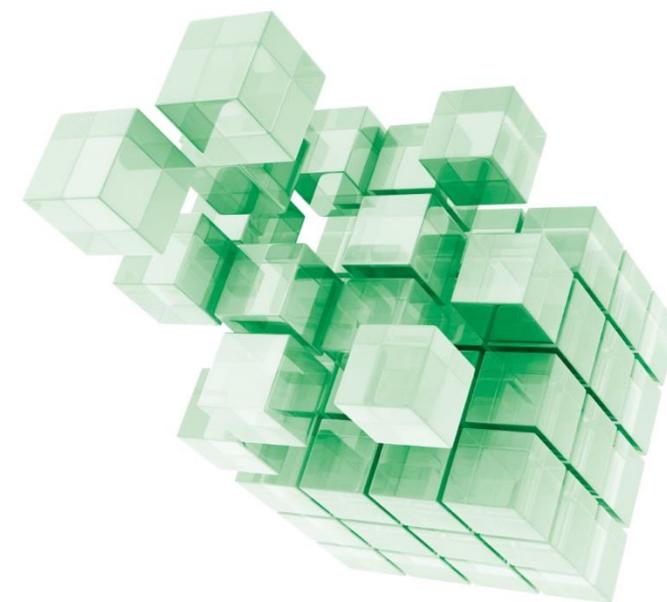




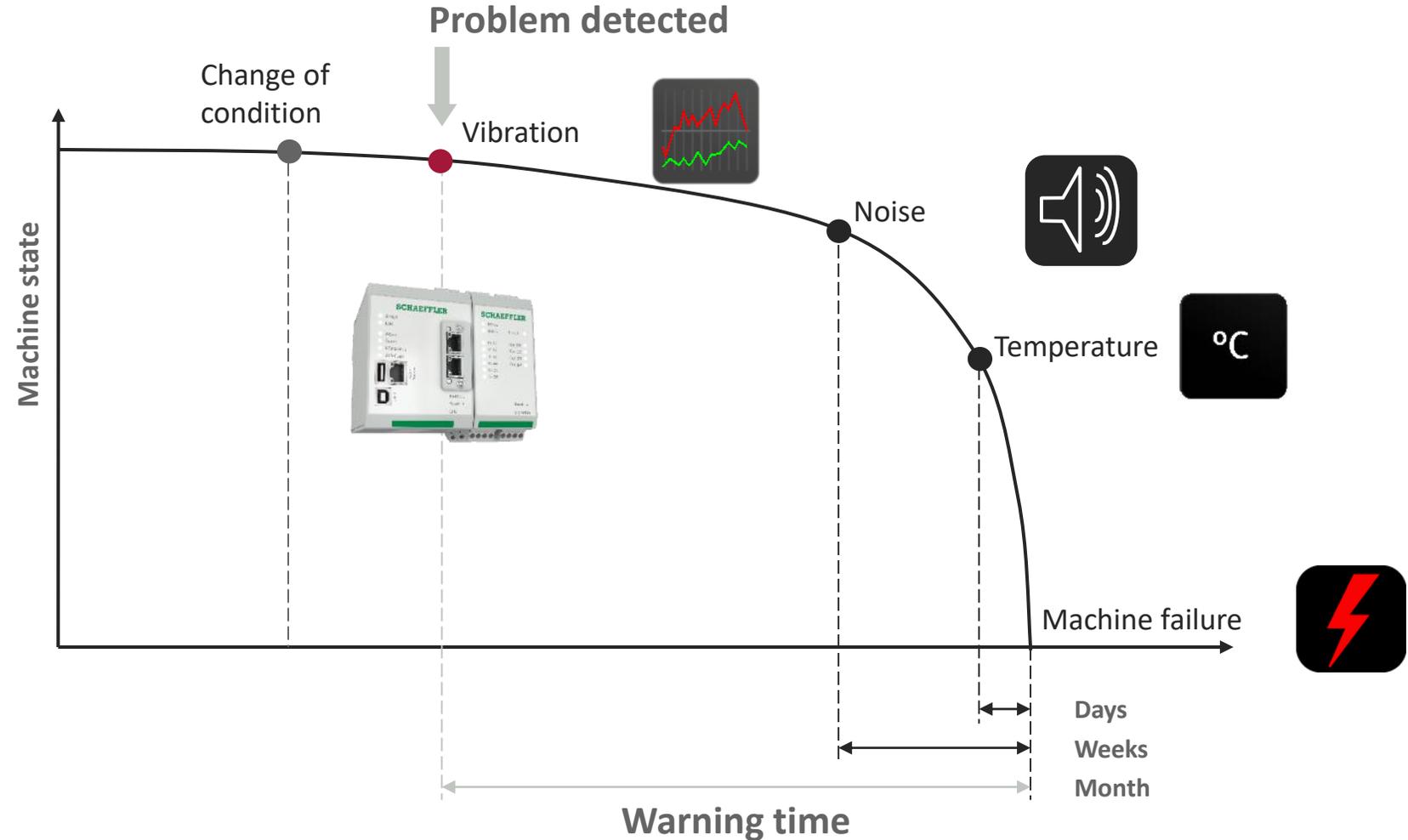
## “Portafolio Schaeffler Industria 4.0 –OPTIME”

Presented by Schaeffler  
18/02/2023



## Why Condition Monitoring?

- Increased availability/ prevention of unplanned downtime
- Planning of service and maintenance is improved
- Subsequent damages are avoided, reduction of maintenance costs
- Analysis of the damage root cause is supported



## Issues with «CONVENTIONAL» predictive condition monitoring

### Human factors

- Hazardous environments
- Weeks in-between measurements
- Cannot cover all rotating machines
- Change work processes and habits
- Gaps in condition monitoring expertise

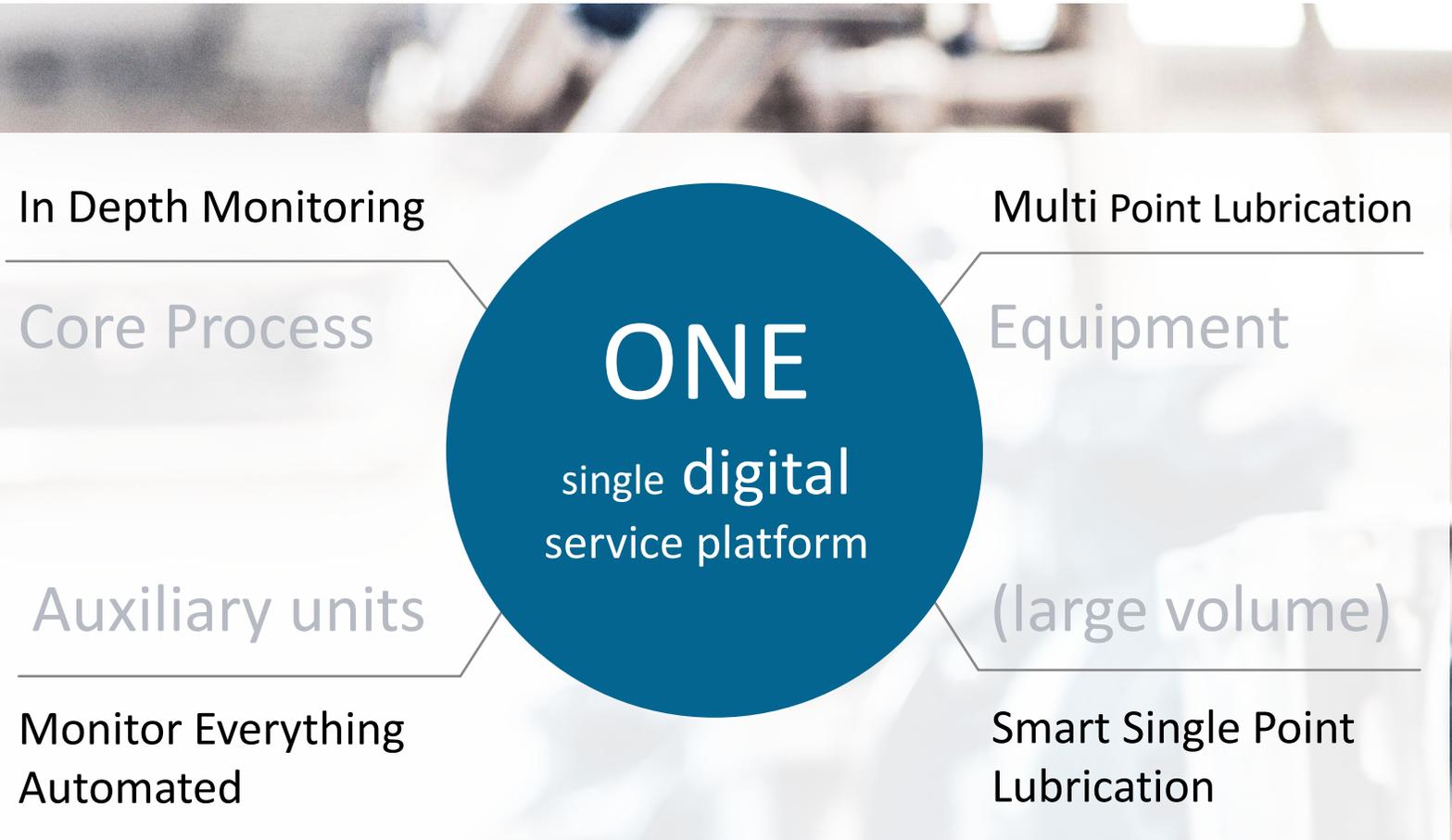
### Missing Digitalization

- Incomplete data
- Multiple databases
- Missing integration into company eco systems
- Missing automation and workflow

**With lubrication it is basically the same**



Requirements towards comprehensive approach for **predictive maintenance** and **smart lubrication**



- SmartCheck
- ProLink
- Optime



# Automatic Diagnosis – for E-Motors, Pumps and Fans

2023

available

OPTIME



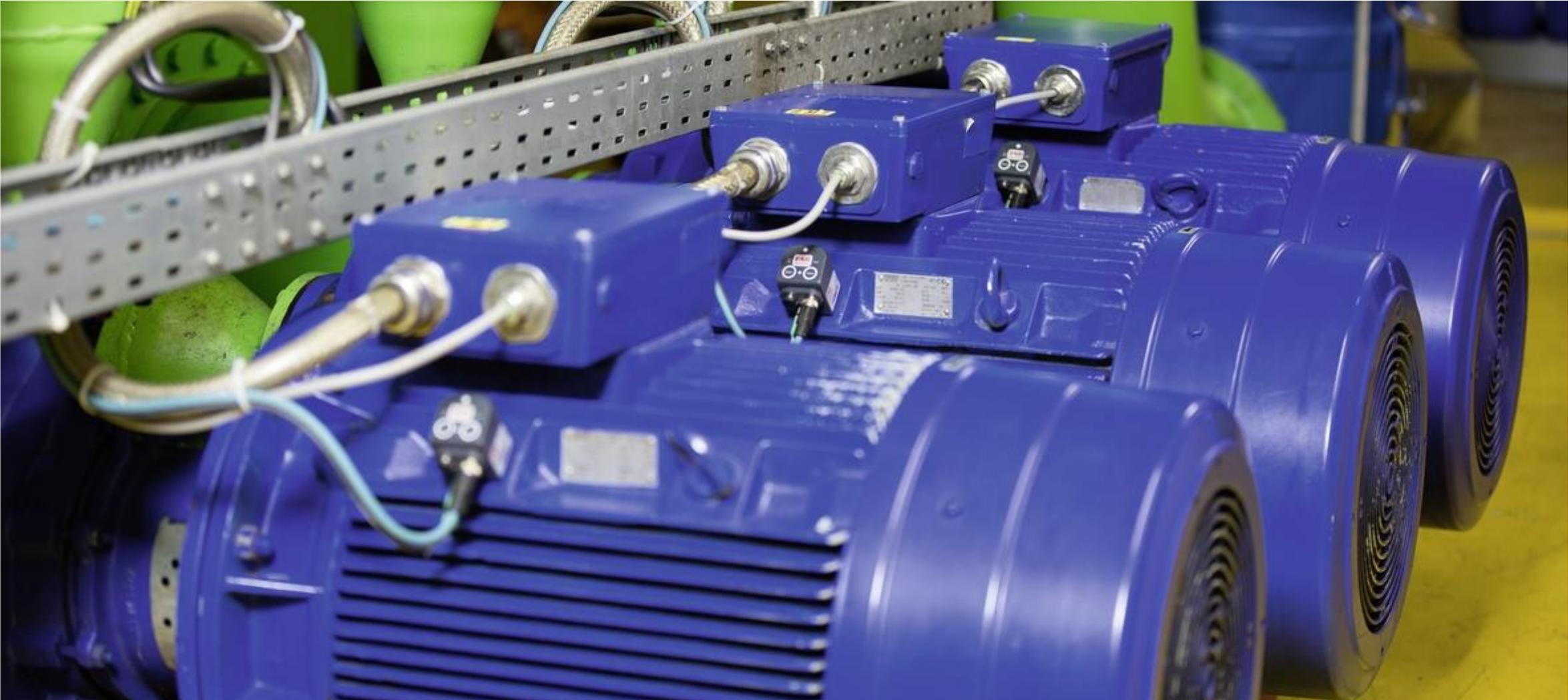
Contents of Automatic Diagnosis





## FAG SmartCheck

Online Condition Monitoring



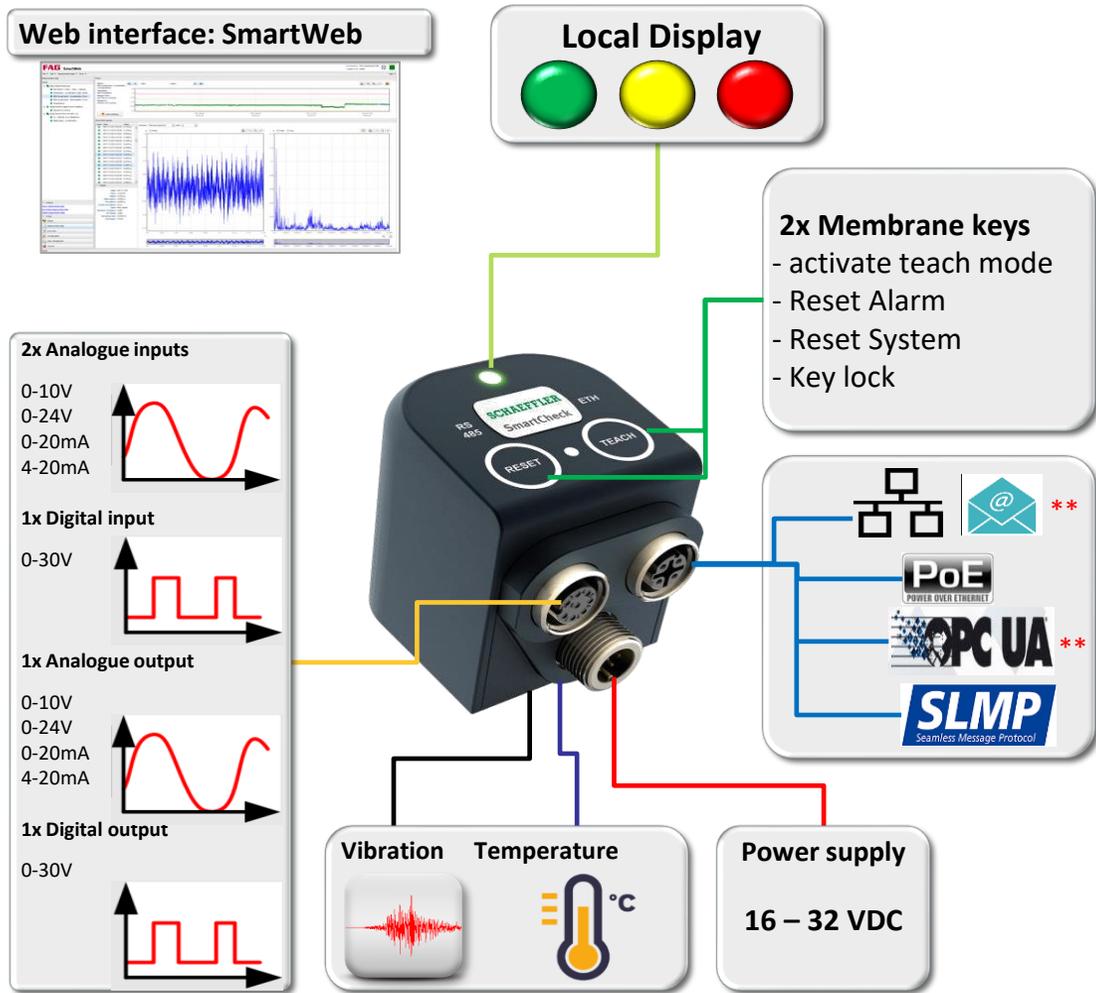
## Vibration sensor FAG SmartCheck

### Hardware FAG SmartCheck

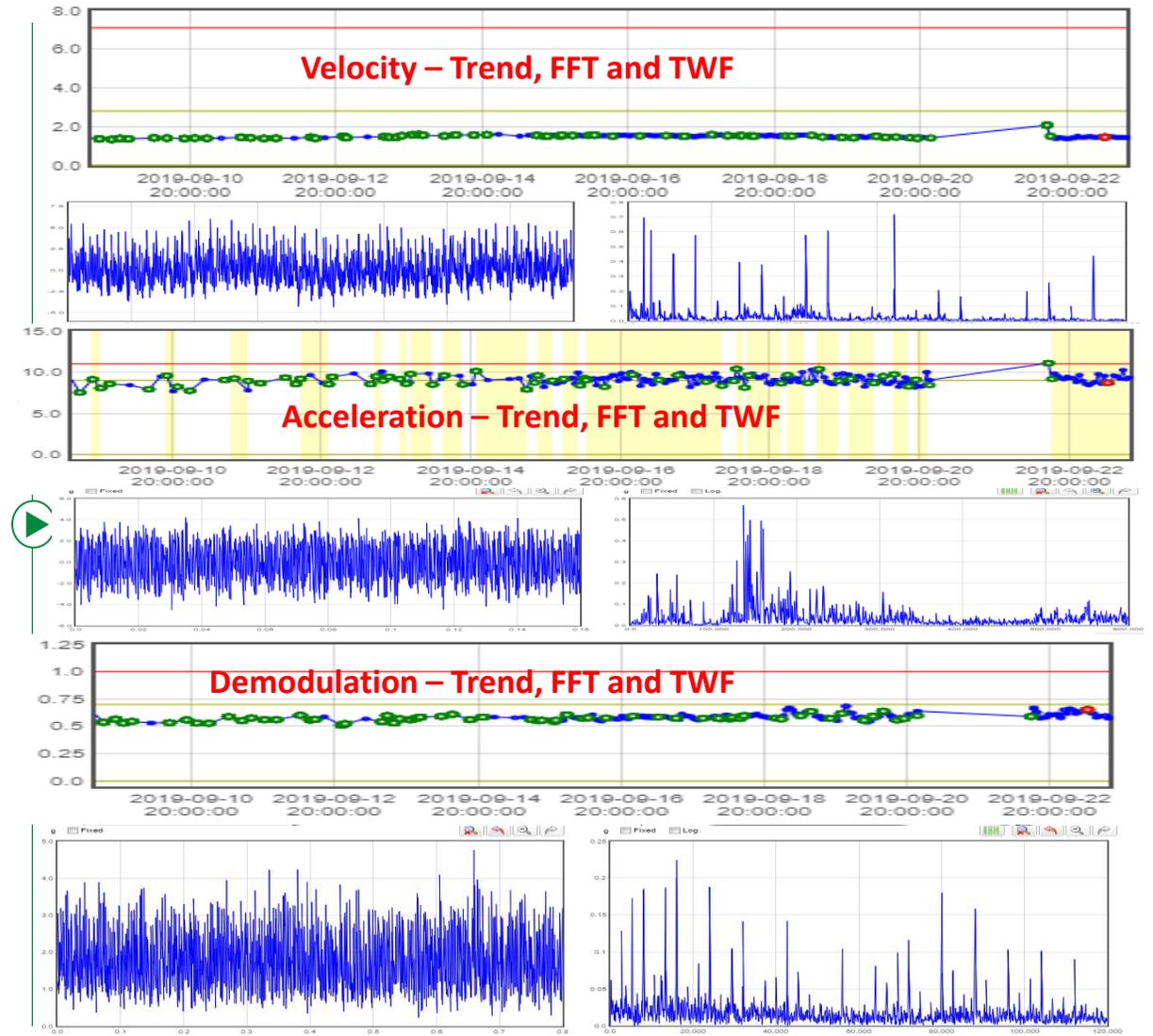


- ▶ Web based online diagnosis
- ▶ Innovative sensor
- ▶ History data for long periods of time

# SmartCheck: Technical details, added features, applications & selling based on added values



\*\* New in 2020



# Smart Check – Key Feature Set

SCHAEFFLER

Mount, power and Go!!

Embedded Software (  dB)

Flexibility

Vib and Temp in one device

Narrow Band alarm capability

Local Indication

Wide Frequency Range

Additional Data

## New in 2020

Email capability

OPC-UA Server (on the Smart Check)

Channel monitoring

MQTT

Preconfigured to start collecting data once powered

Smart Web provides basic data viewing capability with bearing database

Can handle variety of I/O, vibration and Outputs

Unique in the market (for FFT capable system on variable speed equipment)

Allows system to alarm on Gear mesh or BPFO or Unbalance

Green, yellow and red indicating alarm condition

0.8 – 10k Hz frequency range

64 MB memory, IP67 housing, Teach mode, IP Addressable

Provides communication interface to condition changes & data backup

**Open Platform Communications - Unified Architecture (2008) -**

Vendor independent, Scalable, Secure, Standardized

Allow for faster alarming on up to 3 parameters (<1 sec)

**Message Queuing Telemetry Transport**

## Direct integration in ERP and Cloud



Direct integration via standard communication channels:

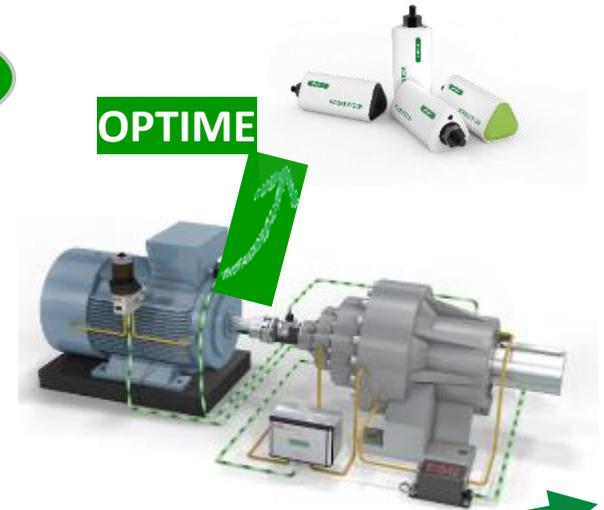
- OPC/UA Server
- WebServices
- E-Mail
- Profinet
- CC-Link IE

# Automatic Diagnosis – for E-Motors, Pumps and Fans

available

2023

OPTIME



Contents of Automatic Diagnosis





# ProLink – Condition Monitoring System

20200710

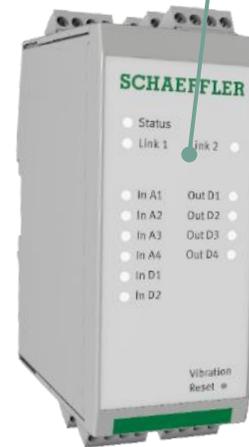
**In a nutshell**

**SmartWeb**

- Configuration assistant
- Automatic learning mode

**Additional modules**

- individually expanded with additional measurement modules



**Cloud-Communication**

- Ethernet
- OPC-UA Server, MQTT, Webservices

**Field bus connection\***

- Profinet,
- CC-Link IE,
- ...

**Vibration module with recording of speed data**

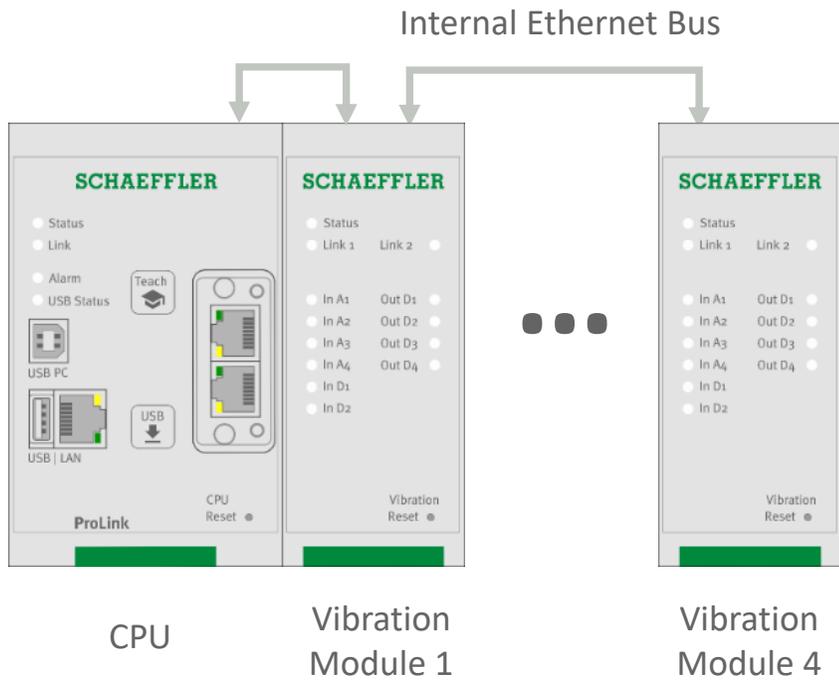
- Extremely high signal quality (24 bit)
- High-quality signal processing

\* Field bus connection will be available in a later release

**Short info**

- Smallest unit consisting of processor module (CPU) and vibration module.
- Depending on requirements, the modules can be expanded from 4 to 8, 12 or 16 vibration channels
- Based on proven SmartCheck technology with consistent operating concept and identical software for both products
- Integration into the process world via usual field buses

## Maximum expansion of the Monitoring System (available)



- Max. 4 Modules
  - 4 x Vibration
- 16 Vibration Input
- 8 Digital Input (of which 8 Pulse A/B coded)
- 16 Switching output (digital)

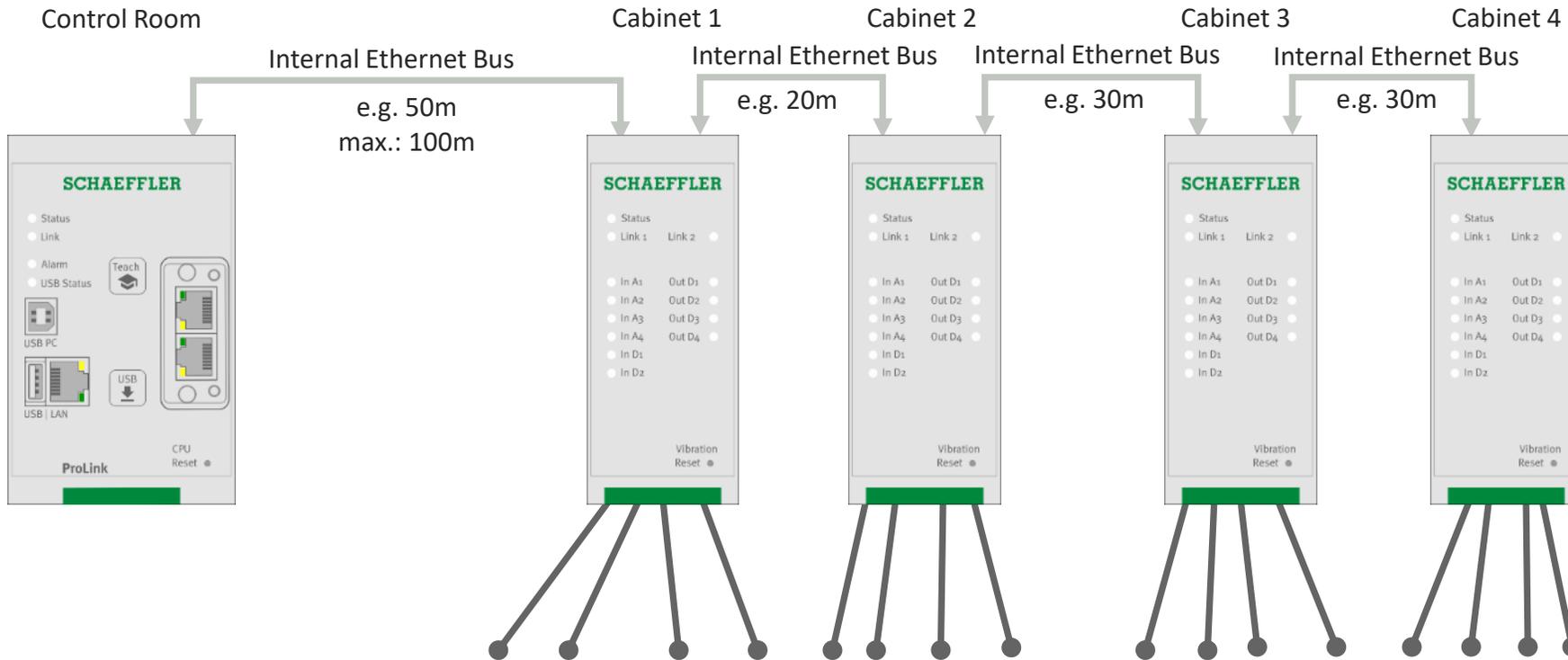
## Direct integration in ERP and Cloud



Direct integration via standard communication channels:

- OPC/UA Server
- WebServices
- E-Mail
- Profinet
- CC-Link IE

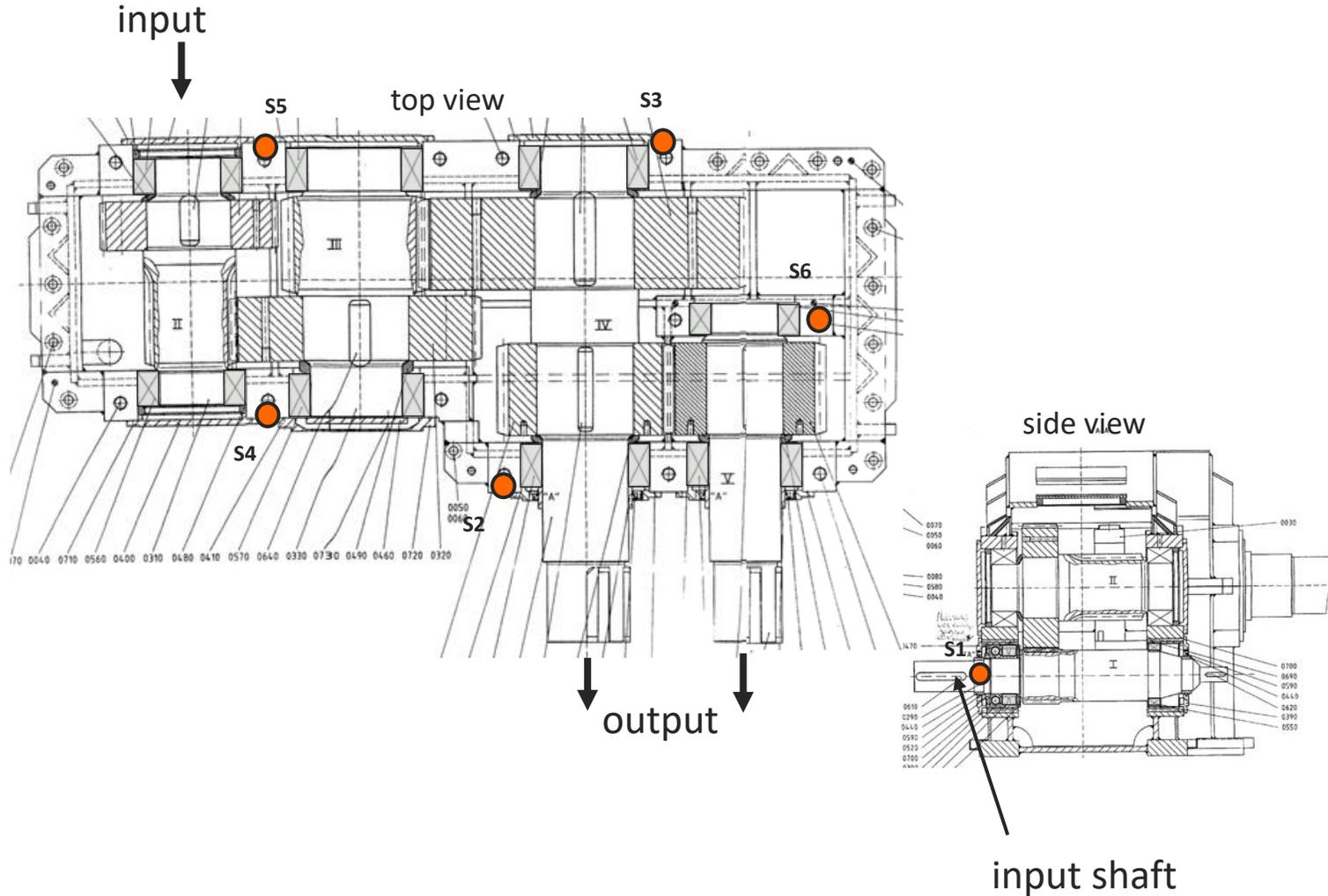
# Example Automotive Industry – Exhausters of Filter System



Hint:  
in each cabinet an additional power supply is needed



# Gearboxes of Heavy Duty Mixers



## Gearboxes of Heavy Duty Mixer



### Scope of Supply;

1x	069695938-0000-10	Prolink-8CH
6x	056059760-0000-10	SENSOR-C002-01S0-00MILM8
6x	069717176-0000-10	SENSOR.CABLE-MIL-M12-30M
2x	069810354-0000-10	DTECTX1-S.ISOAMP-UNIVERSAL
2x	069810869-0000-10	DTECTX1-S.CONNECT-M12-STD-4P-MS
6x	039697592-0000-10	SENSOR.FIX-PLATE-M8
1x	020961278-0000-10	SENSOR.PLATE-GLUE
4x	052558258-0000	CM-HOUR-ENGINEER (configuration)
10x	052558258-0000	CM-HOUR-ENGINEER (commissioning)
24x	074581643-0000	CM-HOUR-E-SERVICE (remote service)

**Differentiation SmartCheck to ProLink CMS**



**SmartCheck**



**ProLink CMS**

	<b>SmartCheck</b>	<b>ProLink CMS</b>
Measurement points	1-3	4-16
Limited space	-	++
Surface >70°C	-	++
ATEX	-	with zener barriers
PLC integration	+	++

Unterwasser ?

Spindle Applikation

## Complexity of applications

### Applications for beginners

- Motors
- Fans
- Pumps
- All Industries



### Advanced applications

- Gearboxes
- High channel no. e.g.
  - Paper Machines
  - Steel Industry
  - Wind turbines
  - Cement Manufacturing



### Application for experts

- Machine tools
- Crane
- **Complex** industrial applications
- ATEX / Eex



# Automatic Diagnosis – for E-Motors, Pumps and Fans

OPTIME

SCHAEFFLER

2021

available

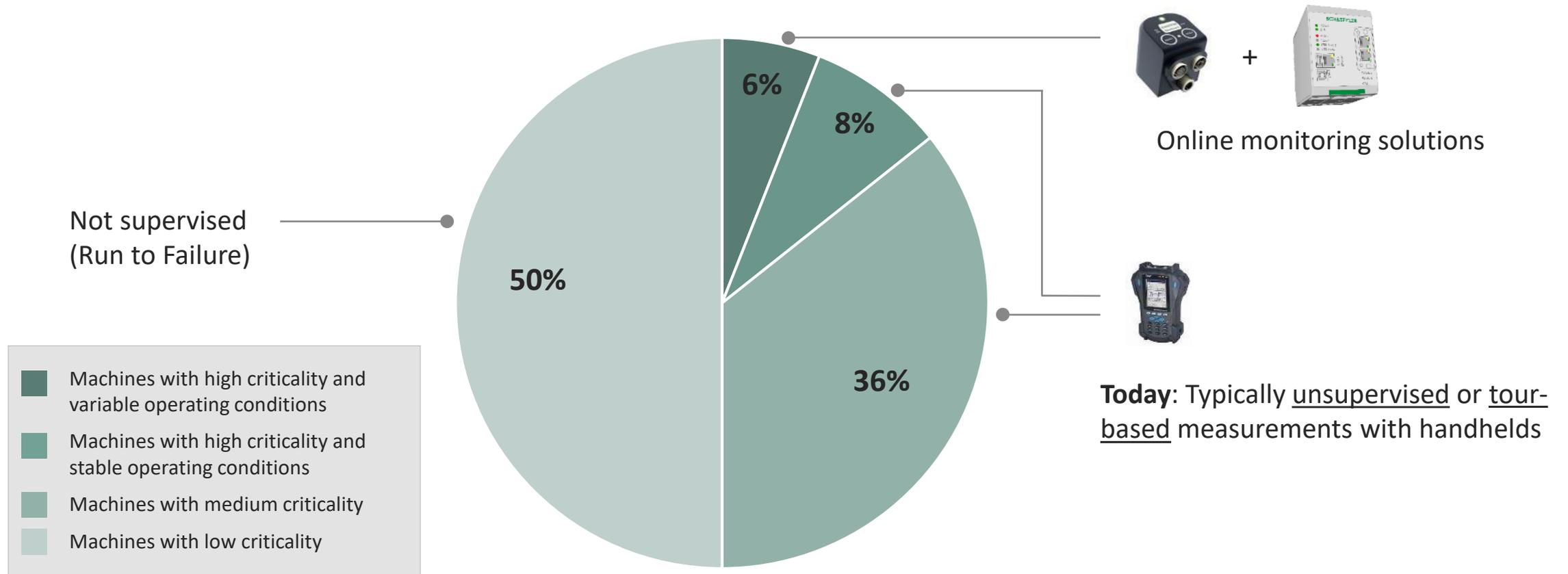


Contents of Automatic Diagnosis



Customer aggregates that are not monitored or only monitored manually represent an uncontrolled risk.

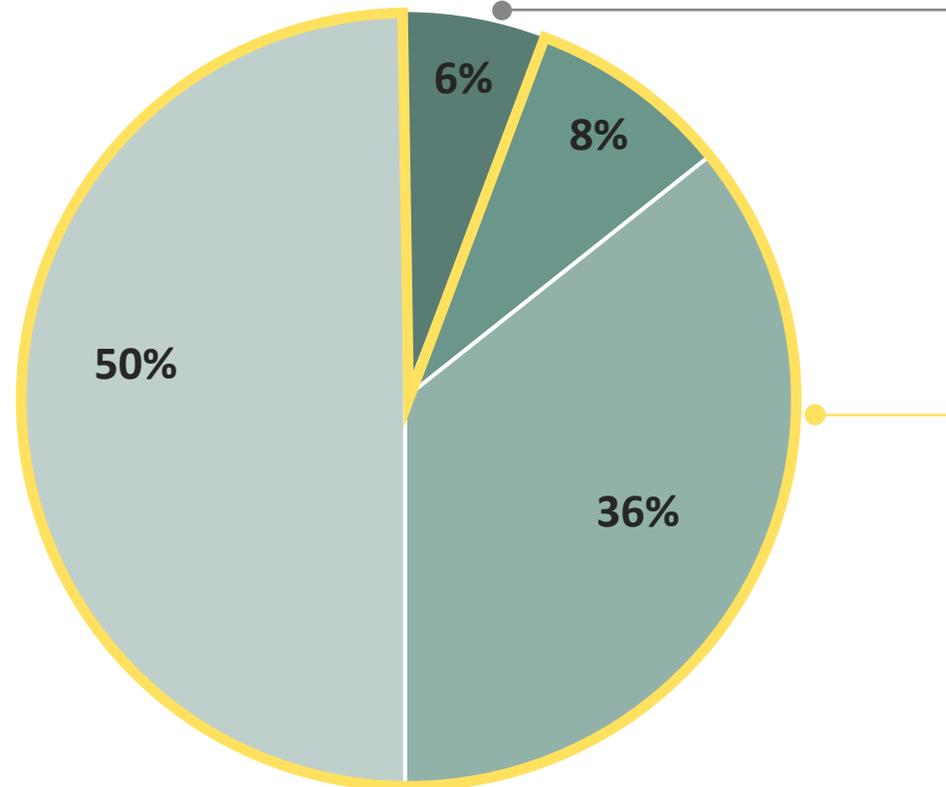
### Condition monitoring in a typical pulp & paper production



# Reduction of risk by introducing the next generation of condition monitoring

## Condition monitoring in a typical pulp & paper production

Typical Pulp & Paper production site:  
> 5000 Measurement Points



- Machines with high criticality and variable operating conditions
- Machines with high criticality and stable operating conditions
- Machines with medium criticality
- Machines with low criticality



Online monitoring solutions



**OPTIME: Online monitoring**

- Affordable
- Easy handling

# OPTIME – Plug, Play & Monitor.



## Automated data analysis with Schaeffler know-how



Schaeffler **OPTIME** is a system that can be easily expanded. It consists of **wireless, battery-powered vibration sensors**, a **gateway** and a **digital service that evaluates this data and provides professional analysis** – conveniently via smartphone or desktop application.



## How it works



### PLUG.

- Simple and fast sensor installation by screw or adhesive connection
- Automatic network construction
- Mesh network as one of the most energy-efficient and reliable IoT networks in the industry
- System can be extended by further measuring points at any time
- No previous knowledge required



### PLAY.

- Intuitive operation for beginners and experts
- Clear visualization of trend developments and severity of possible incidents
- User-specific views possible by grouping the monitored aggregates
- Emergency Alarm
- Digital Service provides professional diagnostics, available 24/7 via app



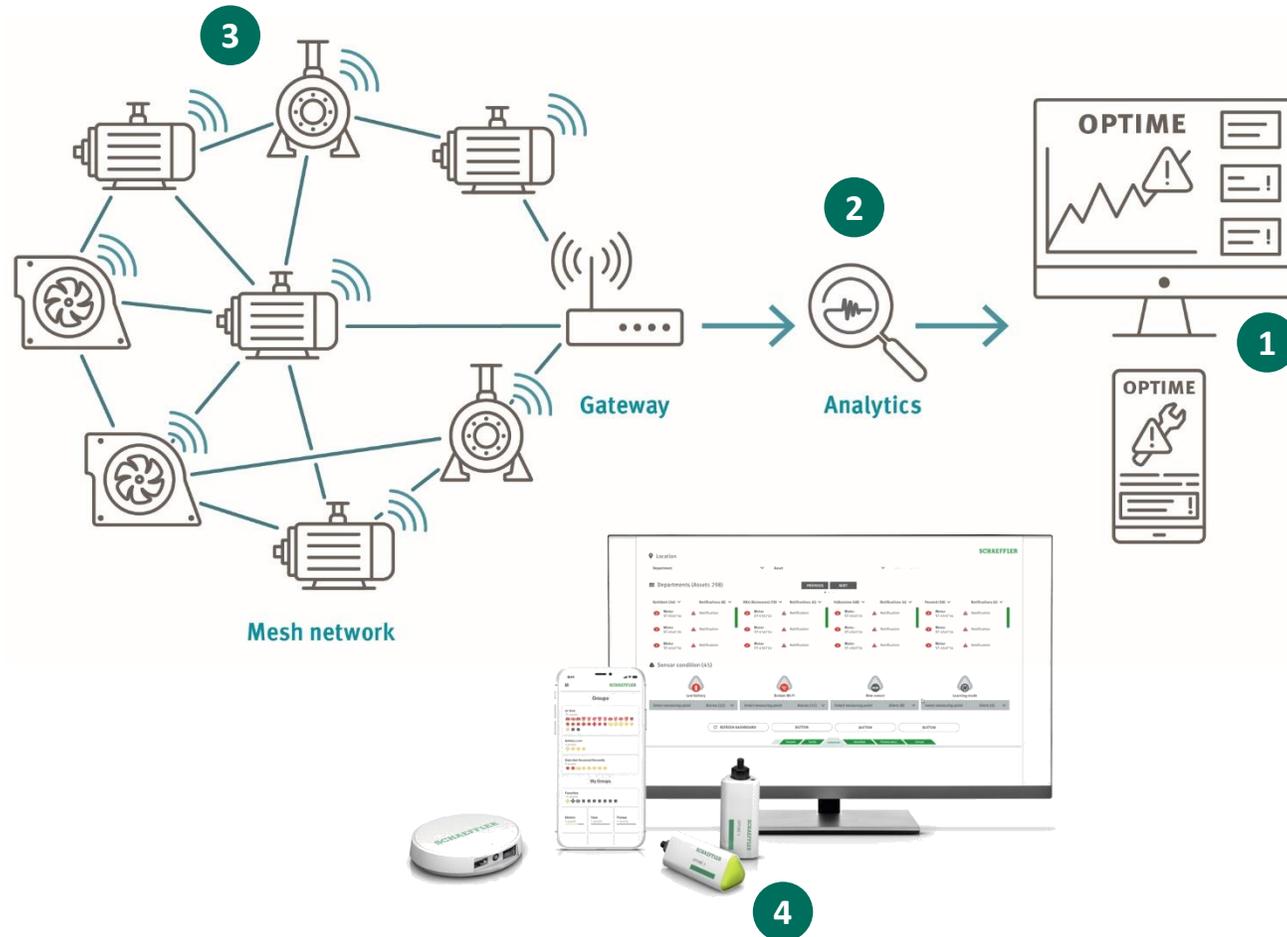
### PREDICT.

- Continuous, automatic analyses based on expert algorithms and machine learning
- Indicates malfunctions weeks in advance and provides information on the causes
- Long-term planning of maintenance measures, personnel requirements and spare parts procurement

OPTIME – typical target applications (...and many of them)



## OPTIME - affordable and effortless next generation condition monitoring



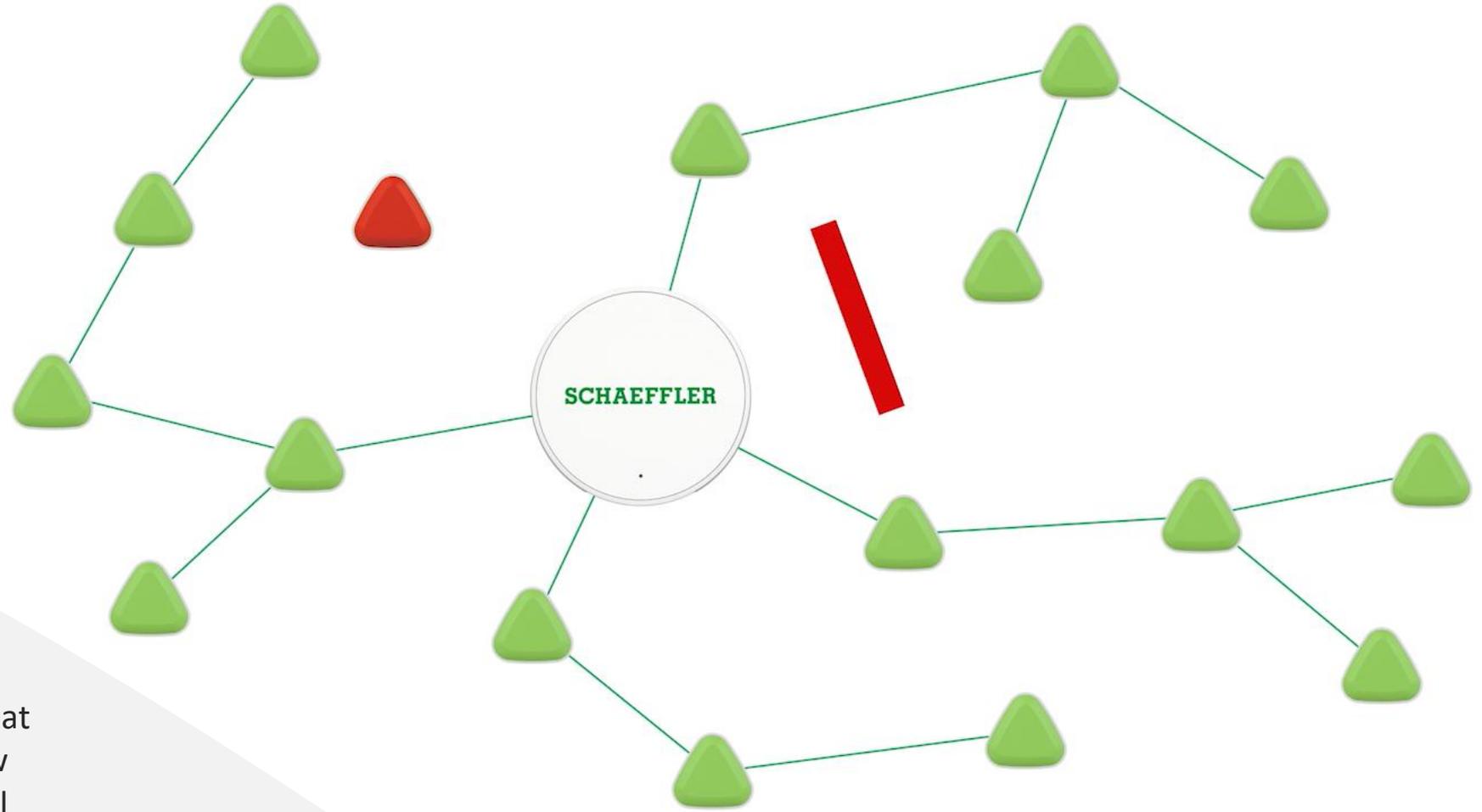
- 1 Easy to use applications:**  
 Desktop application for expert users and mobile application designed to serve the role-based work processes
- 2 Continuous automatic measurement:**

  - Early reaction to impending machine failures on the basis of Schaeffler bearing analysis algorithms and machine learning
  - Effortless and safe condition monitoring and maintenance in all environments.
- 3 Wireless mesh network:**  
 Automatic network management, device provisioning and battery life optimization
- 4 Plug-and-play sensors:**

  - Used as simply as possible.
  - The lifetime of the batteries of the sensors is 5 years.
  - The attractive price allows the use with currently unmonitored or low monitored machines.

## A smart network thanks to mesh technology

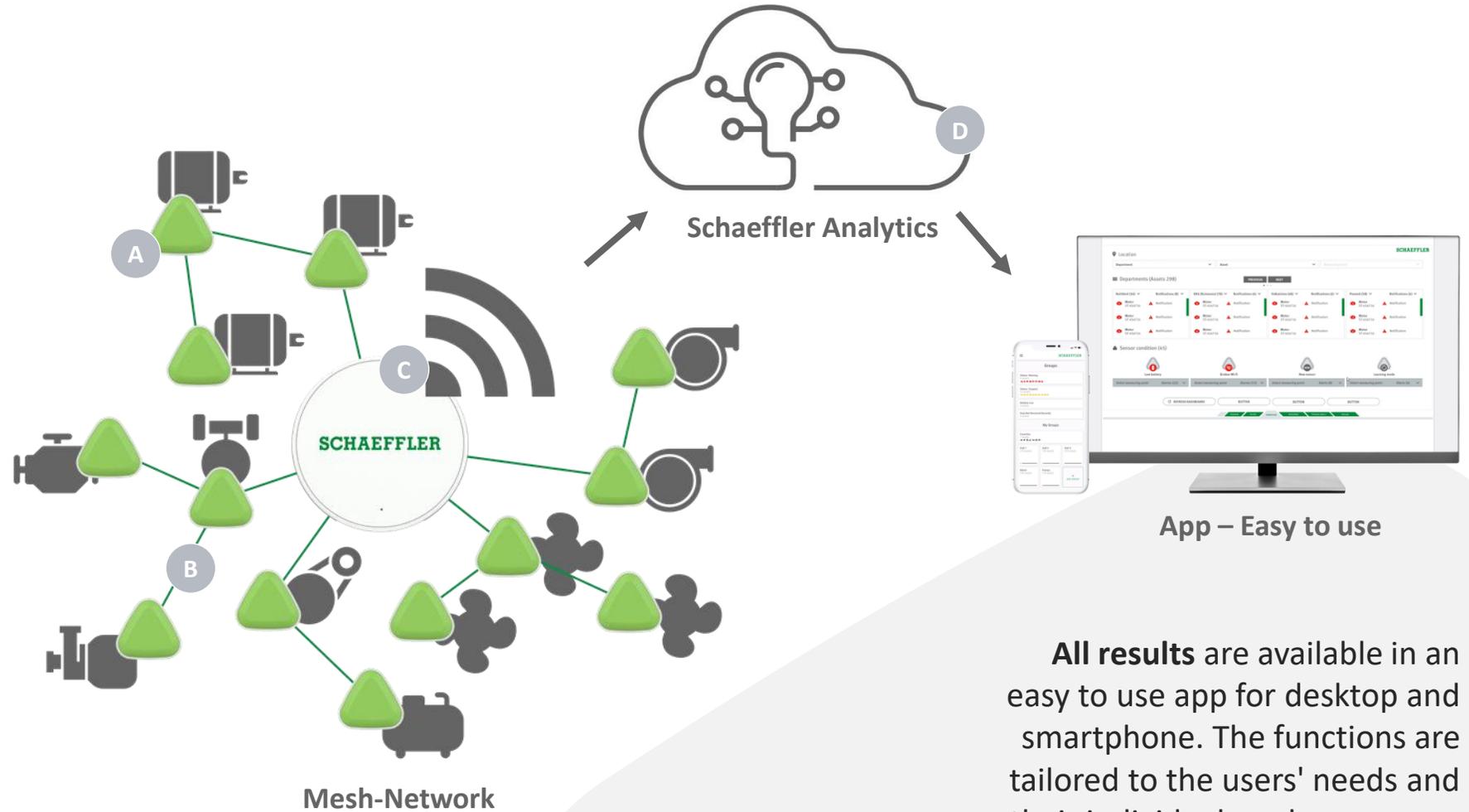
- A Automatic assembly
- B Sensor overload**
- C Sensor failure
- D Barriers



If a sensor fails or is overloaded, the network heals itself. Sensors that are no longer connected find a new way to the gateway. Even structural hurdles can be elegantly bypassed.

# The ABC of complete condition monitoring

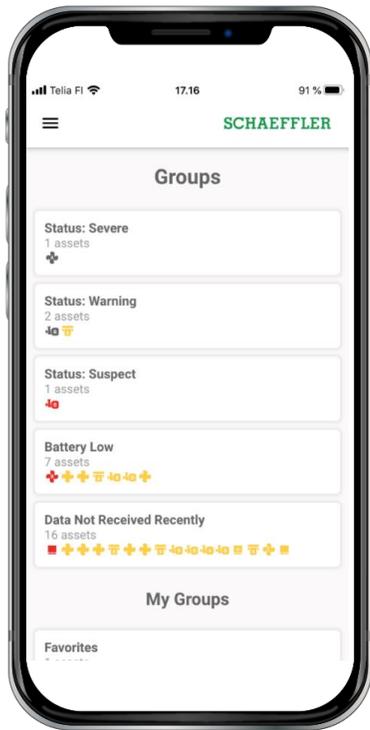
- A** Simple and quick installation of the battery-powered sensors on the machines.
- B** Wireless sensors record vibration and temperature data for automatic monitoring of machines and plants.
- C** The gateway receives the sensor data and transfers them to the cloud.
- D** The digital service evaluates data and delivers professional error analyses – conveniently via smartphone or desktop application.



**All results** are available in an easy to use app for desktop and smartphone. The functions are tailored to the users' needs and their individual work processes.

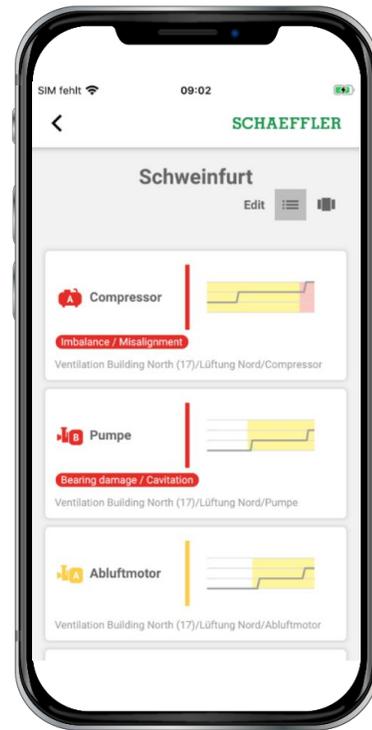
# One service app for all your user groups

## Individual groups



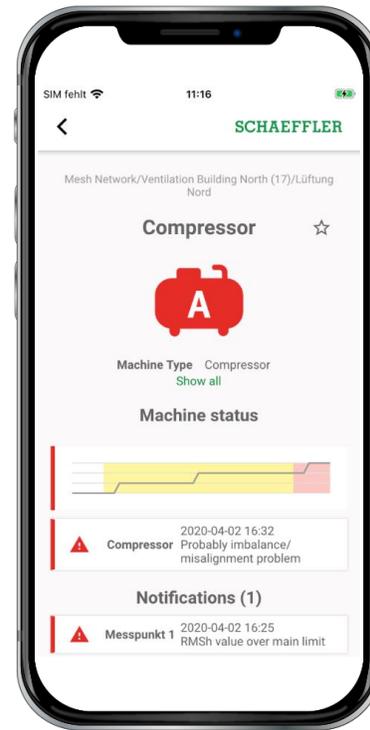
Full transparency over all machines

## Prioritized list view

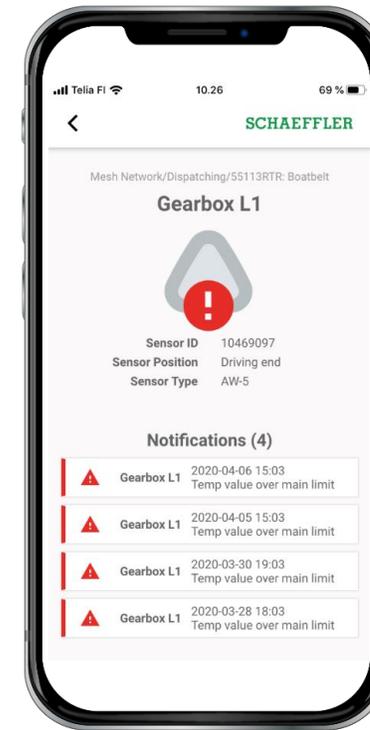


Prioritized maintenance issues

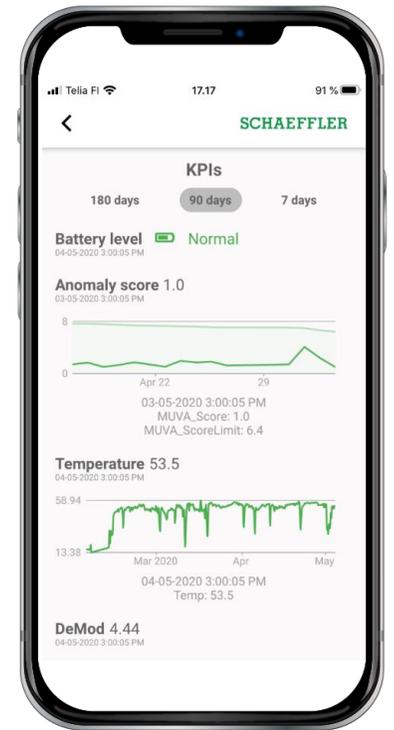
## Asset and condition status details



Self-learning machine condition assessment

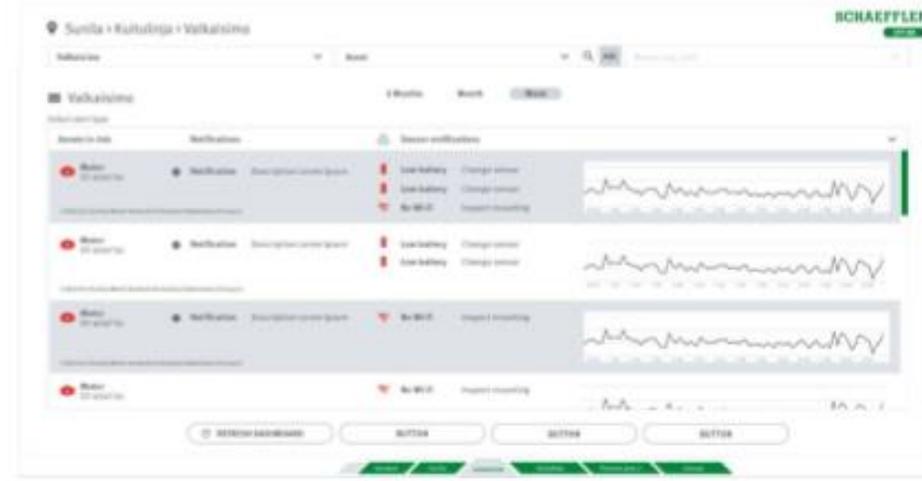
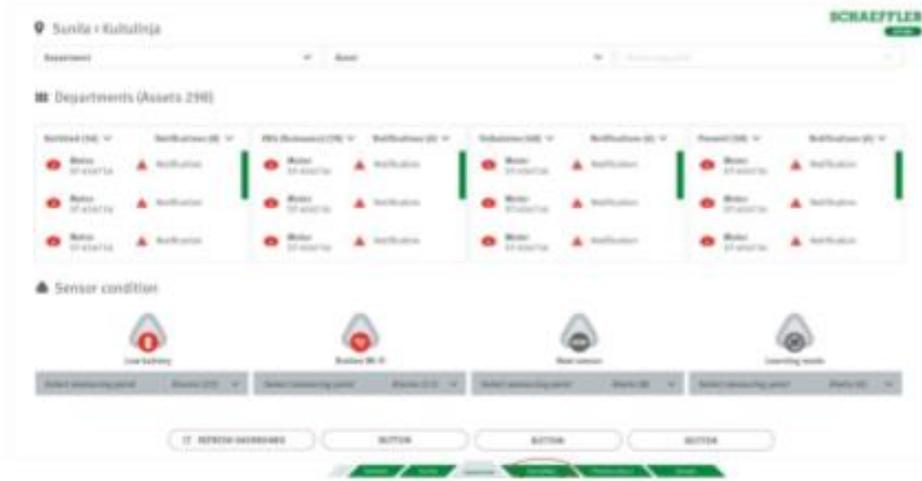


Understandable recommendations



Trend and data view for experts

### OPTIME PC-App



## Efficient and simple



### **Cost-efficient monitoring**

Monitoring of hundreds of rotating machines for just a few cents per day – up to 50 percent less expensive than monitoring with handheld meters



### **Quick install**

The installation of the sensors and the setup of the app takes a few minutes – no previous knowledge necessary



### **Using expert knowledge**

Digital Service delivers professional diagnoses based on expert algorithms and machine learning, available 24/7 via app – so you always make the right decision



### **For beginners and advanced students**

Intuitive operation offers decisive information and comprehensive extensions suitable for different users and needs

## Application example cement



### Typical Process Steps

**Quarry:** Rock transport, raw meal and/or cement additives,  
**Clinker Burning:** Cyclone tower, clinker transportation,  
**Cement Milling:** Milling and separating circuits, **Dispatching:**  
Boat loading, clinker transportation



### Typical Machines

E-Motor & gearbox & support bearings  
E-Motor & fan & support bearings  
E-Motor & fan

“

**FINNSEMENTTI**  
A CRH COMPANY

*OPTIME is characterized by a **reasonable price** and easy installation, which allows the monitoring to **be extended to many machines in cement mills**. With OPTIME, our maintenance staff has the **transparency of the condition** of most of our machines without having to monitor the machines all the time from close by.*

## Application example cement

### Finnsementti, Cement mill, Parainen, Finland



#### Project status

##### Last month achievements

- Installed 128 sensors and 10 gateways
- Self-learning period for alarms on-going
- Manual data analysis done on weekly basis.
  - Two findings have already led to maintenance activities

##### Next month targets / actions

- Improve weak connection in single underground tunnel
- Automatic alarms enabled
- Close follow-up for machines with findings
- Update user dashboard and sensor FW version

#### Installed sensors and gateways

Total: 128 sensors and 10 gateways

- Harbour (pier): 11 sensors
- Harbour (dispatching): 15 sensors
- Raw material: 28 sensors
- Cement milling: 23 sensors
- Clinker storage: 39 sensors
- Cyklone tower: 8 sensors
- Aquarium: 4 sensors



## Application example Schaeffler Schweinfurt (Metal processing/bearing production)



### Typical Process Steps

Heat treatment, ventilation plant, petroleum plant, test rig, cooling lubricant, central supply



### Typical Machines

E-Motor  
Pump  
Fan

“  
**SCHAEFFLER**

*When we heard about OPTIME, we stopped investing in manual hand measurements. We no longer need to include our own IT, as the gateways are already equipped with SIM cards.*

**OPTIME - it has never been easier to avoid up to 90% unplanned bearing-related downtime.**



- **Monitor your machines for less 20 cents a day per machine.**
- ...and OPTIME monitors continuously.



- **Start monitoring hundreds of assets within hours.**
- ...and no training is required for OPTIME.



- **Schaeffler experts for diagnostics and consulting**
- ...and all in one app.

## Portfolio Overview – Schaeffler Condition Monitoring Solutions (Typical Applications)

### OPTIME



Next generation affordable and effortless condition monitoring, easily scalable



#### General:

- Auxiliary machinery with **mostly stable** operating conditions (speed, load)
- Factories or parts of those, where a large number of single machines or measuring points (**>100**) are to be monitored
- Machines with a speed range between 100 and 5.000 rpm

### SmartCheck



Full-grown one-channel Condition Monitoring system with an intelligent teach mode and an integrated webserver



#### General:

- Production-critical machinery
- Machinery with variable process conditions
- Applications starting from 50 rpm
- Smaller machinery, where 1-4 measuring point are sufficient

### ProLink CMS



Modular multi-channel Condition Monitoring system for vibration and other values with enhanced connectivity



#### General:

- Production-critical machinery
- Machinery with variable process conditions
- Machinery, where 4 to 16 measuring points are necessary
- Applications where special fieldbus-connectivity is required
- Very low speed applications (<50 rpm)
- For special sensor requirements (e.g. high temperature, small footprint,...)



Feature	OPTIME	SmartCheck	ProLink CMS
Low cost per measurement point	✓		
Wireless solution (very easy installation)	✓		
Application Speed	100 – 5.000 rpm	> 50 rpm	< 20 rpm possible
Typical pre-warning time*	2 - 4 weeks	2 – 3 month	2 – 3 month
Connection to Cloud	✓	✓	✓
Process-oriented monitoring		✓	✓
Connection to PLC		✓	✓
High temperature applications (> 85°C)			✓
Special sensor requirements (extremely rugged, small profile, other)			✓

\*depending on the application

Predictive Maintenance on ONE Platform

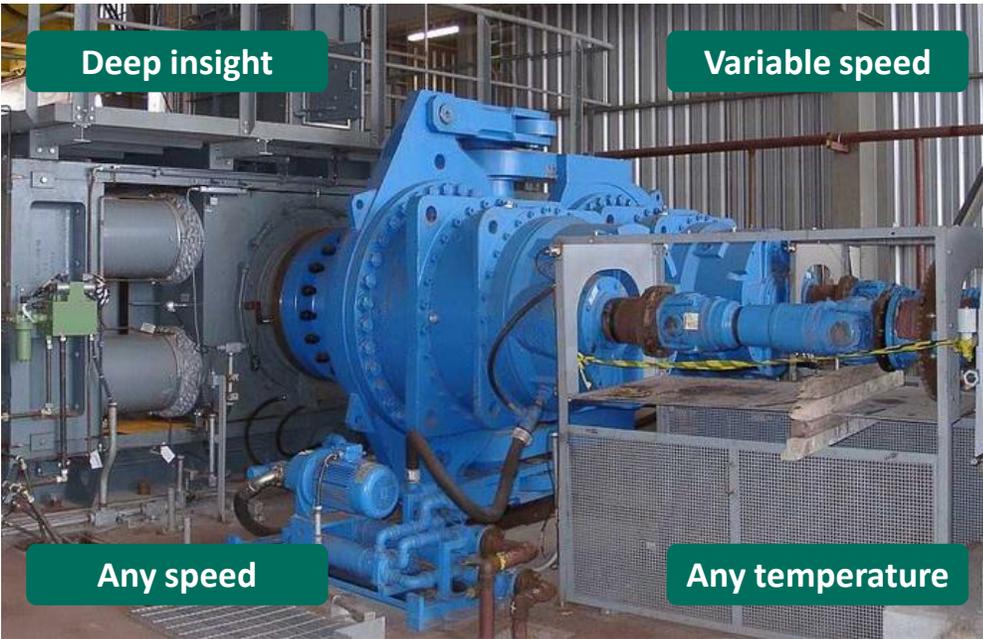
Auxiliary Units: Monitor Everything Automated



ONE  
single digital  
service platform

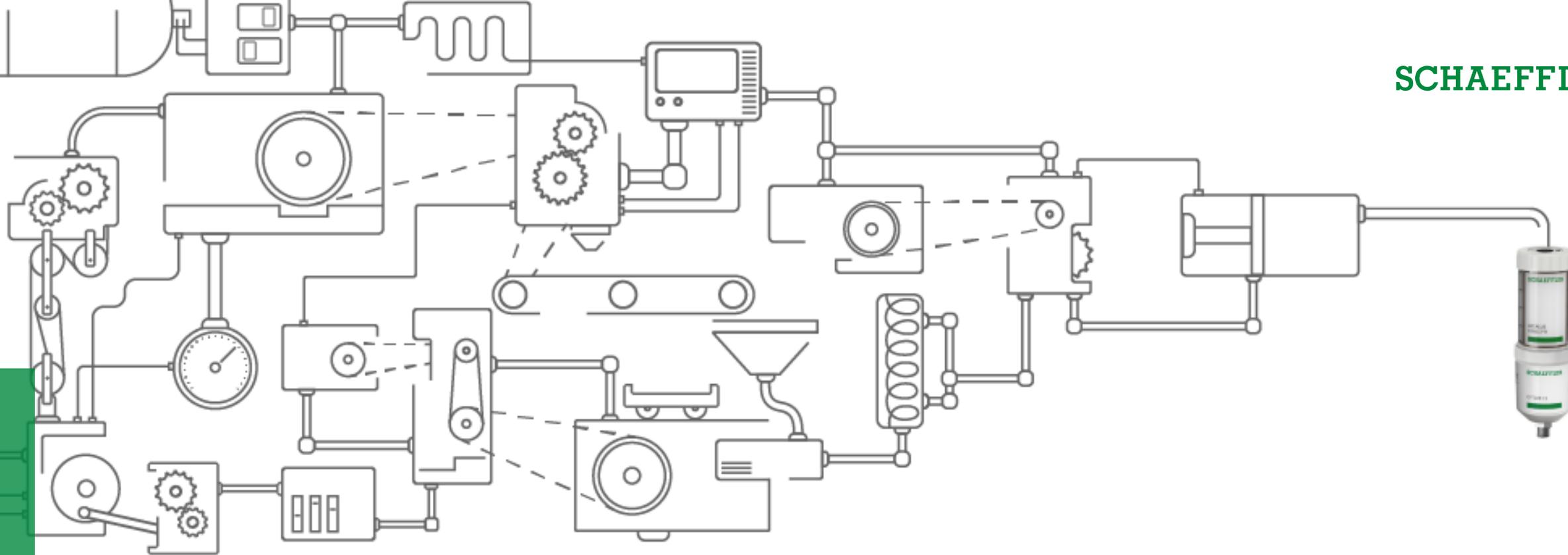
Wireless Solution

Core Process: In Depth Monitoring



Wired Solution

SCHAEFFLER



# OPTIME C1

The world's first smart lubricator

We pioneer motion

Schaeffler is

**your solution provider**

for smart maintenance

## A thoroughly positive user experience



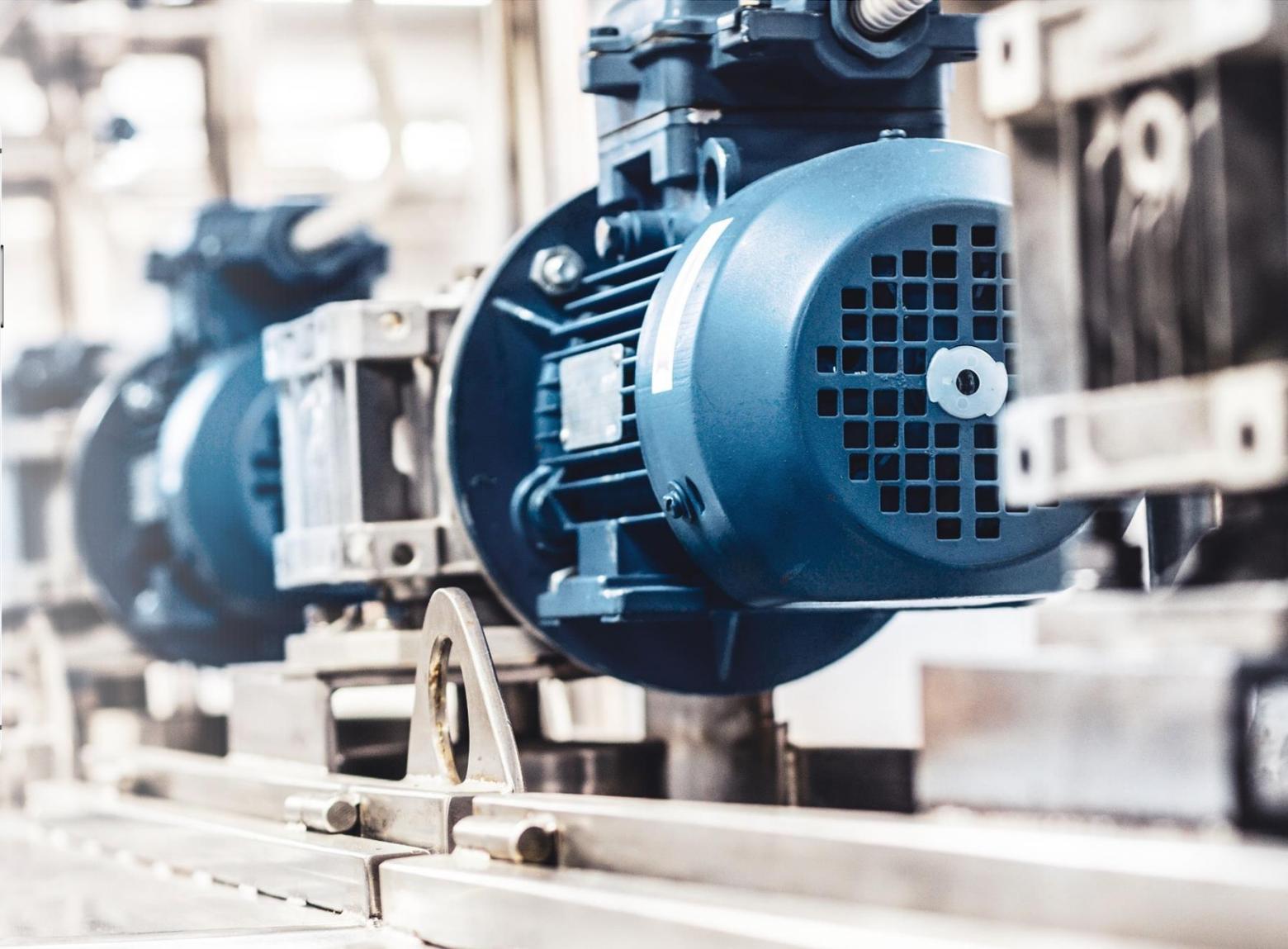
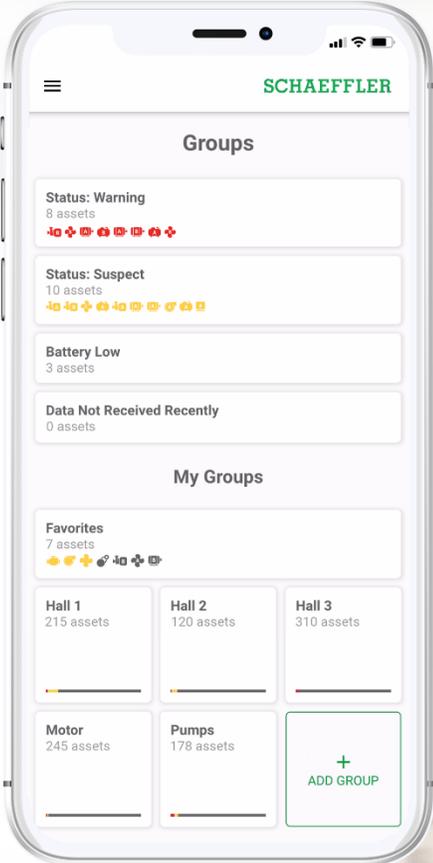
From installation to operation to maintenance.

One-stop shopping for all innovative and smart solutions to meet long-term productivity needs.

**In short:**

**We make life as easy as possible for our customers**

The world's first smart lubricator built to simplify the task of lubricating your machines



## Complex challenges

### Maintenance tasks in your plant are complex

And part of that complexity comes from the tasks that maintenance teams wish they could cut out of their daily maintenance routines – but can't.

Tasks such as:

- Lubricating by hand
- Manually checking many lubrication points
- Finding the right cartridge replacement for automatic lubricators

Which poses risks including:

- Over- or under-lubrication
- Localized pollution
- Bearing and component failures



## Complex challenges

**But lubrication is crucial**

**Because insufficient/incorrect lubrication is the No. 1 cause of machine bearing failure and downtime.**

And there's been simply no better way of doing these tasks. Until now, that is.

### Typical causes of bearing issues:



## Turn complexity into simplicity

# OPTIME C1: The world's first smart lubricator

Combines all of the benefits of our Concept1 automatic lubricators with award-winning condition monitoring technology.



### **MORE transparency:**

**Award-winning OPTIME technology** lets you monitor the condition of all your lubrication points – from wherever you are – via the mobile app or web-based dashboard



### **MORE simplicity:**

**Plug-and-play functionality** makes OPTIME Concept1 simple to install, use and refill



### **MORE uptime:**

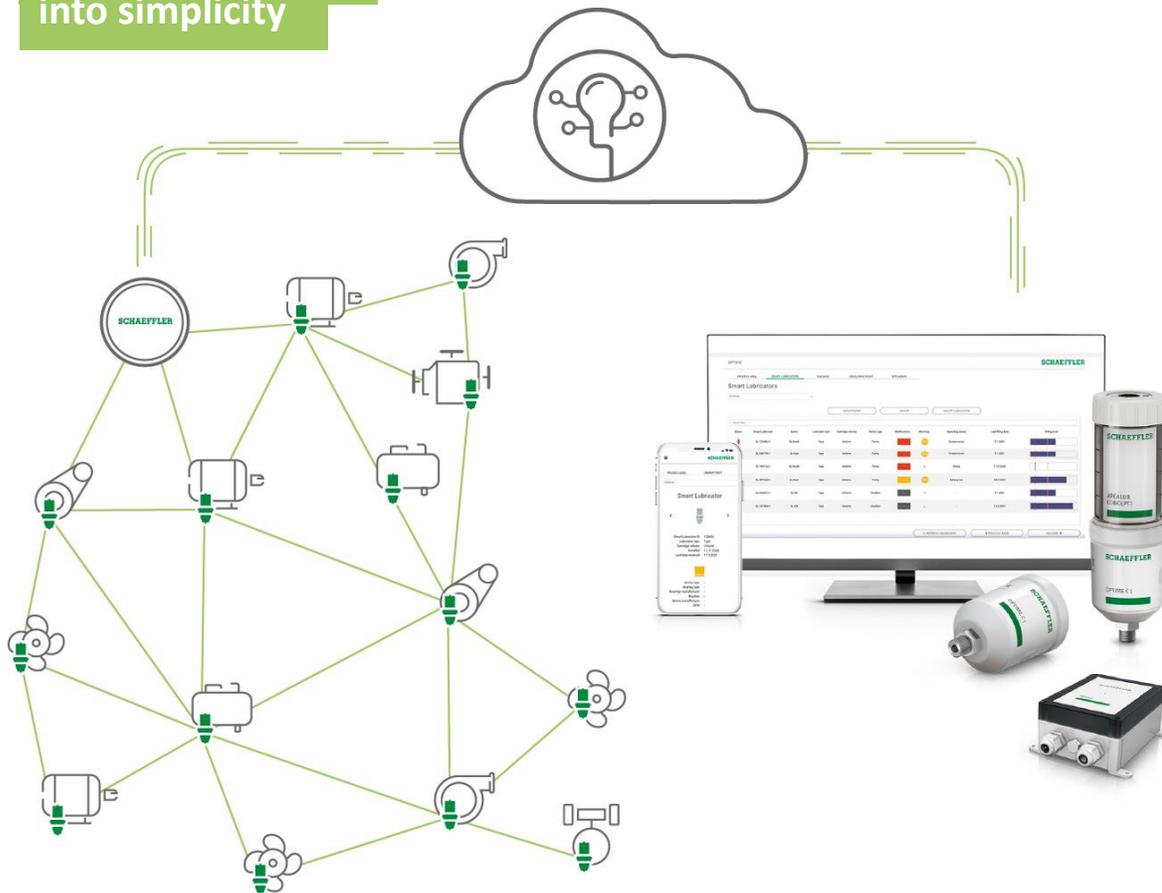
**Improved lubrication** eliminates premature bearing failure, reducing unexpected and expensive machine downtime



# How it works

## About OPTIME C1

Turns complexity  
into simplicity



With the new OPTIME C1, you can simplify the complex job of lubricating your machines.

- Easy-to-use and economical solution for automatic single-point lubrication
- Designed with the user in mind: simple sub-2-minute commissioning process, smooth expandability and wide range of possible uses
- Secure communication network
- All machine/lubrication statuses available in one app
- Part of the award-winning OPTIME family
- Easy-to-understand alarms and alerts mean fewer empty cartridges or blocked pipes
- No manual, laborious checks to ensure adequate lubrication
- Part of the OPTIME condition monitoring solution from Schaeffler

## About OPTIME

Optime –  
Plug. Play. Predict.

### The award-winning condition monitoring solution.

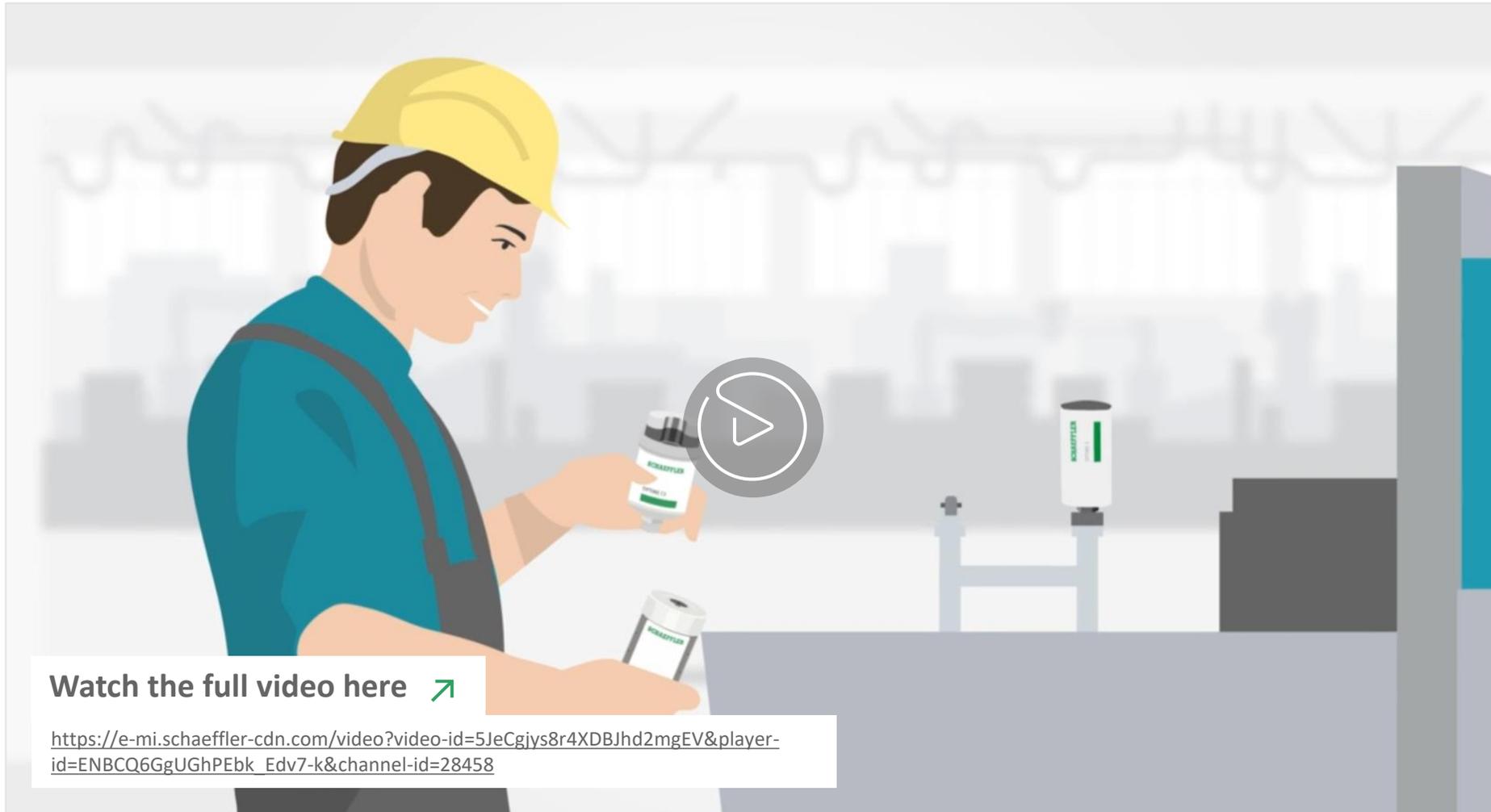
- OPTIME C1 is the latest addition to the award-winning Schaeffler OPTIME family
- The system was developed for the condition monitoring of rolling bearings
- Allows lubrication status to be checked on-site and remotely, not just within Bluetooth range, but anywhere with Internet connectivity
- Can detect potential damage, imbalances or misalignments – even weeks in advance
- Makes predictive maintenance of machines both affordable and easy



reddot winner 2021

**Best-in-class:** The Schaeffler OPTIME solution received the Red Dot Award in 2021 – an award that recognizes outstanding product design. The innovative solution was honored in two categories: “Smart Product” and “Industrial Equipment.”

## Watch the how-to video



Watch the full video here [↗](#)

[https://e-mi.schaeffler-cdn.com/video?video-id=5JeCgjys8r4XDBJhd2mgEV&player-id=ENBCQ6GgUGhPEbk\\_Edv7-k&channel-id=28458](https://e-mi.schaeffler-cdn.com/video?video-id=5JeCgjys8r4XDBJhd2mgEV&player-id=ENBCQ6GgUGhPEbk_Edv7-k&channel-id=28458)

A man with a grey beard and short hair, wearing a dark grey t-shirt, is looking directly at the camera. He is in a workshop or factory setting, with various mechanical parts and tools visible in the background. The lighting is warm and focused on the man.

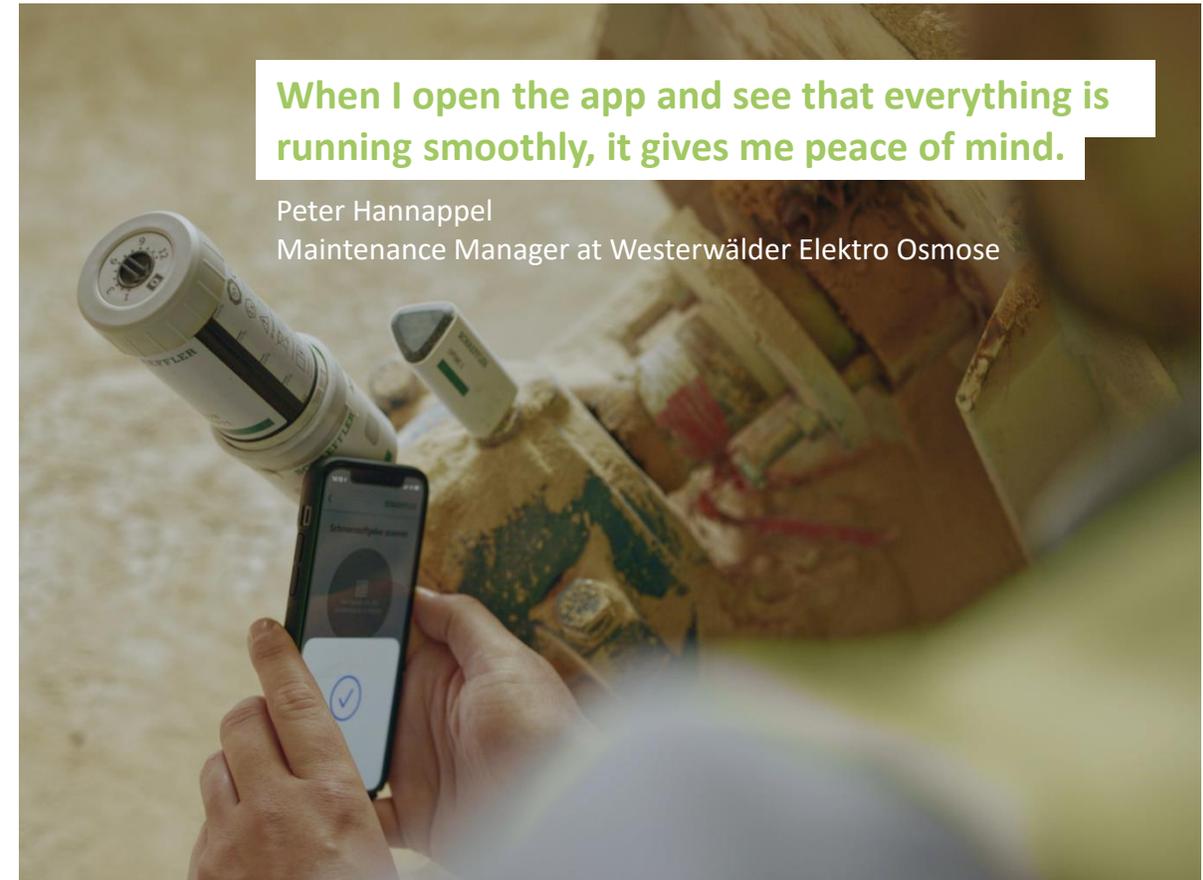
**Customer  
success story**

## Westerwälder Elektro Osmose

Less complexity,  
less downtime

**When a machine breaks down, the entire production process can come to a standstill. Here is how the OPTIME C1 solved this challenge for Westerwälder Elektro Osmose and ensured greater uptime.**

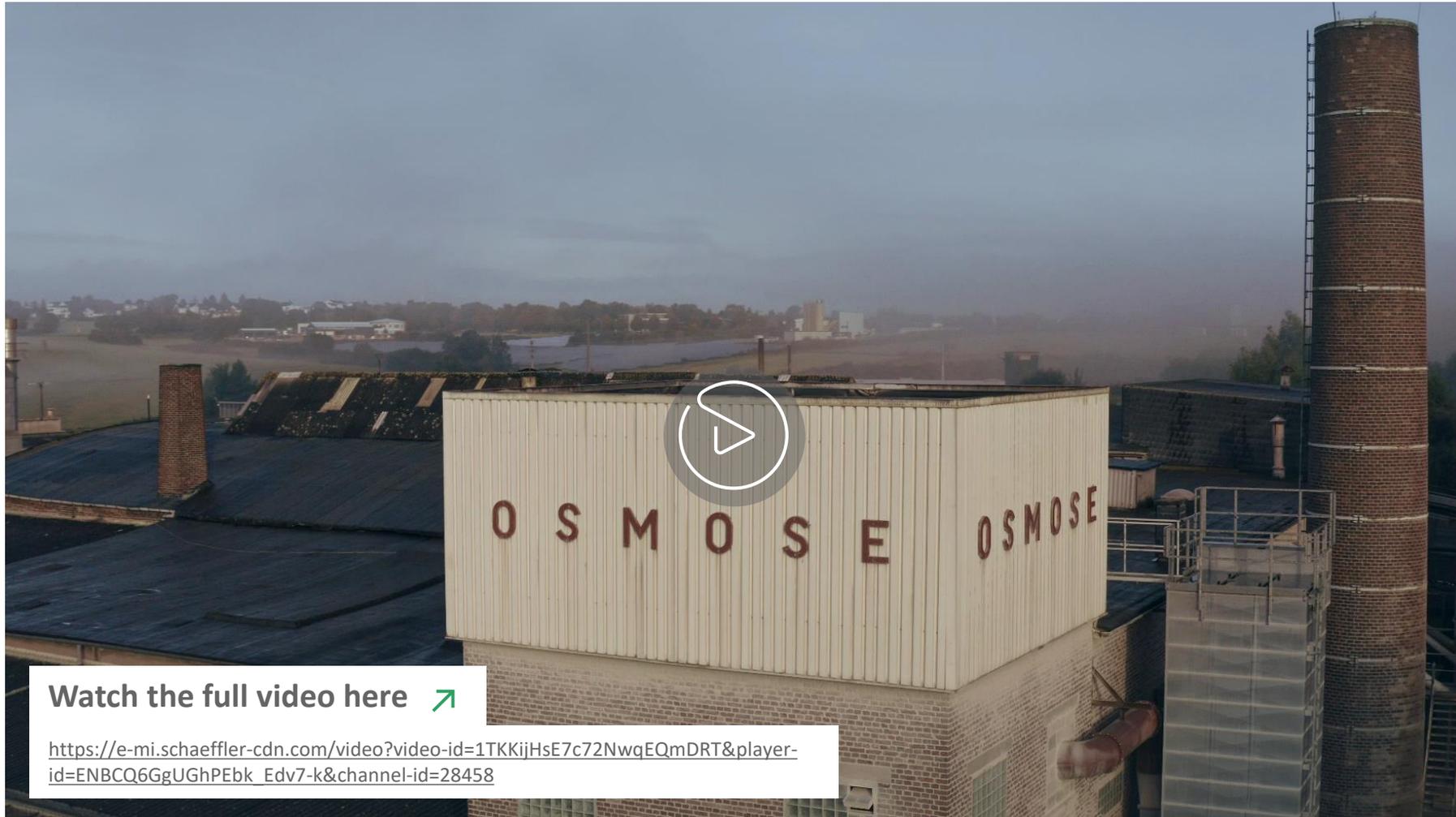
- Every lubrication point can be outfitted with the OPTIME C1
- The small size of OPTIME C1 lets it be installed anywhere, even in tight spaces
- Lubrication points can then be “forgotten” – the app alerts workers when action needs to be taken (for example: if the lubricator cartridge needs to be replaced)
- This frees up resources while enabling quick action to avoid downtime



**When I open the app and see that everything is running smoothly, it gives me peace of mind.**

Peter Hannappel  
Maintenance Manager at Westerwälder Elektro Osmose

## Westerwälder Elektro Osmose



# Use cases

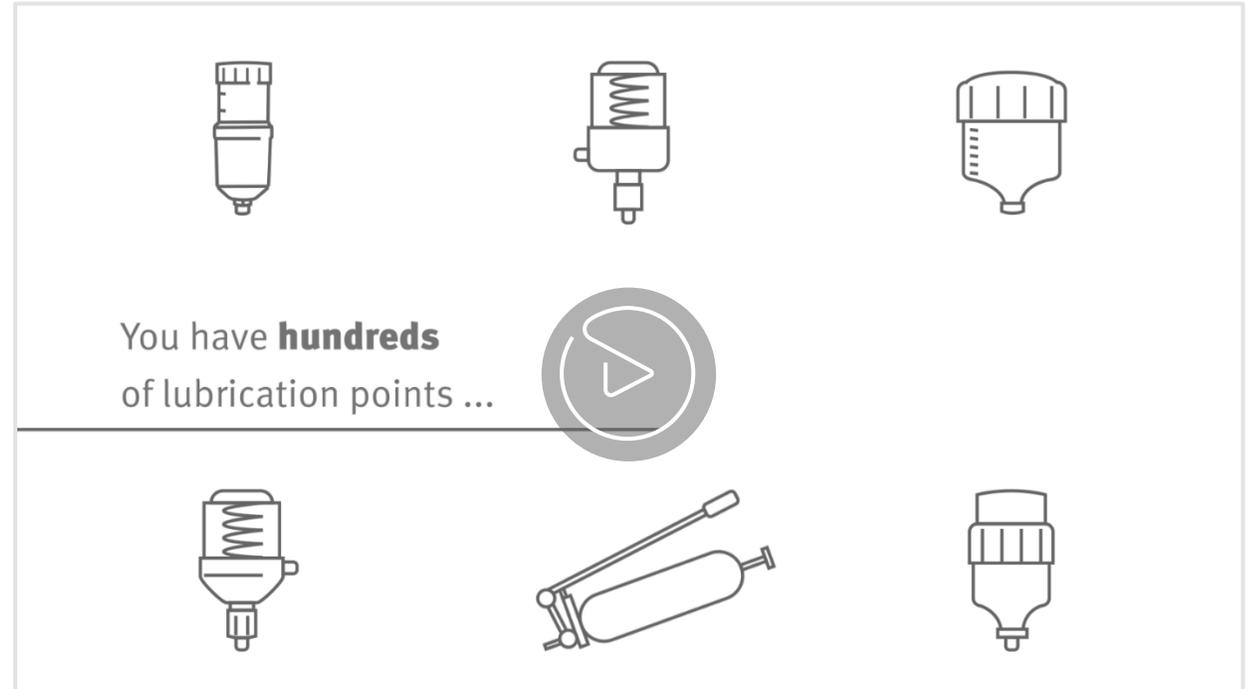


## Turn stress into serenity

**Challenge 1: You have hundreds of lubrication points to manage. But how?**

**Keep an overview of all of your lubrication points and any potential lubrication problems – no matter where you are – by connecting them to the IIoT with OPTIME.**

- Current status and fill-level information available at a glance
- Avoid lubrication shortages, the cause of 80% of bearing defects
- Automatic alarm in the event of unusual operating conditions
- No need for time-consuming manual checks



**Watch the full video here** [↗](#)

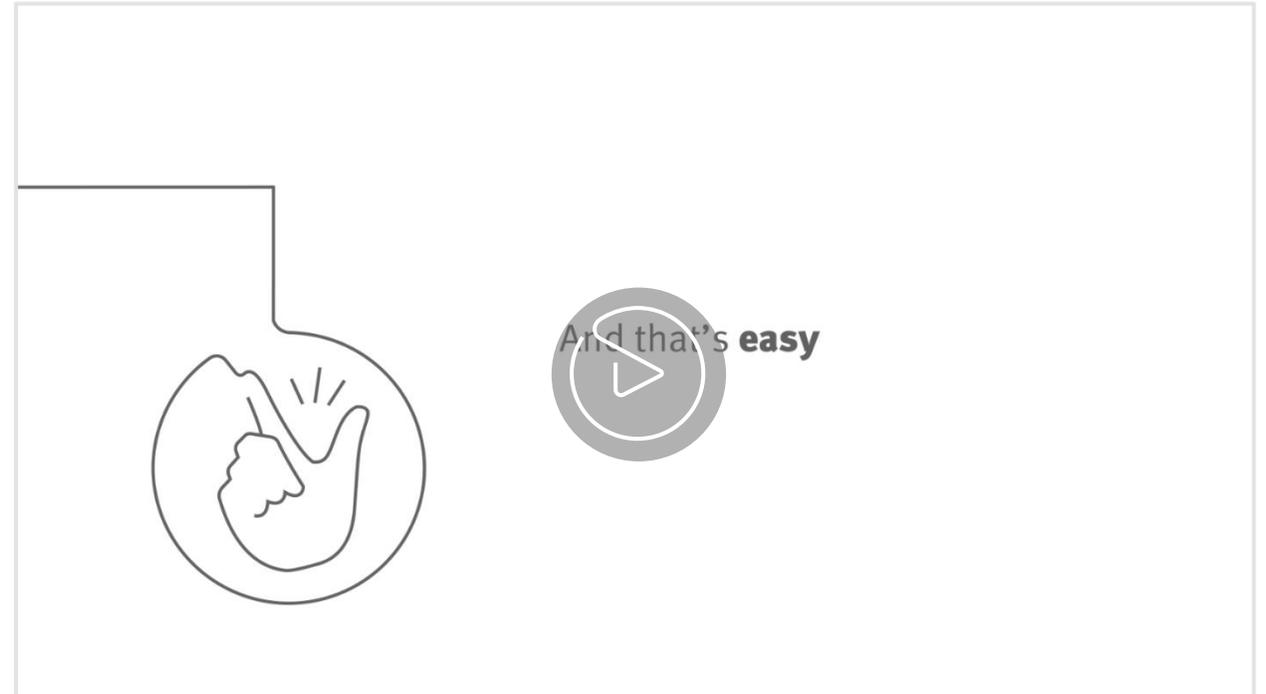
[https://e-mi.schaeffler-cdn.com/video?video-id=CdNq2B4HwAFwDxrQt3djAd&player-id=ENBCQ6GgUGhPEbk\\_Edv7-k&channel-id=28458](https://e-mi.schaeffler-cdn.com/video?video-id=CdNq2B4HwAFwDxrQt3djAd&player-id=ENBCQ6GgUGhPEbk_Edv7-k&channel-id=28458)

## Turn chaos into calm

### Challenge 2: You need to change the lubricator cartridge. But how?

Reduce costly manual mistakes when changing your lubricator cartridges with the OPTIME app, which will tell you the correct grease to use and the appropriate settings for that specific lubricator.

- Changing cartridges is quick and easy: replacement just needs to be screwed on
- User guidance available via the app in several languages
- Reduction in downtime due to reliable, correct lubrication



Watch the full video here [↗](#)

[https://e-mi.schaeffler-cdn.com/video?video-id=7vbPv7JTWoYWD9xPTSybPj&player-id=ENBCQ6GgUGhPEbk\\_Edv7-k&channel-id=28458](https://e-mi.schaeffler-cdn.com/video?video-id=7vbPv7JTWoYWD9xPTSybPj&player-id=ENBCQ6GgUGhPEbk_Edv7-k&channel-id=28458)

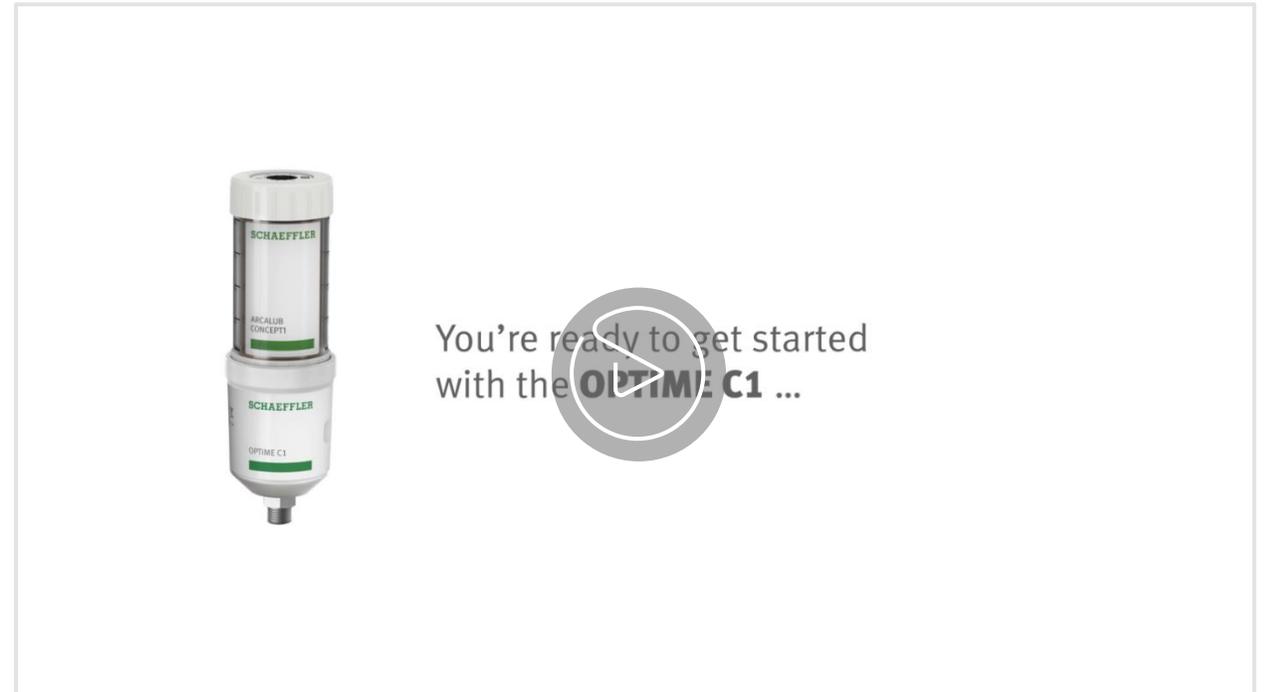
## Turn effort into ease

### Challenge 3: You want to get started. But how?

Connect your OPTIME C1 lubricators quickly and simply thanks to the plug-and-play functionality as well as the extremely user-friendly OPTIME app.

- Designed with the user in mind
- Guided and simple installation, commissioning and maintenance
- Extended bearing life as result of optimized and controlled lubrication
- Saves an average of 44% (€62) per year, per lubrication point vs. manual lubrication\*

- Based on a sample calculation with five years usage, 125ccm grease per year/lubrication point, 100 devices



Watch the full video here [↗](#)

[https://e-mi.schaeffler-cdn.com/video?video-id=58rk\\_j1tfYBSRPRxjC3veL&player-id=ENBCQ6GgUGhPEbk\\_Edv7-k&channel-id=28458](https://e-mi.schaeffler-cdn.com/video?video-id=58rk_j1tfYBSRPRxjC3veL&player-id=ENBCQ6GgUGhPEbk_Edv7-k&channel-id=28458)

# Technical details



**OPTIME C1**

Description	Value	Unit
<b>Function OPTIME C1</b>		
Drivesystem	Electromechanical	-
Operating pressure	≤ 10	bar
Metering volume per lubrication interval	0.5	cm <sup>3</sup>
Metering volume per day (dependent on size and setting of CONCEPT1)	0.17 up to 8.3	cm <sup>3</sup>
Commissioning	NFC	-
<b>Lubricator OPTIME C1</b>		
Dispensing time (steplessly adjustable)	1 up to 12	months
Lubricant volume	60 or 125	cm <sup>3</sup>
Lubricant - Grease	< NLGI 2	-
- Oil	> 68	cSt
<b>Communication</b>		
Wirepas Mesh (ISM band)	2.4	Ghz
Range with line of sight	100	m
<b>Electrical characteristics</b>		
Power supply (battery pack)	6	V
	2.3	Ah

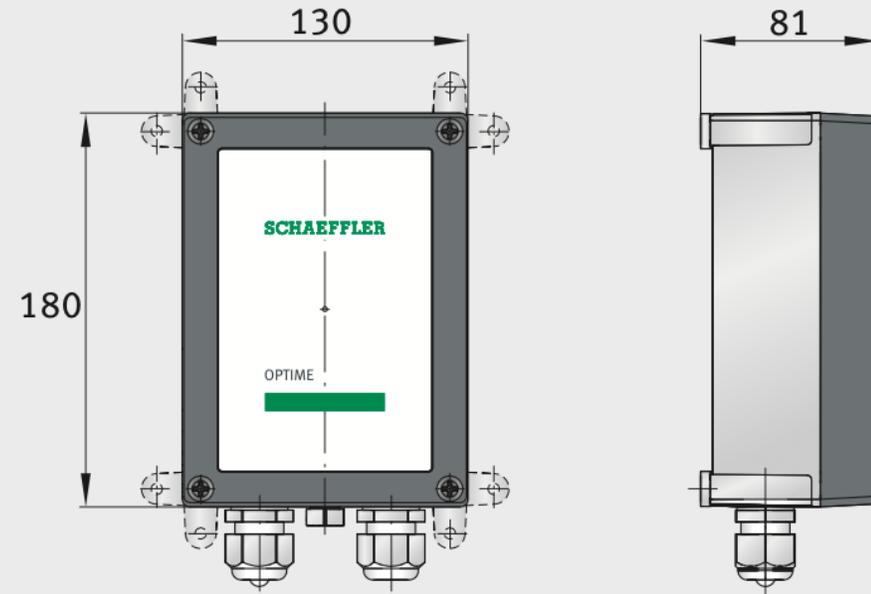
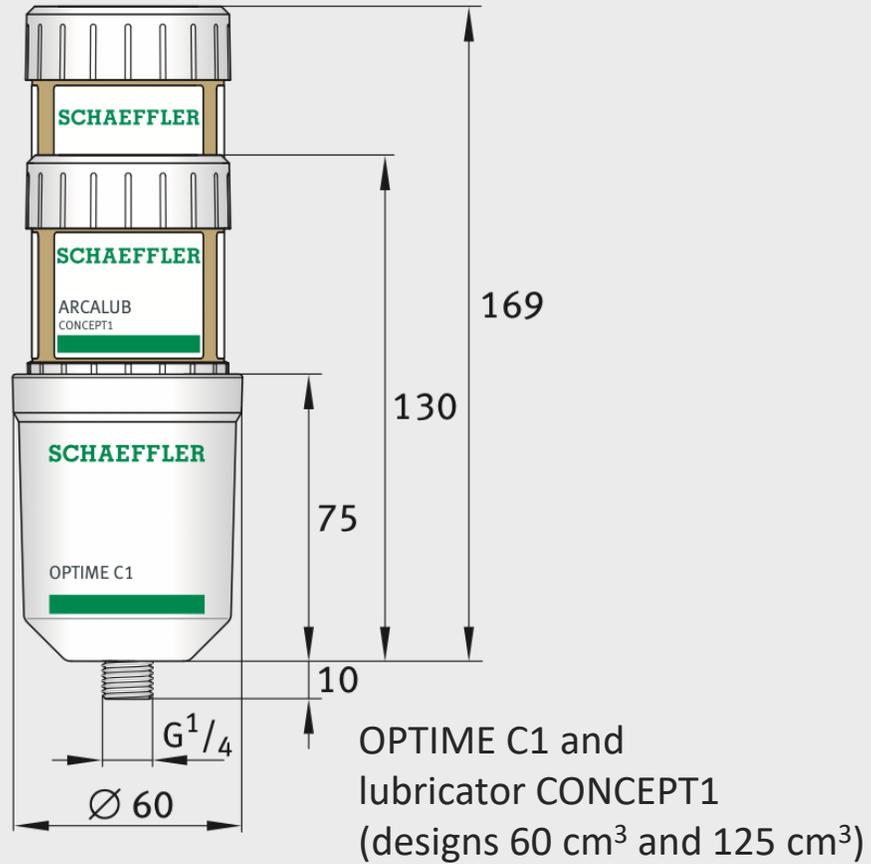
Description	Value	Unit
<b>Other characteristics</b>		
Mounting position	As required	-
Threaded connector	G 1/4	-
Housing material	PET	-
Mass	= 0.25	kg
Warranty and operating life	Duration	2 years
	Number of emptying operations	10
Packing unit	10	pieces
<b>Ambient conditions</b>		
Protection class	IP68	-
Operating temperature	-10 up to +55	°C
Storage (protect from direct sunlight, store in a dry place )	Temperature (recommended)	+20 ±5 °C
	Humidity	≤ 65 %
<b>Certificates</b>		
CE Radio Equipment Directive 2014/53/EU	-	-

## Gateway

Description	Value	Unit
<b>Communication</b>		
Wirepas Mesh (ISM band)	2.4	GHz
2G, LTE CAT M1 (additional options with installed local LTE stick)	-	-
Wi-Fi	2.4	GHz
Ethernet RJ45	-	-
SIM card format	Micro SIM (3FF)	-
<b>Electrical characteristics</b>		
Power consumption	30	VA
Power supply AC	85 up to 264	V
Frequency	47 up to 440	Hz
<b>Ambient conditions</b>		
Protection class	IP66	-
Operating temperature	-20 up to +50	°C
Storage	Temperature	-40 up to +85
	Humidity	20 up to 90

Description	Value	Unit
<b>Dimensions, mass</b>		
Length	180	mm
Width	130	mm
Height	81	mm
Mass	= 1.2	kg
<b>Certificates</b>		
CE	-	-
Radio Equipment Directive 2014/53/EU	-	-

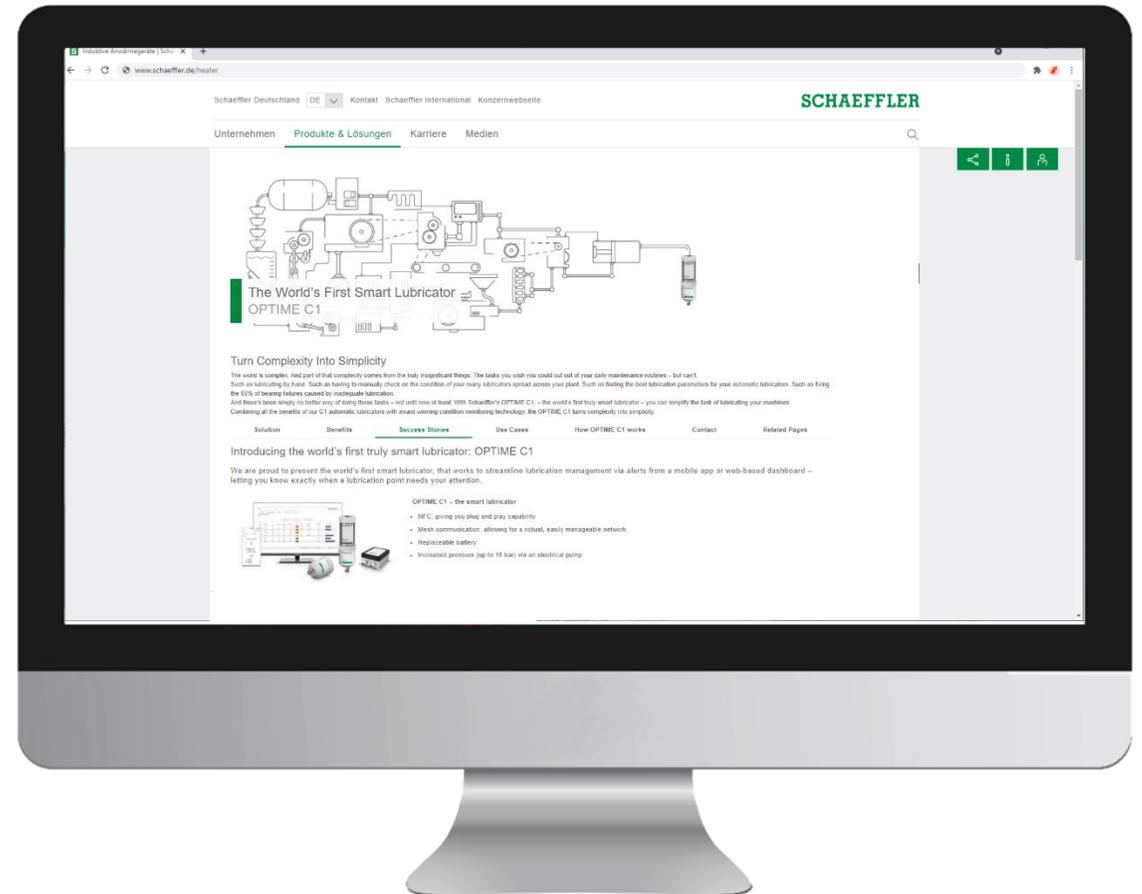
## Dimensions



Gateway

Want to turn complexity into simplicity?

Visit: [www.schaeffler.de/en/optime-c1](http://www.schaeffler.de/en/optime-c1)



## Related products



### **OPTIME – Plug. Play. Predict.**

<https://medias.schaeffler.de/en/condition-monitoring/optime>



### **Schaeffler lubricators**

<https://medias.schaeffler.de/en/lubrication/lubricators>



### **Schaeffler lubricants**

<https://medias.schaeffler.de/en/lubrication/lubricants>



¿Preguntas?