Vibration monitoring

Monitoring the machine's pulse with precision



ifm.com/cnt/vibration-monitoring

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Vibration monitoring

Monitoring the machine's pulse with precision

Insights
Imagine having permanent real-time visibility into the condition and processes of your machines.

Reliability
Imagine you could maximise plant availability and machine health and prevent costly surprises.

Planning
What if you could address machine and system problems in their early stages and plan maintenance activities proactively?

Optimisation
What if you could ensure process continuity or even optimise the process of your installation by detecting vibration data?

Equipment / machine failures are usual gradual. Different condition parameters can indicate a deterioration.

Vibration condition monitoring offers a good way of predicting changes in condition.

Increased vibration and friction occur long before a machine fails. Through active monitoring, potential damage can be detected weeks to months in advance.

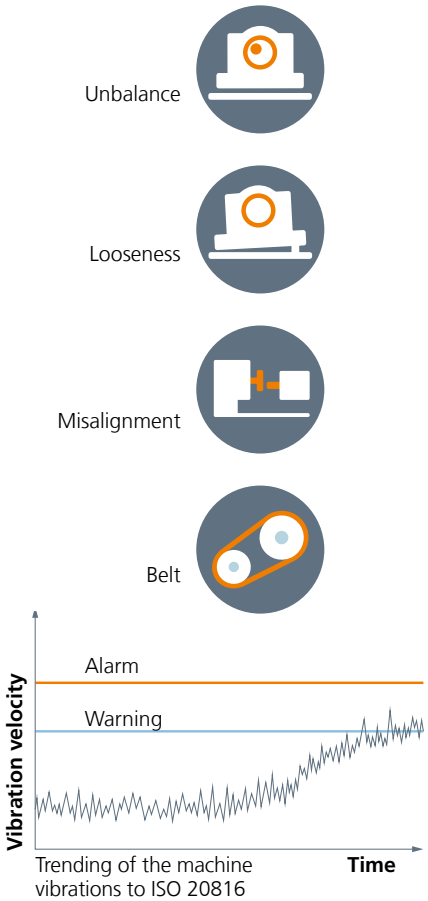
Digitalise maintenance with solutions from ifm!

5 YEARS
Warranty
on **ifm products**

More information at:
ifm.com/cnt/vibration-monitoring



Detecting impending damage at an early stage to avoid consequential costs



Trending of the machine vibrations to ISO 20816

Machine protection and remote maintenance

The monitoring of exhaust air systems or pumps in the water supply concerning wear and stress makes it possible for the operator to organise efficient maintenance. Alarm outputs serve to protect the system, to trigger remote maintenance and to facilitate targeted analysis.



Monitoring vibration velocity

The VK / VT / VW vibration sensors monitor the overall vibration condition of machines and plants according to ISO 20816. The sensor measures the rms vibration velocity on a non-rotating component surface and triggers an alarm if the machine vibrations are too strong.



Simple:
monitoring of the overall condition of the machine

Standardised:
compliant to ISO 10816 / ISO 20816

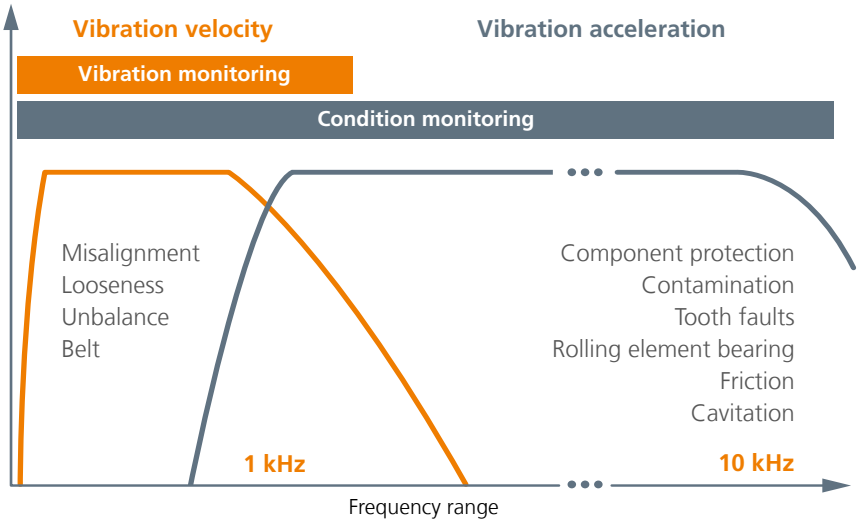
Safe:
protection against machine damage

Flexible:
easy integration into the application

Reliable:
longer uptime

What vibration reveals about machine health

Even if in peak condition, all machines generate vibrations during operation. However, due to unbalance, misalignment or looseness, these vibrations may increase to a level that will have a negative effect on the functionality and service life of the machine. The ISO 20816 standard defines precise vibration limit values for industrial machines that can be used to assess the machine condition from new to critical. With ifm's product portfolio, the vibration behaviour can be monitored precisely and according to your requirements. Even only slightly increased vibration velocities will be detected and signalled. This is how impending defects can be detected and remedied at an early stage to avoid expensive damage and downtime.





Wireless vibration sensor type VW
Battery-powered vibration sensor for intermittent measurement of the overall vibration of simple machines. Requires a suitable gateway.



Basic vibration sensor type VK
Switching output and transmitter function. Response delay avoids triggering at start-up.



Basic vibration transmitter type VT
Simple transmitter function, 4...20 mA.



Intelligent vibration sensor type VN
4-digit alphanumeric display with colour change, history memory with real-time clock, analogue and switching output or 2 switching outputs.



Acceleration sensors type VSA / VSP / VSM
Robust acceleration sensors for a wide range of applications, e.g. immersion applications, intrinsically safe sensors or sensors with multiple measuring axes.



Diagnostic electronics type VSE / VSE9
4-channel diagnostic module with additional process value inputs and integrated history memory, flexible networking possible.

Good to know:
Type VK and VT sensors are also available with ISO calibration certificate

Would you like to learn more?
ifm.com/cnt/switch-and-transmitter



Increasing availability, reducing maintenance costs, assuring quality



Intelligent vibration sensor type VN
On board display, history storage for documentation, for rotating machines >120 rpm.



Intrinsically safe acceleration sensor type VSP0xA
For the measurement of vibration in hazardous areas. Connection to the VSE diagnostic electronics installed outside the ATEX zone via a barrier.



Acceleration sensors type VSA / VSP / VSM
Different types, also for mounting in difficult to access areas. Various measuring ranges with voltage output (100 mV/g) or current loop (0...10 mA). Connection to the VSE diagnostic electronics.



Diagnostic electronics type VSE / VSE9
4-channel diagnostic module with additional process value inputs and integrated history memory, flexible networking possible.

Our solution for condition monitoring of machines.
ifm.com/cnt/vibration-monitoring

Safe:
permanent condition monitoring of critical machines

Anticipate:
machine diagnosis for early damage detection and avoidance of serious consequential damage

Optimise:
maintenance actions can be planned

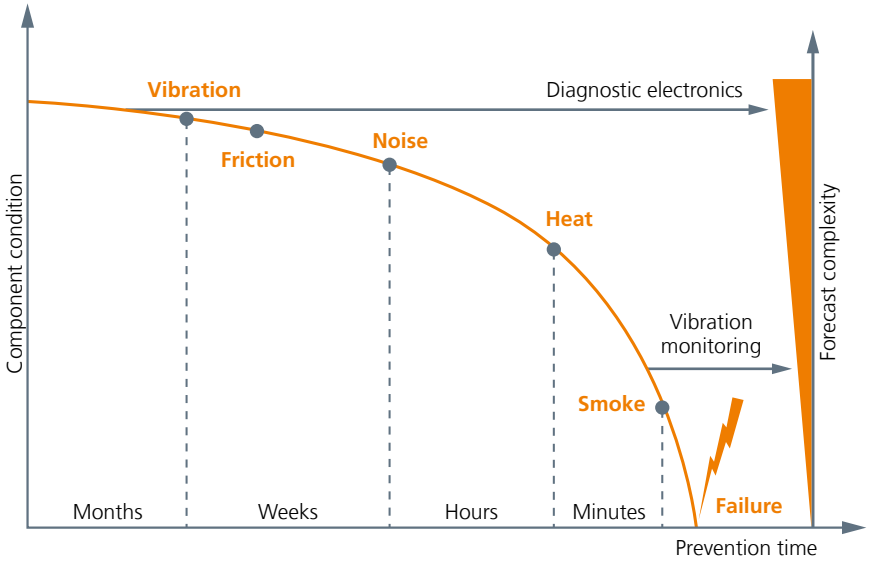
Long service life:
make optimum use of the residual life of components

Economical:
make production processes transparent – meet TCO (total cost of ownership) concepts

Precise:
Counters detect values such as exposure time and machine uptime and support production based on key indicators.

The most efficient way to avoid unplanned downtime

With condition-based monitoring, imminent machine damage can be detected at an early stage. This enables predictive maintenance planning, which in turn allows for consistent product quality and the associated efficient use of resources. The vibration products from ifm reliably detect and evaluate vibration data. This is how the current machine condition is transmitted to the controller or the IT infrastructure as a condition value and, if necessary, as a warning or alarm signal. Counter functions also facilitate the calculation of component lifetimes influenced by the frequency and intensity of impacts, temperature or speed.





Continuous real-time monitoring

With intelligent condition monitoring systems from ifm, machine vibrations can be continuously detected even in inaccessible places. The data is immediately converted into condition indicators for easier interpretation. The flexible networking via Ethernet and fieldbus interfaces offers a reliable diagnostic option, even remotely.



Detect vibration and shocks at an early stage

Vibration systems from ifm detect the key condition indicators in order to preventively identify impending machine damage and avoid costly consequential damage.



Vibration diagnosis on a mixing tool

Unplanned standstills of critical machines cause huge cost. Permanent condition monitoring of the whole plant makes it possible to act with foresight and to optimise the process.





Minimising scrap and consequential damage to machine tools



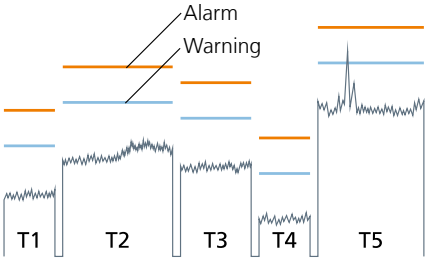
Protection of machine components

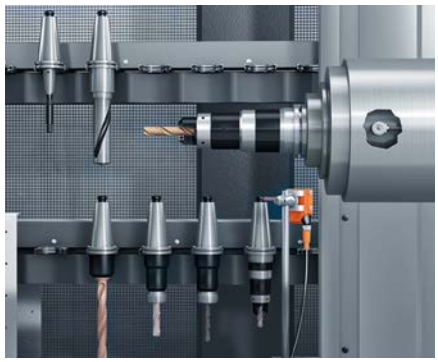


Workpiece protection



Tool protection





Detect unusual vibrations

The micromechanical acceleration sensor type VSA is screwed into the housing of the spindle and detects even the most subtle changes of the vibration behaviour. The sensor withstands even fast movements and high forces without problems.

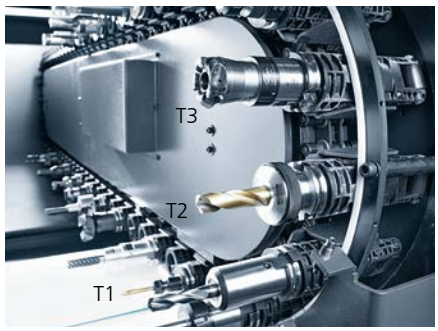


Photo source: DMG / MORI SEIKI
www.dmgmoriseiki.com

Avoid consequential damage to machine tools

Changes in the cutting forces as caused by blunt tooling or swarf jam will be detected on the basis of the changed vibration characteristics. Each tool can be assigned individual tolerance limits e.g. a warning and switch-off threshold. Damage to the workpiece is reliably prevented.

Dynamic:
monitoring of dynamic forces, e.g. in milling processes

Fast:
response times of 1 ms

Safe:
machine, tools and workpieces are protected against expensive consequential damage

Preventive:
early condition monitoring avoids unplanned failures

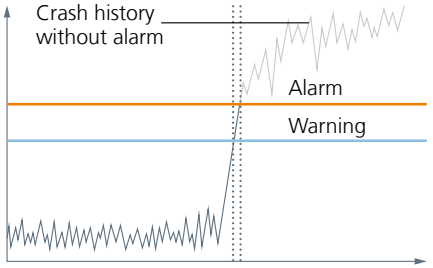
Integrated:
direct connection to the machine controller via a fieldbus interface

Monitor spindle vibration, avoid standstills

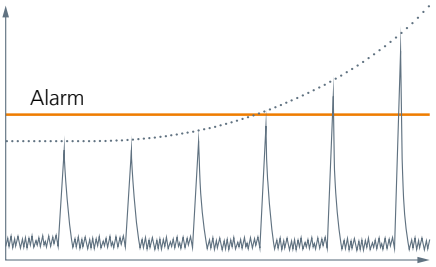
Incorrect settings and process parameters as well as incorrectly selected or defective tools can quickly have far-reaching consequences: The spindle and workpiece may crash, the spindle may be permanently overloaded, the manufacturing quality may be insufficient or the workpiece may be damaged. The resulting unplanned downtimes and increased rejects reduce plant efficiency and cause unnecessary costs. These costs are unnecessary because damage to the machine tool and workpiece can be efficiently prevented.

Through permanent monitoring and diagnostic of the spindle's vibration behaviour, collisions or excessive cutting forces will be detected within a millisecond and a corresponding switching signal will be output.

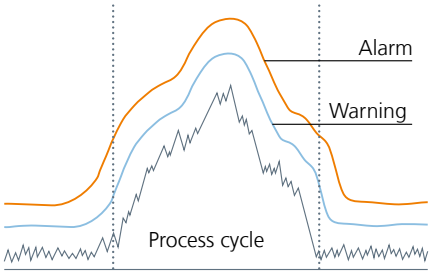
The integration of the vibration monitoring into the machine controller via the fieldbus interface ensures optimum evaluation adapted to the current operating status. For example, individual alarm thresholds can be defined for different tools. This ensures that the machine will shut down reliably or change to a safe state before serious damage or downtime will occur.



Machine protection: spindle collision detectable in 1 ms



Trending in a stamping process



Adaptive limit value consideration



Acceleration sensors type VSA / VSM

Trouble-free operation in the event of fast movement or influence of high forces. Integrated self-test for permanent safety.



Diagnostic electronics type VSE

Frequency-selective monitoring, history memory with real-time clock, counter function, network capability TCP/IP.

Diagnostic electronics type VSE15 / VSE95

Frequency-selective monitoring, history memory with real-time clock, counter function, network capability TCP/IP. Interface for the most common fieldbuses.

Our solution for machine protection and process monitoring
ifm.com/cnt/evaluation-unit-and-sensors



Smart condition monitoring with IO-Link vibration sensors



Intelligent vibration sensor type VVB
Efficient condition monitoring for simple machines via IO-Link. Detects and analyses various condition indicators internally for early damage detection.



Smart condition monitoring sensor type VVB3
The second generation of the type VVB sensor with 3-axis MEMS technology relies on proven condition indicators. Besides, dynamic unbalance and rolling bearing analyses can be carried out directly in the device. The integrated characteristic value history and the machine operating hours counter complement the device to create an IO-Link condition monitoring solution.



Fatigue (v-RMS)



Crest



Friction (a-RMS)



Temperature



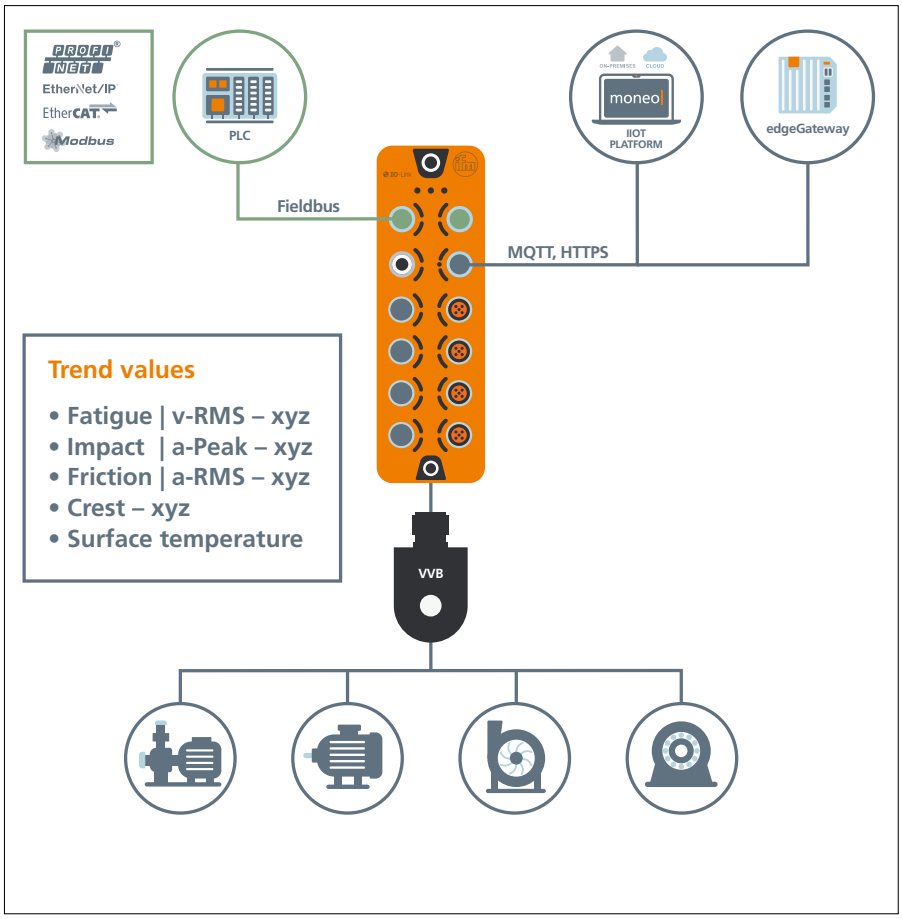
Impacts (a-Peak)

IO-Link condition monitoring – everything at a glance
ifm.com/cnt/vibration-sensors-with-IO-link

Reliable:
smart monitoring of relevant condition indicators – plug & play without any configuration

Complete:
comprehensive condition monitoring in a robust stainless steel housing

Easy:
IO-Link simplifies integration into existing control systems and IT-based maintenance systems



Monitor proven indicators in real time

The smart IO-Link condition monitoring sensors of type VV continuously detect the vibrations on the machine surface and use them to calculate proven indicators for evaluating the machine's condition. This provides the user with information on fatigue (v-RMS), mechanical friction (a-RMS), impacts (a-Peak) and bearing wear (Crest). The surface temperature is also transmitted as an additional wear indicator.

Thanks to the digital communication interface, the sensor offers a whole range of smart additional functions, such as detecting the machine's operating hours and switch-on operations based on the vibration level.

The sensor also has intelligent self-monitoring functions such as short-circuit protection or MEMS self-test to ensure reliable operation at all times.



Data flow towards control system and IT level

All data is transmitted simultaneously both to the control system and to the IT level via IO-Link, so that the user has all relevant indicators for IT-based condition monitoring, for example in the **moneo** IIoT platform.

Simple limit value setting to ISO 20816-3

Setting the vibration limit values is also easy with the VVB30x: Based on the ISO 20816-3 standard, the machine category can be selected and the suitable product can be chosen. If a limit value is exceeded, a detailed fault analysis is easily possible thanks to the integrated BLOB ring memory.

The persistent ring memory contains the raw acceleration data, which can be provided automatically at any time if required.

Thanks to the VV, a comprehensive vibration analysis and precise machine monitoring is easier than ever before.

Systems for vibration monitoring

Suitable products for your application

	**Wireless vibration sensors**	For intermittent monitoring of the overall vibration condition of machines and equipment according to ISO 20816.	**VW**
	**Basic vibration sensor and transmitter**	For permanent monitoring of the overall vibration condition of machines and equipment according to ISO 20816.	**VT** **VK**
	**Intelligent vibration sensors**	For measuring the overall vibration according to ISO 20816 or as a condition monitoring solution for simple machines.	**VN**
	**Vibration sensor with IO-Link**	Enables real-time monitoring of the four categories of machine failure: impact, fatigue, friction and temperature.	**VVB** **VVB3**
	**Diagnostic electronics**	4-channel diagnostic system for the evaluation of dynamic signals, with additional analogue inputs.	**VSE** **VSE90x** **VSE15x** **VSE95x**
	**Acceleration sensors**	Provide the measured machine body sound as a raw signal for downstream vibration monitoring or diagnostics.	**VSA** **VSP** **VSM**
	**Accessories**		

OPC UA server software: VOS

To connect the vibration diagnostics to higher-level systems (SCADA, MES, ERP).

Software: VES & APA tool

Software for parameter setting and online data monitoring of the intelligent vibration sensors and diagnostic electronics.

Physical interfaces								Condition monitoring capabilities					
Analogue output	Switching output	Signal input (e.g. 4...20 mA)	TCP / IP	Fieldbus	IO-Link	Wireless	Display / status LEDs	ISO 20816-3 (v-RMS)	Broadband monitoring + acceleration	Narrowband analysis / FFT	Temperature	Internal trending	Counter
					✓		✓			✓		
✓							✓					
✓	✓					✓	✓					
✓	✓	✓				✓	✓	✓			✓	
✓	✓				✓			✓	✓		✓		✓
✓	✓				✓		✓	✓	✓	✓*	✓	✓	✓
✓	✓	✓	✓				✓	✓	✓	✓		✓	✓
✓	✓	✓	✓	✓			✓	✓	✓	✓		✓	✓
✓													

* only unbalance and rolling bearing analysis

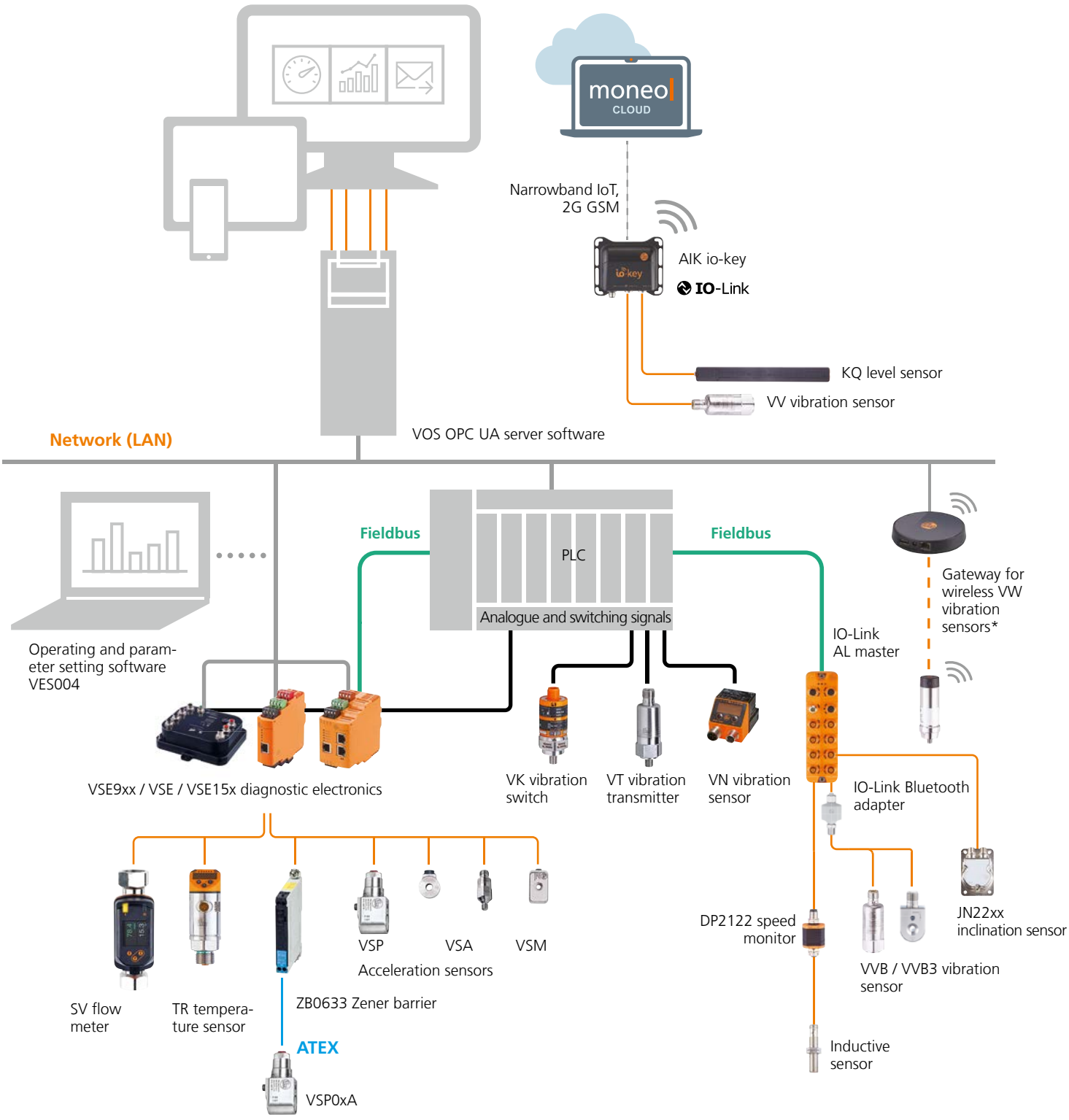
Accessories / connection technology

A wide product range of connection technology (e.g. sockets, Y-cables) and adapters makes it easy to implement the sensors.

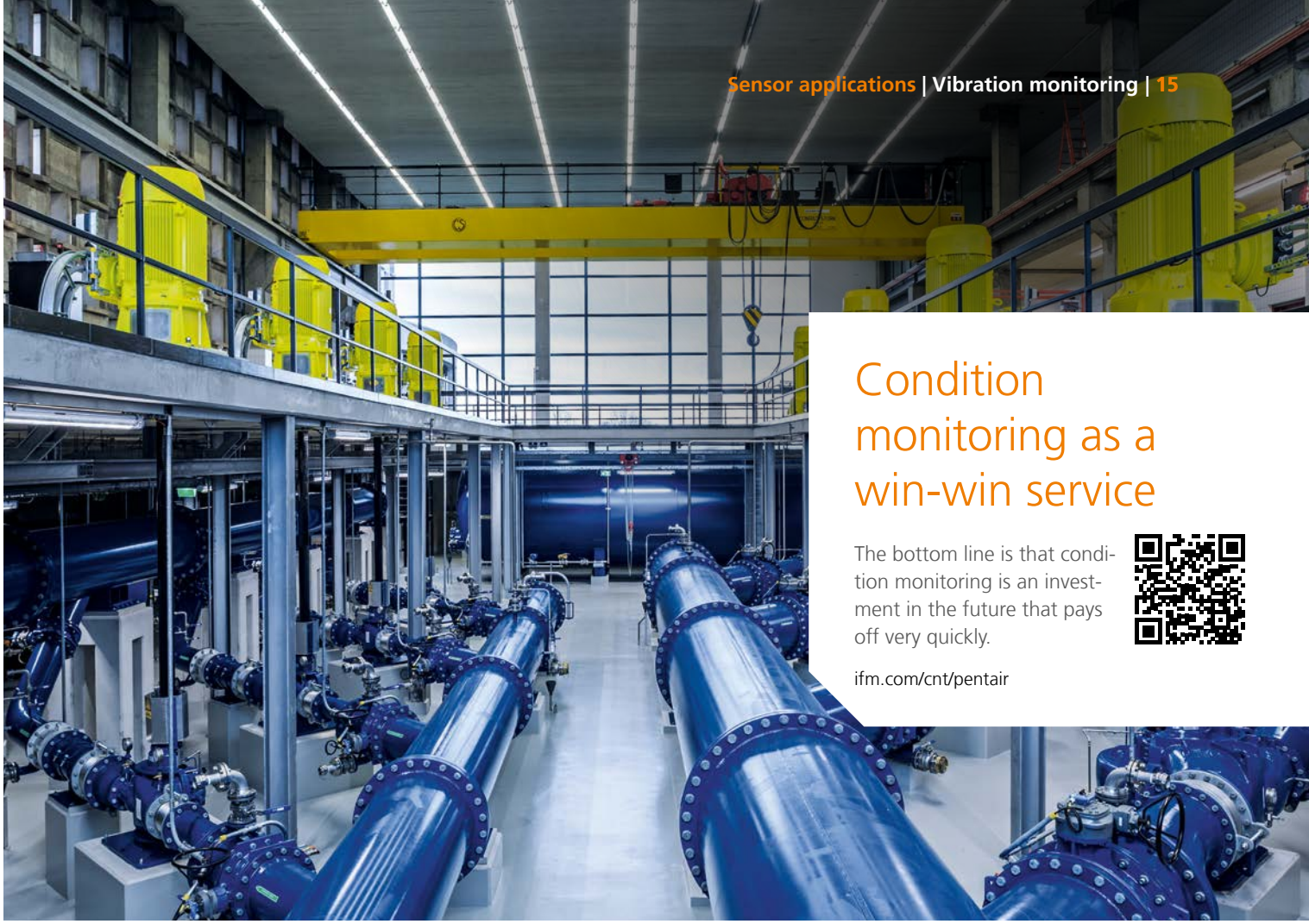
Fundamentals and technology
What is vibration?
ifm.com/cnt/vibrationsensors-technology

Systems for vibration monitoring

From sensor to ERP



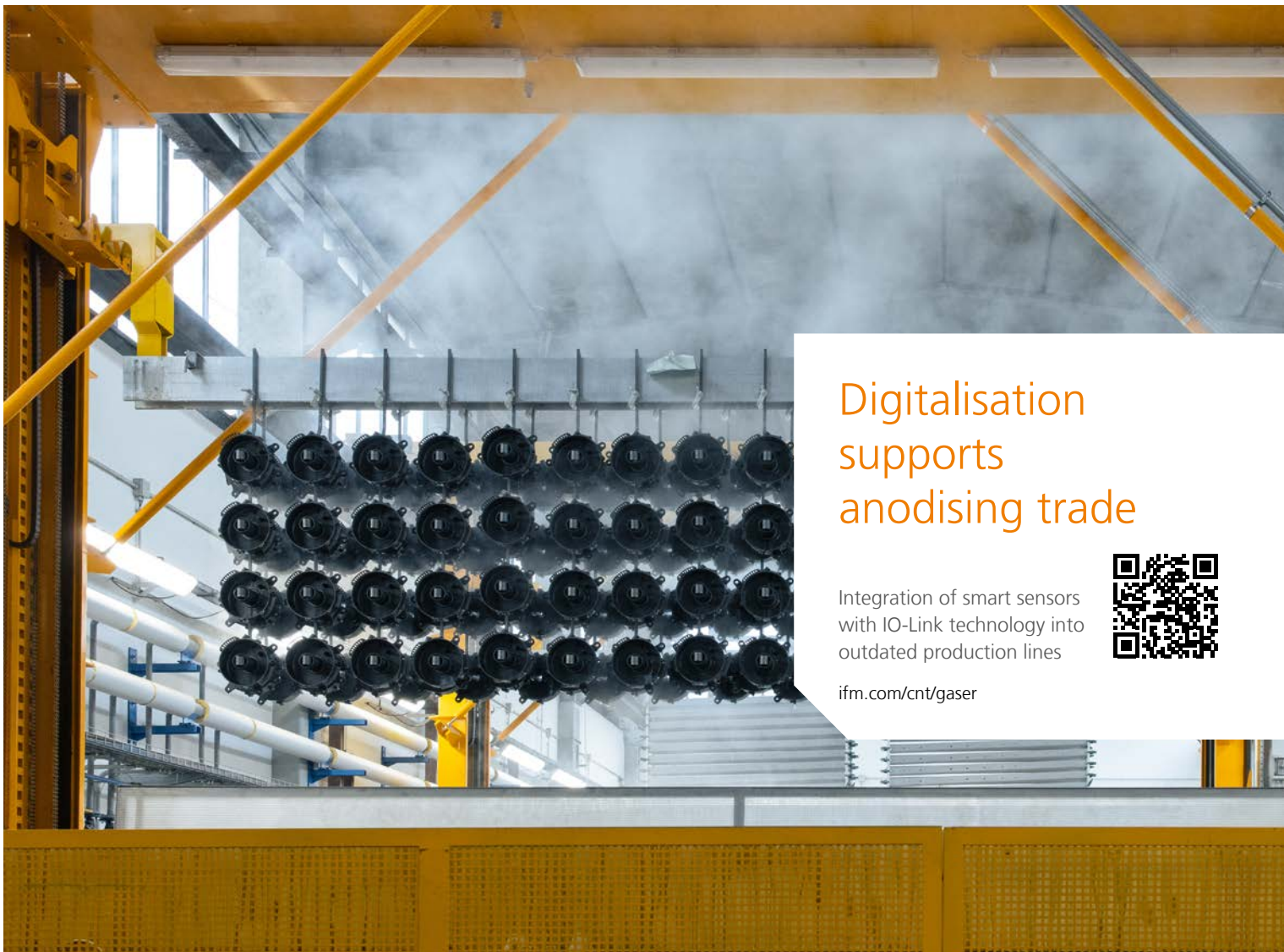
*The gateway for wireless vibration sensors and the wireless VW vibration sensor are excluded from the 5-year warranty.



Condition monitoring as a win-win service

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

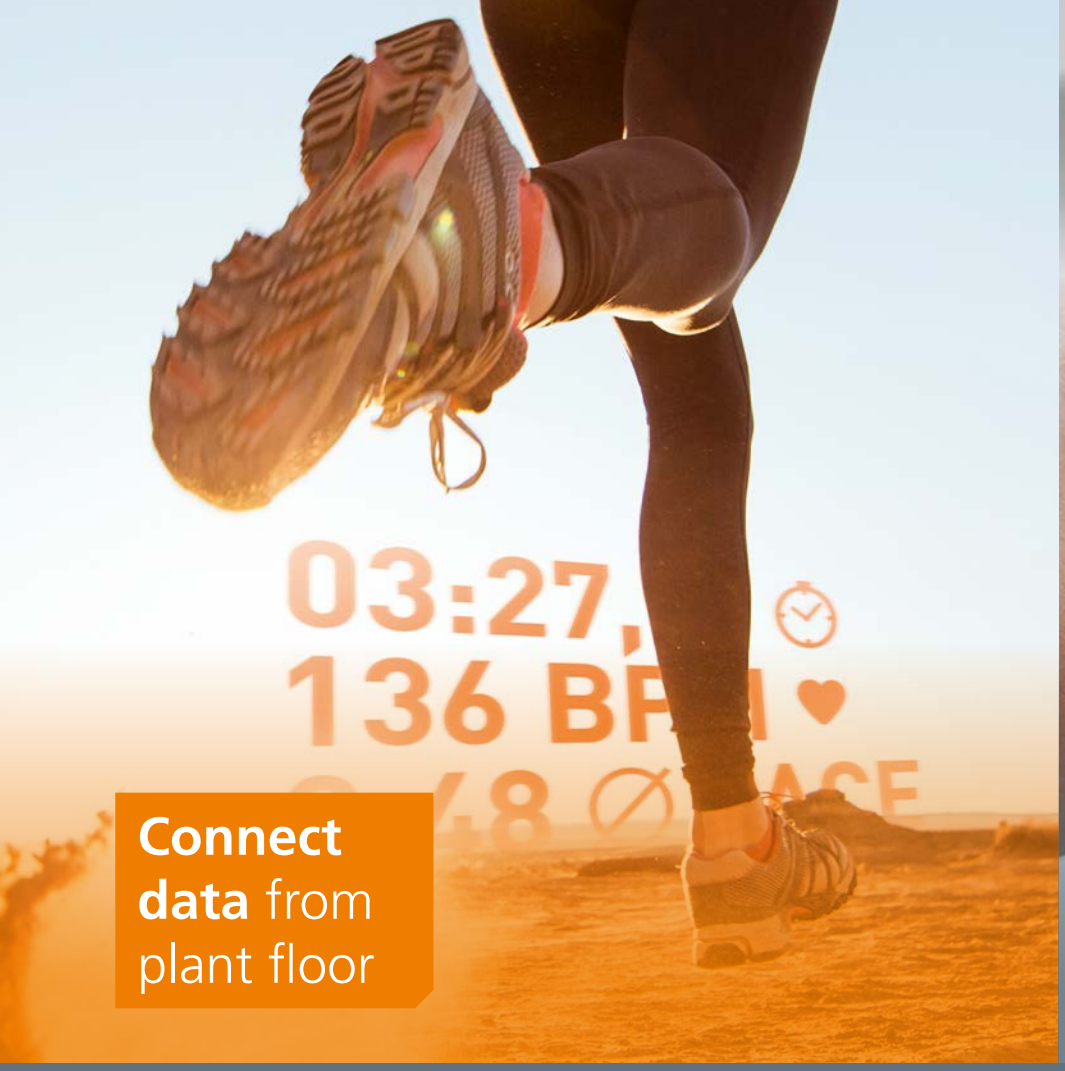
ifm.com/cnt/pentair

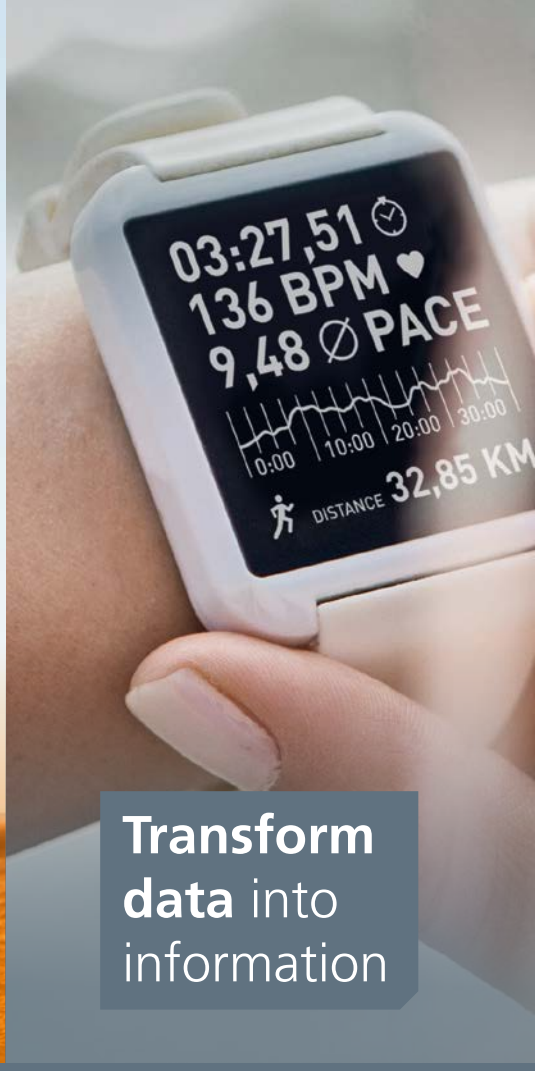


Digitalisation supports anodising trade

Integration of smart sensors with IO-Link technology into outdated production lines

ifm.com/cnt/gaser





Use the full power of your data

moneo: the IIoT platform for those who care about their plants

"My pulse frequency is 45 per minute when I'm asleep and healthy. If I am ill, it is about 55. Under full exertion, my heart pumps more than three times per second. I run my usual ten-kilometre route in less than 50 minutes on a good day and at a temperature of about 20°C. How do I know all that?

The fitness tracker on my wrist collects my body data and my performances on a daily basis and analyses them for me. It helps me understand my body system. I can tell at a glance whether my body can cope with the exertion or whether I'm in the red zone and overexerting."

The sensors on my wrist makes my complex human organism transparent to me. While such a thing may have been difficult to imagine in the past, it is hardly anything special for us today. Take a glance at your wrist to check how your body is doing. It's as simple as that.

moneo: the result of a deep understanding of the machine

Monitoring the status and current condition of your machines and plants is very simple as well. With moneo. For more than half a century, we have had our finger on the pulse of the industry, shaping the evolution of automation. We are now distilling this expertise and in-depth understanding of all kinds of machines and plants from the OT level and combine it with the inexhaustible possibilities of digitalisation. Thanks to our IIoT platform, you can check the condition of your plant at any time. It will show you whether everything is running in the green zone or whether performance is declining, consumption values are getting out of hand or maintenance is required.





Get **actionable insights**

Data becomes information. Information becomes added value.

Your plant already offers the preconditions for it: sensors permanently provide data on temperature, pressure, level and object presence. In most cases, however, this data only reaches the controller. And this only accounts for about 5 per cent of the wealth of knowledge that is available. Thanks to moneo, you can easily benefit from the remaining 95 per cent. Like a fitness tracker, our IIoT platform collects the incoming data, evaluates it and generates information you can use to optimise your processes and workflows and to fine-tune maintenance schedules.

Never again in the red zone

Temperature curves, compressed air consumption, cycle times, operating hours, levels and vibration behaviour may have an influence on the **performance**, **production quality** and **energy efficiency** of your industrial organism. With moneo, you will be able to act before your plants will run out of steam and before wear, lacking supplies or defects will lead to downtime or precious energy will escape ineffectively through leaks. That is real added value. It saves money, nerves and time. You can, for example, rather invest the time you save after work to improve your personal best over 10 kilometres.

Do you want to understand your machines and plants better and keep them fit? Are you ready for more information, performance and efficiency?

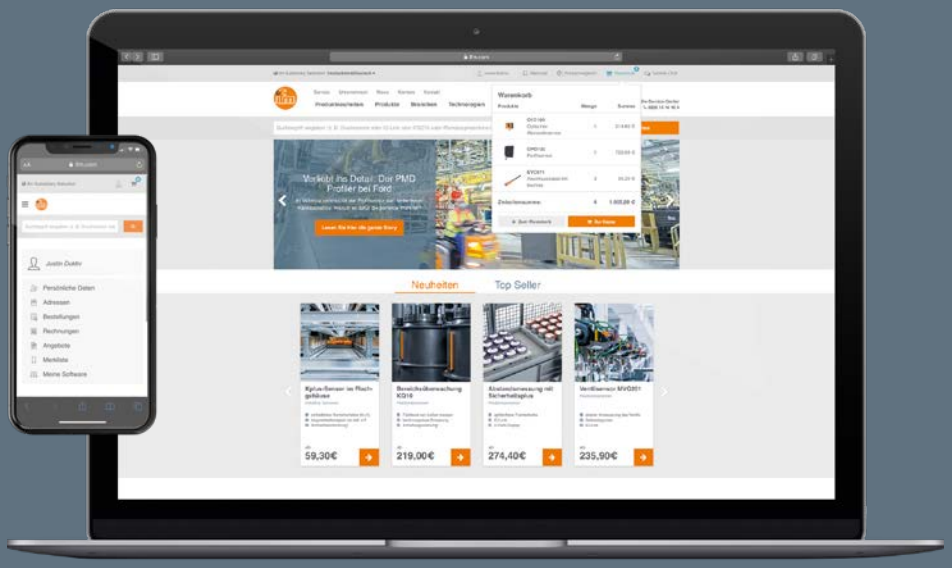
Then start now. With moneo.

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Everything the automation heart desires

The online shop: find more, search less

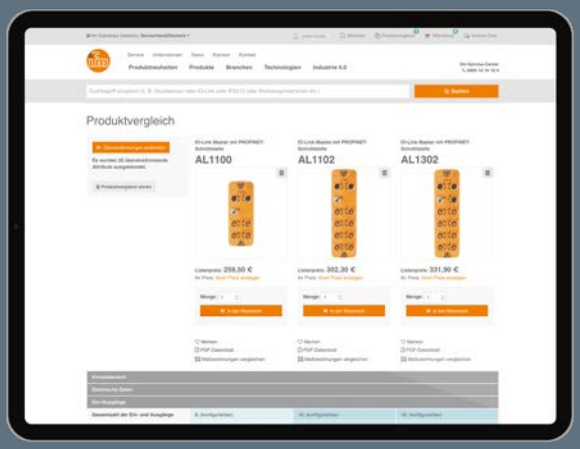
Where does efficient plant automation start? We think: when shopping! And that's why our online shop is designed to guide you to the product you need as quickly as possible. At the same time, we also want to offer you maximum service when shopping online. For example, the selectors help you to narrow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



Products, accessories and interesting facts

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

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



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

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

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

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

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

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

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