

► Our technology. Your success.

Pumps • Valves • Service



## Industry 4.0:

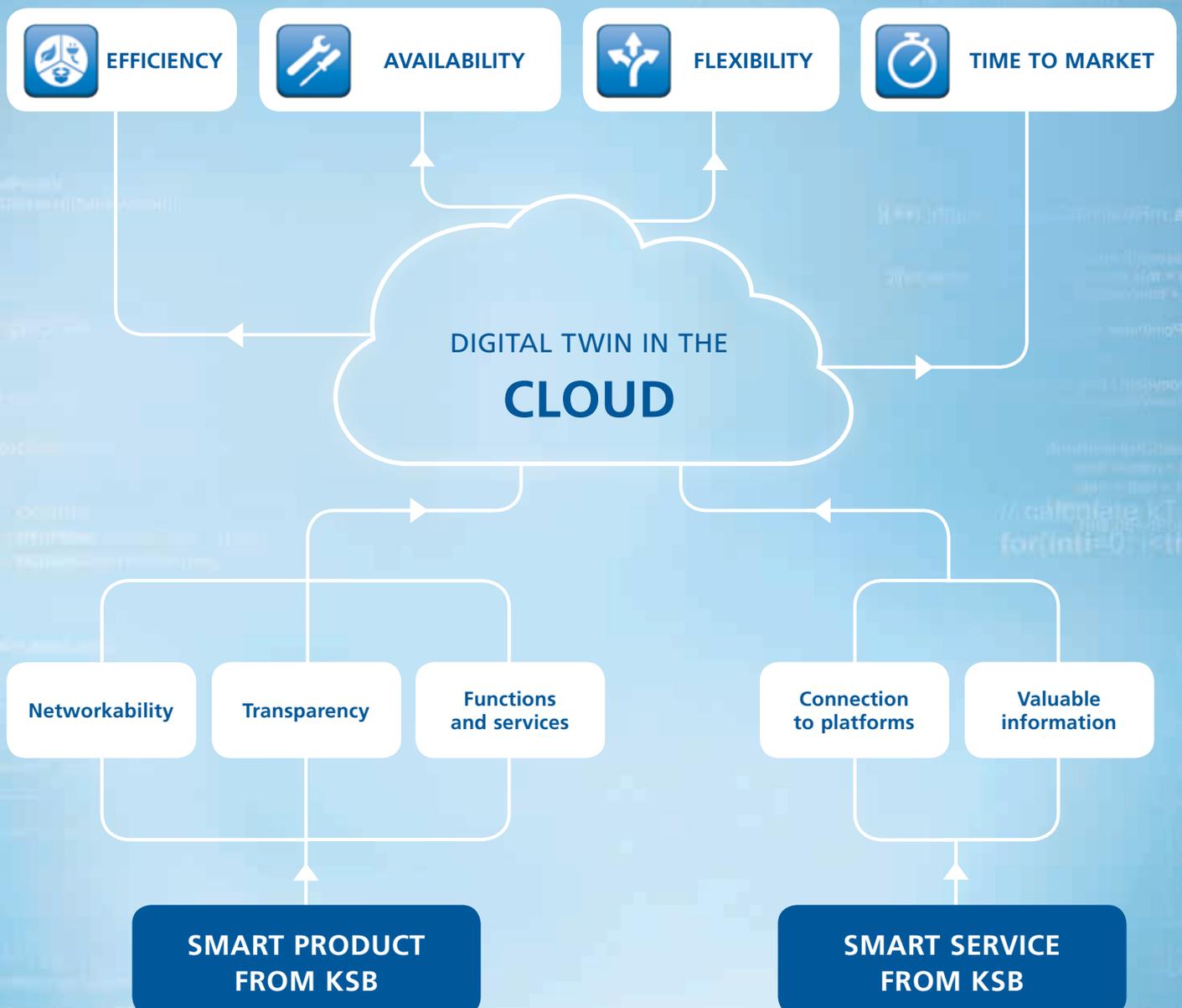
We have experience with the future



## Industry 4.0: KSB takes on the production of the future

Thanks to digitalisation and intelligent networking, systems are becoming more flexible, more efficient and more reliable in their operation. With KSB's pioneering solutions, you can today already benefit from Industry 4.0.

You can find all the information also on our web site: [www.ksb.com/industrie4-0-en](http://www.ksb.com/industrie4-0-en)



### **The fourth industrial revolution with KSB**

Industry 4.0 describes a profound change in industrial value creation. Following the mechanical, electric and electronic transformation of industry, the age of extensive digital networking has arrived with the Internet of Things and Services. Here, real production and digital processes combine to create so-called cyber-physical systems. If these encompass the entire system and all processes, we refer to this as a smart factory.

KSB is your ideal partner on this path. As a founding member of the technology initiative SmartFactoryKL, we have many years of experience in developing Industry 4.0 solutions and today already offer you smart pump technology of the future.

### **Optimum productivity thanks to smart networking**

The aim of Industry 4.0 is to maximise productivity and the ability to adapt production quickly and efficiently in response to changing conditions and new orders – even for lot size 1. For this purpose, the systems of the future require maximum



Resource efficiency and optimised use of materials



Availability and operating reliability



Flexibility through short-term reconfigurability



Reduction of time to market

This requires individual products to communicate with each other decentrally and respond autonomously to changes in the system condition. The foundations for this are delivered by KSB's smart products and services, whose digitalisation capabilities create a strong foundation for developing the smart factory.

### **A piece of Industry 4.0: smart pump technology from KSB**

KSB provides a range of products and services to increase the productivity of your system. From the mobile app KSB Sonolyzer®, which uses motor noise to identify potential savings, to the PumpMeter diagnostic system – they all have one thing in common: they supply information and provide functions in the form of a digital twin. A digital twin is the virtual image of a real object such as a smart pump. It enables networking in the smart factory, thereby maximising productivity.

## Ready for Industry 4.0

### with smart pumps and smart services

Integration of products and services into the smart factory requires information, functions and services to be available at the right place at the right time.

#### Smart products therefore provide three key qualities

##### **Networkability**

KSB products differ in their networkability: they are either static and passive through a QR code on the pump, which is read by mobile devices, or dynamic and active through the provision of process data in real time via network connections.

##### **Transparency**

All smart products can be uniquely identified digitally and can be captured, for example, using their serial number. The amount of relevant product information available depends on the type of networking and level of digitalisation.

##### **Functions and services**

Smart pump sets independently contribute to optimising operation through decentralised intelligence. They do this by autonomously carrying out functions, such as control of operation, and making these functions available to the digital twin at the network interfaces.

#### Two aspects of digitalisation turn services into smart services

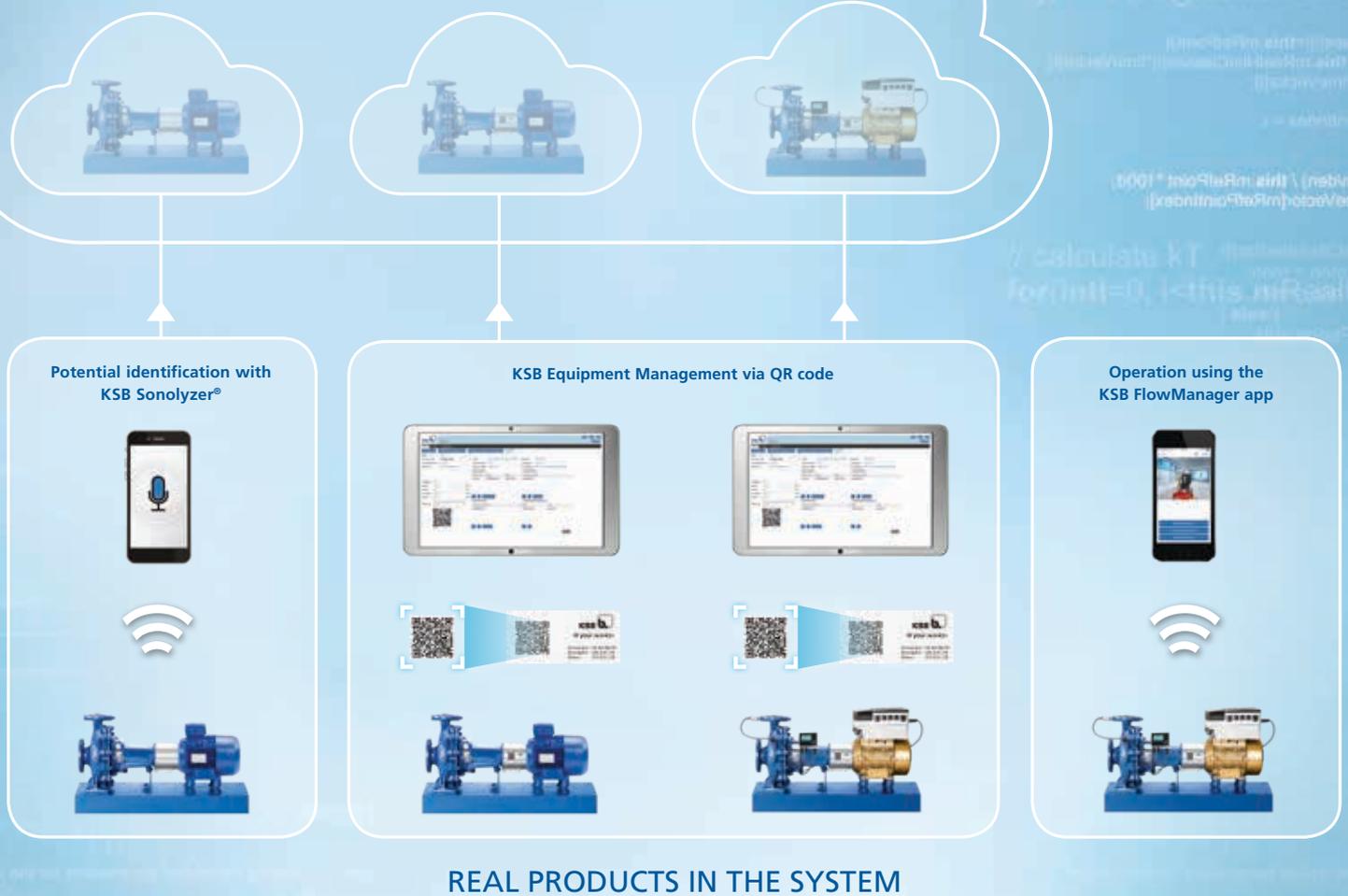
##### **Provision of smart data**

Smart services are based on valuable information from networked products such as electronic history files or mobile condition monitoring. This enables increased efficiency during servicing and maintenance, for example.

##### **Connection to platforms**

Service information is available on platforms and mobile devices. Every relevant work step and every change to the product is recorded and provided digitally.

## DIGITAL TWINS IN THE CLOUD



## At the heart of the smart factory: the digital twin in the cloud

### Much more than pump data: the digital twin

The fact that pumps and other products in Industry 4.0 are networked means that current and relevant information relating to condition, operation and history can be called up any time. To ensure that different applications and users always work on the same correct data basis, this information is provided by the digital twin. Each physical pump set has its own digital twin that portrays it and serves as a central source of information. Here, every change to the real product is also registered. Unlike the concept of big data, it is not purely about data collection, but rather valuable information. When combined with standardised interfaces, the digital twin serves as a basis for networking with other devices and systems.

### Where digitalisation of production is at home: the cloud

Different users and functions from different divisions of the company can access the digital twin during every process step, either via the cloud or through a direct connection to the device. In this way, details of the operational status or history files are easily accessible also on mobile devices. At the same time, all data is protected against unauthorised access and data loss, making the digital twin in the cloud the core element of the smart factory.

## Smart factory: products and services for analysis

Benefit from Industry 4.0 developments for your analyses: with the smart solutions from KSB. The main idea is to no longer view products separately, but instead holistically and networked with services and other products. At the heart of this is smart data: relevant, valuable information on the operation of your system that KSB provides you on different platforms.

### Identify optimisation potential with KSB Sonolyzer®

KSB Sonolyzer® is a free app that helps you quickly determine whether energy can be saved. It does this by measuring the noise frequency of the fixed-speed asynchronous motor through the microphone on a smartphone or tablet in just 20 seconds, identifying any potential for increasing pump efficiency. This works not only with KSB pumps but also with non-KSB brands and other rotating equipment.

### Full transparency with PumpMeter

The intelligent pump monitoring unit PumpMeter continuously measures the suction and discharge pressures of your pump and establishes the pump's operating point based on the differential pressure. The clear display provides transparency and also immediately shows whether energy can be saved through more efficient operation. PumpMeter therefore not only provides data but relevant information that can immediately serve as a basis for deciding how to optimise operation.

#### Smart data

- Free initial assessment of whether optimisation potential exists and whether a comprehensive energy efficiency check is necessary.
- Estimation algorithm that was developed by KSB and is the first of its kind on the market.
- Analysis result shows whether the operating point is inside or outside the part-load range.

#### Connection to platforms

- Based on your location, you can contact the responsible KSB expert directly by phone or e-mail.
- The app is available for free with Android and iOS, and runs on smartphones and tablets – with specially protected devices even in potentially explosive atmospheres.

#### Networkability

- Straightforward connection to process control systems
- Analog interface and bus communication via Modbus RTU available
- Further field buses such as Profibus can be used via gateways

#### Transparency

- On-site display of all important measured variables and operating data
- Supplied completely assembled
- Parameterised for the individual pump

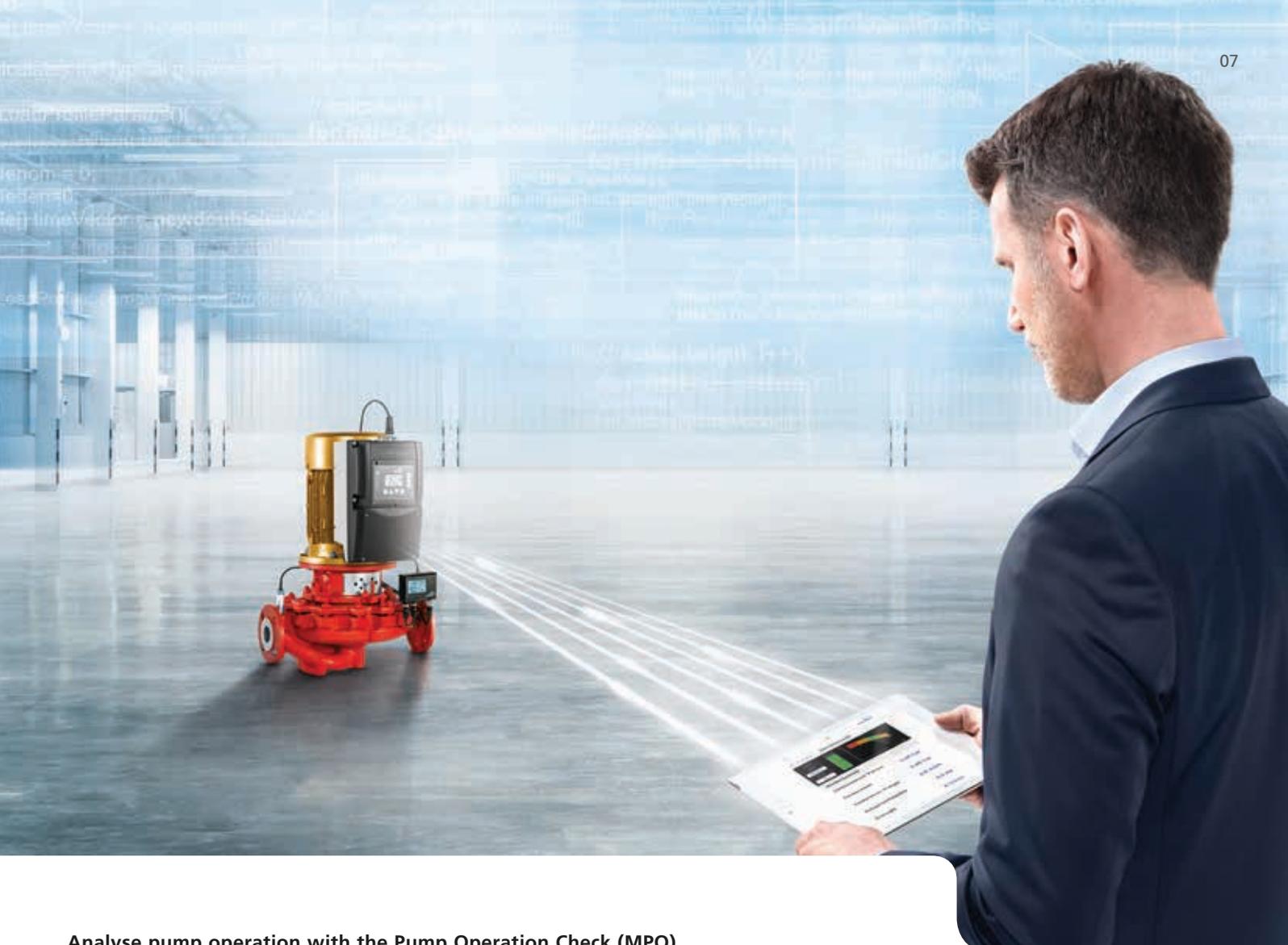
#### Functions and services

- Full transparency of operation as a basis for calculation and optimisation of the pump's operating point
- Simple, clear display of savings potential through automatic analysis



All information on KSB Sonolyzer® and app download at: [www.ksb.com/sonolyzer-en](http://www.ksb.com/sonolyzer-en)

Find out more about PumpMeter at: [www.ksb.com/pumpmeter](http://www.ksb.com/pumpmeter)



### Analyse pump operation with the Pump Operation Check (MPO)

The Pump Operation Check in multiple pump operation (POC 4 MPO) allows you to analyse the energy efficiency of your multiple-pump system. To this end, PumpMeter records the operating data of the pump sets and saves it in the cloud. You can easily access the optimisation recommendations online.

#### Provision of smart data

- Reading the load profile (pressure, speed) recorded by PumpMeter during operation
- Analysing the operating range of fixed speed, dry-installed pumps
- Identifying potential for optimisation and deriving recommendations for action to improve efficiency
- Report of findings with recommendations for optimisation
- Vibration analysis
- On request: quotation for implementation

#### Connection to platforms

- Live measurement data view on portal
- Data export

The POC (Pump Operation Check) offers a corresponding analysis of single-pump applications.

For more information please visit [www.ksb.com/poc](http://www.ksb.com/poc)

## Smart Factory: products and services in operation

With KSB, you profit today from the benefits of Industry 4.0. To this end, it is key that products no longer be considered as separate entities, but as being able to be combined with other products and services to realise smart all-in solutions. The basis for this is smart data: KSB provides you with relevant, valuable information on your system that can be accessed on different platforms.

### Autonomous speed control with PumpDrive

PumpDrive continuously matches the speed of the pump and thus the pump's output to actual system demand, ensuring that pump operation is as energy-efficient and reliable as possible. This can reduce costs considerably, particularly if a system has fluctuating demand. Demand-based operation can save you up to 60% of the required energy and increase availability and operating reliability.

### Mobile overview with the FlowManager app

The FlowManager app turns a smartphone into a remote control for PumpDrive, which can be controlled by an integrated wireless module via Bluetooth. In addition, the smart app makes all data and information available via mobile devices. The app is a digital twin of the smart pump set, enabling maximum ease of maintenance, fast commissioning and more.

#### Networkability

- Straightforward connection to the control system possible via different field bus modules: Profibus DP, Modbus RTU, LON, BACnet, TCP/IP, Profinet
- Integrated wireless module for connection via Bluetooth

#### Transparency

- The parameters are set at the factory based on all pump and motor data
- Display of operating data

#### Functions and services

- Multiple-pump operation (up to six pumps with full redundancy)
- Operating time or age-based service intervals
- Compensating for flow rate-dependent pipe friction losses via the dynamic pressure compensation function
- Differential pressure control and sensorless dry running protection
- Efficient with sleep mode and energy savings meter
- Characteristic curve control and integrated operating point estimation
- Integrated dual-pump management
- Functional check run
- Function packages for pressure boosting and waste water applications



#### Smart data

- Monitoring of operating data
- Management of data
- Commissioning assistant: quick and easy commissioning

#### Connection to platforms

- The app is available on mobile devices
- Uses the digital twin of the smart pump set

Download at:



Information on PumpDrive at:  
[www.ksb.com/pumpdrive](http://www.ksb.com/pumpdrive)

### Reduced complexity with MyFlow Technology

MyFlow Technology allows you to achieve the same output with fewer pump casing variants: The unique drive solution for constant flow applications reduces variant complexity by over 50 percent! It also offers additional benefits, such as greater planning reliability by adjusting the operating point to individual requirements with a single click via the FlowManager app.

#### Smart data

- Changing the fixed speed with a simple click, without having to machine the impeller.
- Adjusting the speed level at full impeller diameter replaces matching the impeller to a specified speed.

#### Connection to platforms

- Speed can be matched to individual requirements by smartphone – by virtual impeller trimming. Unlike before, the operating process does not need to be interrupted.

More information on MyFlow Technology at:  
[www.ksb.com/industrie4-0-en/myflowtechnology](http://www.ksb.com/industrie4-0-en/myflowtechnology)

### Smart overview with KSB Guard

Maintenance only needs to be performed when it is actually necessary: KSB Guard helps you determine maintenance intervals with greater accuracy. After all, it monitors all of your pumps and relays measurement data on an hourly basis that you can conveniently access on your computer or smartphone.

#### Smart data

- Monitors the status of your pumps hourly and notifies you immediately of any deviations.
- Specific status data helps you plan maintenance intervals and perform maintenance work.
- Notifies you via a warning or alarm of excessively high RMS values or incorrect temperatures, low battery charge level and, if necessary, to lubricate or replace bearings.

#### Connection to platforms

- Data and additional information on the pump can be evaluated conveniently and easily in the app or accessed via a computer.
- Notification by e-mail or push message if so desired.

More information on KSB Guard at:  
[www.ksb.com/ksbguard](http://www.ksb.com/ksbguard)



## Closer to the future: with KSB as a **strong partner** for Industry 4.0

When realising the vision of Industry 4.0, we contribute not only by providing smart products and services, but by continuously further developing our future-oriented solutions in product development, in pilot projects and in cooperation with our partners. To come closer to achieving maximum productivity in the smart factory, we are trying to realise existing networking potential using the cloud. Here the digital twin integrates available information from different sources throughout the product life cycle.

### Actively shaping the future: smart pump technology for the megatrends of tomorrow

Megatrends such as urbanisation, population growth and climate change also present new challenges for pump technology, making proactive research and development at KSB vital. Teams of KSB experts worldwide are working, for instance, on digital networking of hydraulic systems. Partly in cooperation with universities, research institutes and partner companies, we are analysing trends, adapting technologies and developing future-oriented business models in start-up projects.

On the topic of Industry 4.0, KSB has been active in various working groups and associations for over 10 years. The industry has taken on a pioneering role in digitalisation, but KSB is also involved with smart solutions in other applications. We are working in all areas to fulfil customer requirements of tomorrow – today, with innovative products.



Quick, straightforward access to pump data with KSB Equipment Management: data accessed via a QR code on the pump set is displayed on a tablet browser.

### Smart maintenance in action: pump data in the cloud

Quick and easy access to pump data: a KSB pilot project for smart Equipment Management meets the requirements of many a service engineer. The data is stored in the cloud and can be accessed on a tablet or smartphone using the QR code on the pump set. This makes not only technical data directly accessible, but also the entire pump history, maintenance measures and test reports with photos.



With the pump data available on mobile devices, we are testing networking.

### KSB and SAP: smart cooling for the cloud

If your data is in the cloud, then there is a good chance that it is actually stored at St. Leon-Rot Data Centre operated by SAP, the leading innovator in the field of enterprise software. Here, customer data is stored with utmost security, though the enormous amounts of computing power do generate a lot of heat. As a stable cooling supply is essential for the centre's operation, SAP places its trust in technology from KSB.

For the first time ever, KSB and SAP are now combining their standards of technological excellence in a pioneering Industry 4.0 application: in the future, PumpMeter and PumpDrive will send a pump's current operating status and the pump history into the cloud to SAP's Remote Service Management via integrated interfaces. This will allow system-wide status monitoring, fault detection and the prediction of potential breakdowns. KSB and SAP employ this concept to exploit the potential of Industry 4.0 to ensure the availability of cooling at the Data Centre.



Smart pump sets from KSB ensure cooling supply at the Data Centre.



In the future, PumpMeter and PumpDrive will be connected to SAP's Remote Service Management.



Technology that **makes its mark**

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