five consecutive seasons as a water engineer on an expedition in Antarctica: *"My task was to build a water circulation system. In just a few weeks, I managed to set up a system that runs on 100 per cent renewable energy. After work, I continued to study the topic by reading relevant literature. I learned that 2.2 billion people worldwide do not have reliable access to clean and safe drinking water. 80 percent of these people live in rural areas. That's where the idea came from: safe drinking water for everyone. Because what I can do in Antarctica, one of the most hostile regions in the world, I can do anywhere in the world."*

In 2017, Jacob Bossaer teamed up with his long-time friend Pieter Derboven and founded the company BOSAQ. Derboven, who holds a PhD in chemical technology, helped provide an innovative and customised water management solution that minimises the use of chemicals as well as maintenance requirements. The foundation for Q-Drop was laid: A decentralised, self-sufficient drinking water treatment system that is powered 100 per cent by renewable energy – and can be transported and operated in a sea container. This is what makes permanent use possible in the first place, even in remote locations around the globe.



” So we decided to use ifm sensors in our first five drinking water treatment systems in Suriname.


### Challenges

**Pieter Derboven**, co-founder and technical director at BOSAQ, explains: “Our systems can treat a variety of different water types. This can be, for example, surface water, bore-hole water, rainwater or wastewater from the industry. In our decentralised drinking water applications, we always aim for the high drinking water quality of European standards, even in international projects. Besides, we also use our systems to generate process water in the industrial environment. In this case, the customer specifies the desired water quality. This can be demineralised water, but it can also be plain drinking water. We always use a multi-stage process for our systems. There is usually a pre-filtration stage, where dirt, large particles and suspended matter are removed. Then we use membrane filtration, for example ultrafiltration, followed by reverse osmosis. For drinking water treatment, the capacity of our systems ranges from half a cubic metre to 10 cubic metres per hour. For industrial systems, we are aiming for a capacity of 5 to 50 cubic metres per hour. In decentralised drinking water treatment systems, we face completely different challenges than in an industrial plant, for example. First of all, the cost of laying a whitewater pipeline in a remote village is very high. That is why we install a decentralised system directly on site. We search for local water sources and then treat them to the desired water quality. Other challenges are, for example, the logistics of setting up, accessibility, energy supply, but also finding qualified and trained people who can maintain and operate the devices on site.”



The SV3150 vortex sensor is very suitable for flow measurement with polluted water.





The ultrasonic flow sensor of the SU series detects the medium temperature in addition to the flow rate and consumption.



The SA5000 flow sensor enables the simultaneous measurement of flow and temperature.



*The compact PT5404 pressure transmitter with G 1/4 process connection has a robust stainless steel housing for use in confined spaces.*

### Self-sufficient system

It is not uncommon for BOSAQ's systems to be located in developing countries, for example in small villages in the jungle where there is no adequate supply of electrical energy. A high degree of self-sufficiency is therefore a fundamental prerequisite that had to be implemented through innovative measures.

**Pieter Derboven:** *"We were forced to develop a lot of innovative solutions. For example, our systems are equipped with an automatic membrane cleaning module developed by us. Our systems can also operate completely independent of the grid, thanks to our own solar power system on the container roof. And last but not least, we can monitor our systems remotely thanks to IoT solutions. We also use AI and receive early messages from the system even before a process parameter reaches a critical warning level. So, via remote access, we have access from our headquarters in Belgium to all our filtration systems worldwide."*

### Sensors monitor the process

In process monitoring, numerous sensors are used for control and monitoring. BOSAQ has found a strong partner in the automation specialist ifm.

**Pieter Derboven** explains how and why the two companies came together: *"We got to know ifm at an innovation fair in 2019 and immediately recognised the potential benefits of ifm sensors for our systems: They are compact, they are robust and there are a lot of proven use cases. That was an important factor for us. We asked around for some references and received positive feedback. So we decided to use ifm sensors in our first five drinking water treatment systems in Suriname."*



The actual filtration process is monitored by three different types of sensors.

*"This concerns the operating parameters of the process, i.e. temperature, pressure and flow. Temperature, for example, is a crucial parameter to gain insight into the actual filtration performance, as it directly determines the permeability of the membrane. On the other hand, flow and pressure are the main control parameters for our filtration processes, which are also highly correlated. The measured values determine, for example, when rinsing is required,"* says **Pieter Derboven**.

In the future, BOSAQ plans to use additional sensor types.

*"We are currently working on a system for an industrial customer where we will install vibration sensors on the pumps. This will give us an insight into the pump condition. This information is crucial for AI-based optimisation of the plant, one of our strengths in industrial commercialisation. We can detect imminent wear at an early stage and plan maintenance measures in good time. And then there's the new ifm LDL101 conductivity sensor, which we will use to measure the water quality and ensure that the filtration system meets the product specifications stipulated by our customer."*

### Conclusion

Reliable, self-sufficient solutions are needed to ensure a consistently high-quality drinking water supply and sustainable process water cycles in industry, even in the most remote places in the world.

Powerful sensors not only help to control the process optimally. They are also used to monitor the system so that possible critical conditions can be detected and remedied at an early stage. This way, the goal of securing industrial water supply and improving the drinking water supply for people worldwide can be implemented reliably and in the long term.





## Urban Crop Solutions

End-to-end solutions  
for vertical indoor farming





# 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.

”Plants can be grown with water consumption equivalent to five percent of the water consumed when growing plants conventionally.

“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.

## **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**.



Urban Crop Solutions conducts plant research for the present and the future in its own laboratories.



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

### **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.

### **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."*



” Our commitment is to produce and transport our products with the highest quality and maximum sustainability.

## 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

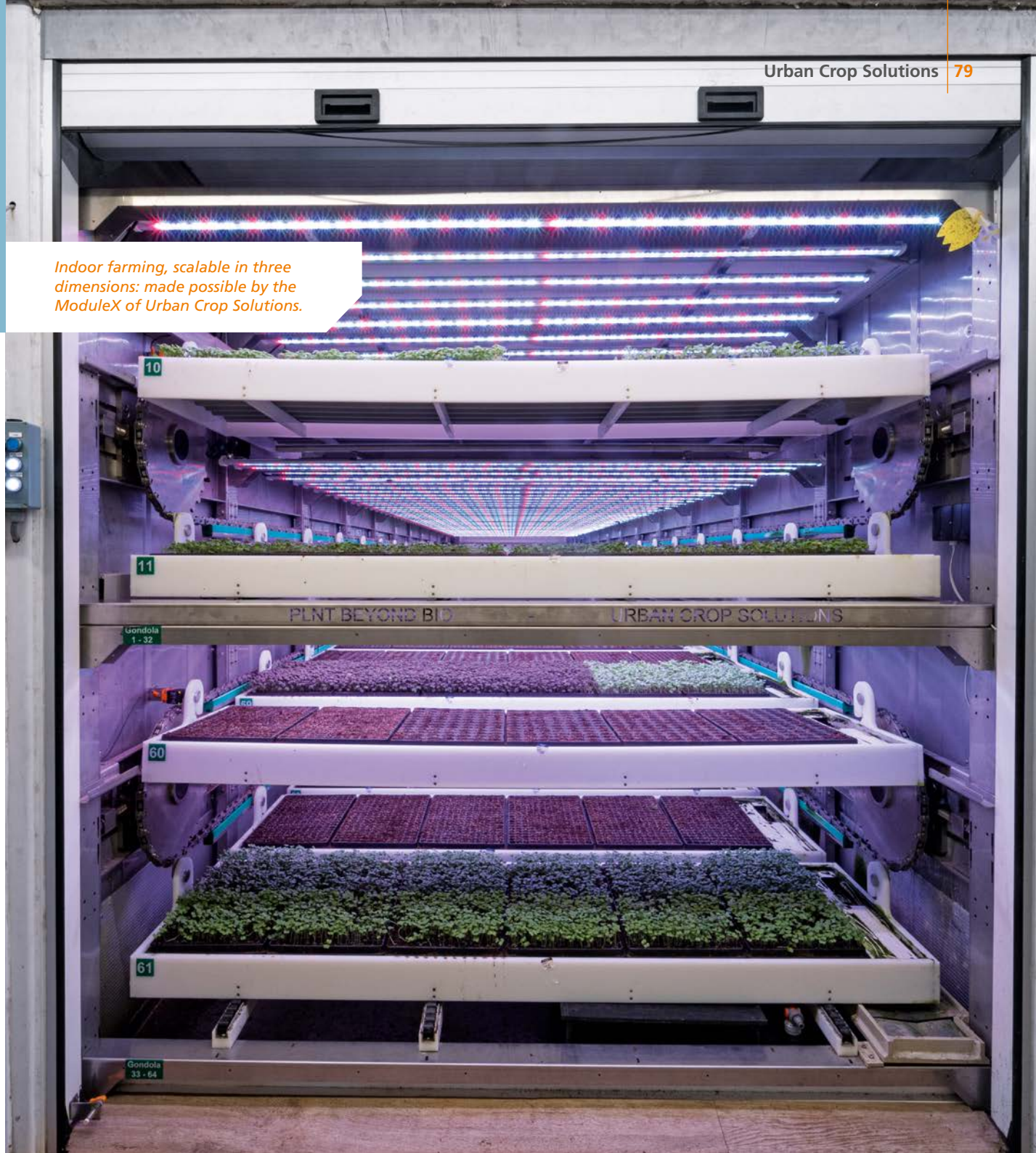
A total of five critical points are monitored by the sensor system to guarantee efficient and reliable operation of the system for vertical indoor farming. An inductive sensor determines whether the door of the ModuleX is opened or closed.

*"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."*

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







” 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.

#### 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.

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.”



*Sustainability as the overall concept: Antwerp company PLNT produces in worn-out sea containers, always only in quantities that are covered by local demand.*

#### 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.





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

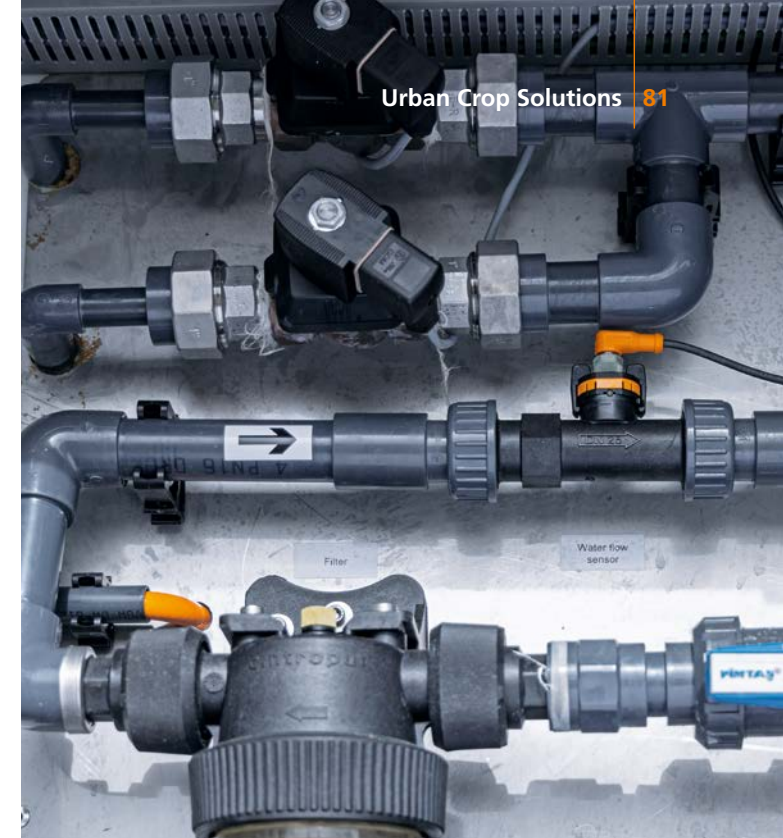
**Hans Snijder** gives his estimate of the situation: *“Indoor farming in general is just getting started. We see ourselves as pioneers – a role that suits us well. And even if the technology continues to improve, I don’t think indoor farming will replace traditional agriculture any time soon. It’s not 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.”*

### 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.



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





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