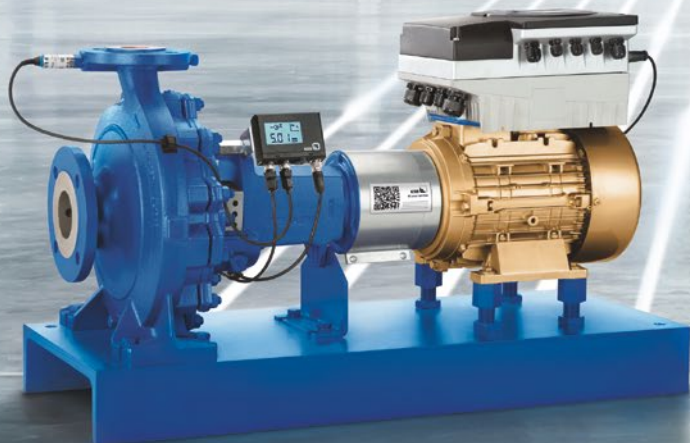


► Our technology. Your success.

Pumps • Valves • Service



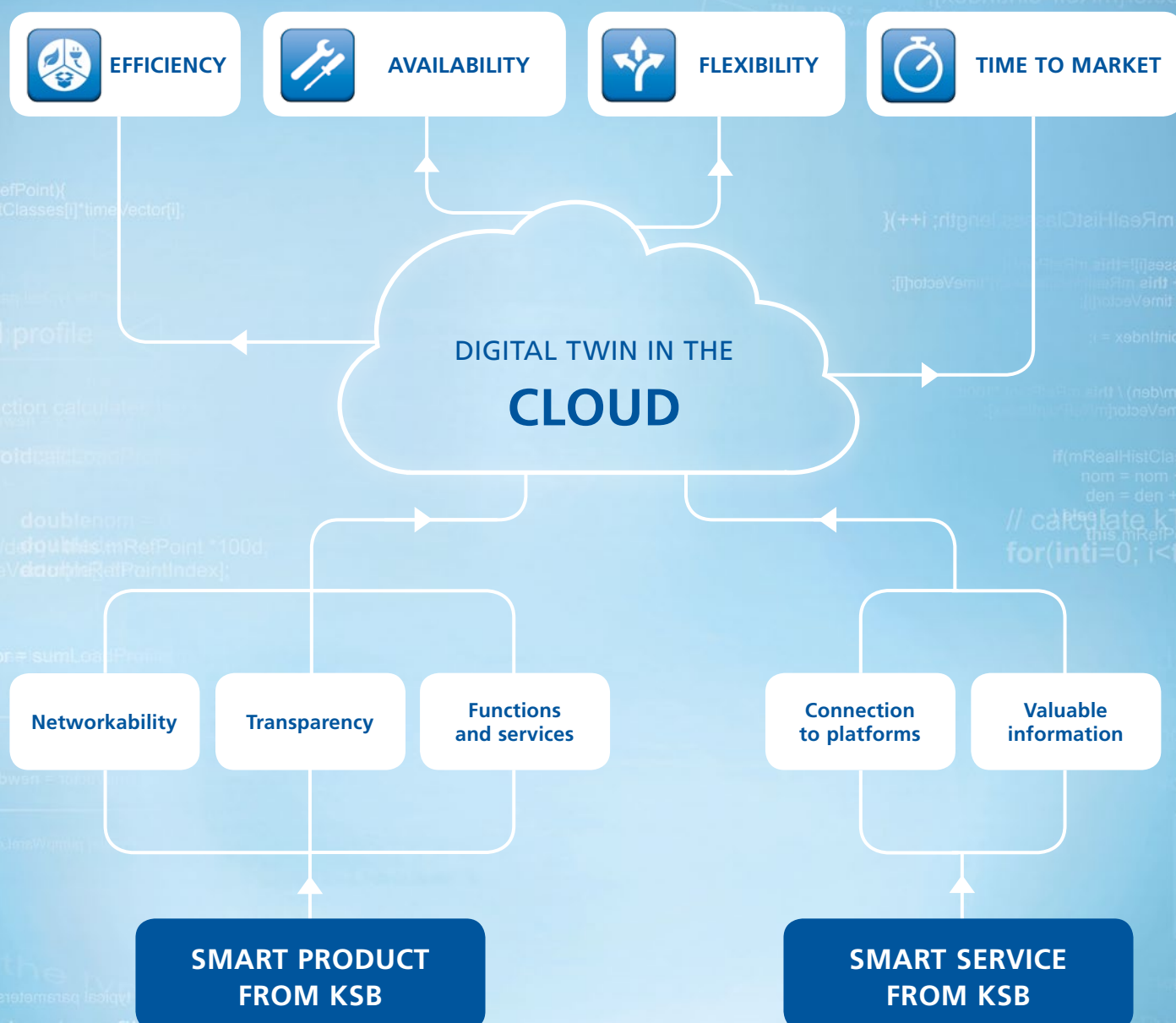
## Industry 4.0: we have experience with the future



## 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/industry40](http://www.ksb.com/industry40)



### **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 valuable information:**

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.

The products illustrated as examples are partly fitted with options and accessories incurring a surcharge.

# The fluid technology of the smart factory:

## smart pumps from KSB

With KSB's smart pump sets, you can today already benefit from a piece of Industry 4.0. A smart pump set consists of a pump and drive, as well as the PumpDrive variable speed system and the PumpMeter monitoring unit. The principle behind this is one of the fundamental ideas of the digitalised industry: sensors and control systems are integrated directly to the product. In this way, operation can be adjusted locally, automatically and autonomously, and information is available via network interfaces.

### With smart KSB products, the pump set has become a piece of Industry 4.0

#### 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.

##### Networkability:

- Straightforward connection to process control systems
- Analog interface and bus communication available via Modbus RTU
- 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 optimisation
- Calculation of the pump's operating point
- Simple, clear display of savings potential through automatic analysis

Find out more about PumpMeter at:

[www.ksb.com/pumpmeter](http://www.ksb.com/pumpmeter)

#### 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 up to 60 % of the required energy and increase availability and operating reliability.

##### 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:

- Integrated multiple pump operation (up to six pumps with full redundancy)
- Dynamic pressure compensation function (compensates for pipe friction losses)
- Sensorless differential pressure control
- Sleep mode
- Energy savings meter
- Characteristic curve control/integrated operating point estimation
- Integrated dual pump management
- Sensorless dry running protection
- Various service intervals (based on operating time or age)
- Functional check run
- Pressure boosting functions package
- Functions package for waste water applications

### Perfectly networked for maximum efficiency

Through the combination of PumpMeter and PumpDrive, maximum savings are made. Based on the precise measurement data from PumpMeter, PumpDrive can estimate the operating point even more precisely – and control operation accordingly. The devices are connected quickly and easily via a pre-configured cable, which can also be easily retrofitted on site.



### My PumpDrive app

Thanks to the integrated wireless module, PumpDrive can be controlled via Bluetooth. This turns a smartphone into a “remote control” for PumpDrive, while all data and information is available in the app. As a result, the My PumpDrive app is a digital twin of the smart pump set, ensuring maximum ease of maintenance, fast commissioning and more.

#### Valuable information:

- Monitoring of operating data
- Management of data
- Quick and straightforward commissioning through mobile commissioning assistant

#### Connection to platforms:

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

Download at: [www.ksb.com/pumpdrive](http://www.ksb.com/pumpdrive)

### FluidFuture®: the energy-saving concept for your system

To help you maximise energy efficiency in your system, we offer smart products and services as well as comprehensive system optimisation. We look at the system as a whole and realise maximum savings for your hydraulic system in four steps.



Experience FluidFuture® at  
[www.ksb.com/fluidfuture](http://www.ksb.com/fluidfuture)

You can find further KSB smart services for Industry 4.0  
on the next page





## Smart tools and services for Industry 4.0

KSB products and services provide data and valuable information on the operation of your system on different platforms. Thus today, they already deliver the data basis for smart factory and Industry 4.0, contributing to increased resource efficiency, availability and flexibility.

### Smart tools and services from KSB provide valuable information:

#### Identify optimisation potential with the KSB Sonolyzer® app

The KSB Sonolyzer® app 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.

#### Valuable information:

- KSB Sonolyzer® offers a free initial assessment of whether optimisation potential exists and whether a comprehensive energy efficiency check is necessary.
- To do this, the app uses an estimation algorithm that was developed by KSB and is the first of its kind on the market.
- The results analysis 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 with KSB Sonolyzer®.
- The app is available for free with Android and Apple, and runs on smartphones and tablets – with specially protected devices even in potentially explosive atmospheres.

All information on KSB Sonolyzer® at: [www.ksb.com/sonolyzer](http://www.ksb.com/sonolyzer)



KSB Sonolyzer® app for  
Android smartphones



KSB Sonolyzer® app  
for iPhones





### Precise analysis with the Pump Operation Check

Pump Operation Check is a precise efficiency analysis of single-pump applications. Measurement and analysis are carried out by KSB experts with the help of the PumpMeter monitoring unit, which creates a precise load profile without impacting the operating process.

#### Valuable information:

- Transparency of pump data with PumpMeter
- Automatic analysis of load profile
- Suggestions for optimisation from KSB experts
- Comprehensive report of findings including economic efficiency analysis

#### Connection to platforms:

- The analysis is carried out via a web front end

More information at: [www.ksb.com/poc](http://www.ksb.com/poc)

**Fluid Future® - Pump Operation Check**  
No new calculation.

**Load profile**  
Current file: Messe

For: Mustermann AG  
From (Company): KSB AG  
Plant designation: coolong liquid supply  
Geod. Head: 10.0 m  
Electricity purchase price: 0.11 €/kWh  
Currency: €  
Start of analysis period: 20.10.2014  
End of analysis period: 03.12.2014  
Analysis period: 2154 Hours

Description of the analysed plant: The pump is part of the cooling liquid supply system and is connected to a cooling tower. The installation situation and the dimensioning of the piping have been checked. It is not necessary to modify the piping. The piping enlargement is energy-optimised.

**Scenario with new pump selection**

Costs of assembly/modification scenario B	1000.00 €
Costs of assembly/modification scenario C	2000.00 €
Purchase price of PumpDrive	5488.50 €
Purchase price SuPremE motor	1744.56 €
Annual increase of energy purchase price	8.6 %
Interest rates for investments p.a.	0.0 %



Recording operating data through the PumpMeter monitoring unit

### All data to hand thanks to KSB service tool

The KSB service tool enables operating status monitoring and central administration of pump data via the digital twin. The fact that the pumps' status and history are available also simplifies service and maintenance. A special assistant is available for commissioning.

#### Valuable information:

- Monitoring of operating data
- Management of data
- Quick and straightforward commissioning through mobile commissioning assistants

#### Connection to platforms:

- PC integration via FDT interface

Learn more at: [www.ksb.com/servicetool](http://www.ksb.com/servicetool)

## 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 along 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.

The products illustrated as examples are partly fitted with options and accessories incurring a surcharge.

### 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 for 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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don't miss out, sign up now:  
[www.ksb.com/newsletter](http://www.ksb.com/newsletter)



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