€

ZERO
CO2
EMISSIONS

+

CONDITION MONITORING

Digital Retrofit for Production machines for all machine types
and industrial sectors

READY TO CONNECT!

grindaix

WHAT IS A DIGITAL RETROFIT?

YOUR EXISTING MACHINES

Simple and professional digitalisation

The Grindaix team has developed a new hardware package for the straightforward digitalisation of existing machines, the Grindaix Condition Monitoring.

Irrespective of

- the machine type,
- the sensor technology used and,
- the sensors yet to be installed,

the Grindaix Condition Monitoring System offers a comprehensive and complete solution for direct installation in your company.

The **main advantages** for **customers** who make a timely decision to digitalise their production environment are:

1. Scalable and manufacturer-independent digitalisation technology for their production machines (existing machines).

2. Standardised and clearly structured data acquisition through isolated applications independent of the existing IT infrastructure. Data exchange via OPC UA with existing IT infrastructure possible.

3. Enabling the use of artificial intelligence in their production engineering environment - and the resulting customer benefit of increasing production robustness!

Don't miss the opportunities of digitalisation!

Whether in terms of

- **minimising your operating material consumption,**
- **increasing your production robustness**, or
- **improving product quality,**

the use of the condition monitoring digitalisation technology will enable you to achieve measurable success. We would be pleased to present the digitalisation package to you in detail at your company.

The Grindaix digitalisation system enables you to achieve the following in no time at all:

- standardised IT infrastructure (plug&play), including server, display unit and visualisation software
- industrial standard for data exchange (OPC UA)
- uniform time stamp of all collected data
- real-time monitoring of all machines, systems and components
- limit value-dependent monitoring per sensor and measurement variable
- recording of data history
- data exchange with existing machines

YOUR GOALS !

DIGITALISATION 1.0

Besides increasing productivity (number of good parts per unit of time) while generally maximising profitability (operating result), there are basically no limits to the additional opportunities offered by digitalisation technology in production systems.

Optimisation targets can be defined and programmed individually for each company. For example, there are some areas of production engineering in which the quality of safety-relevant components plays a greater role than achieving minimum production costs.
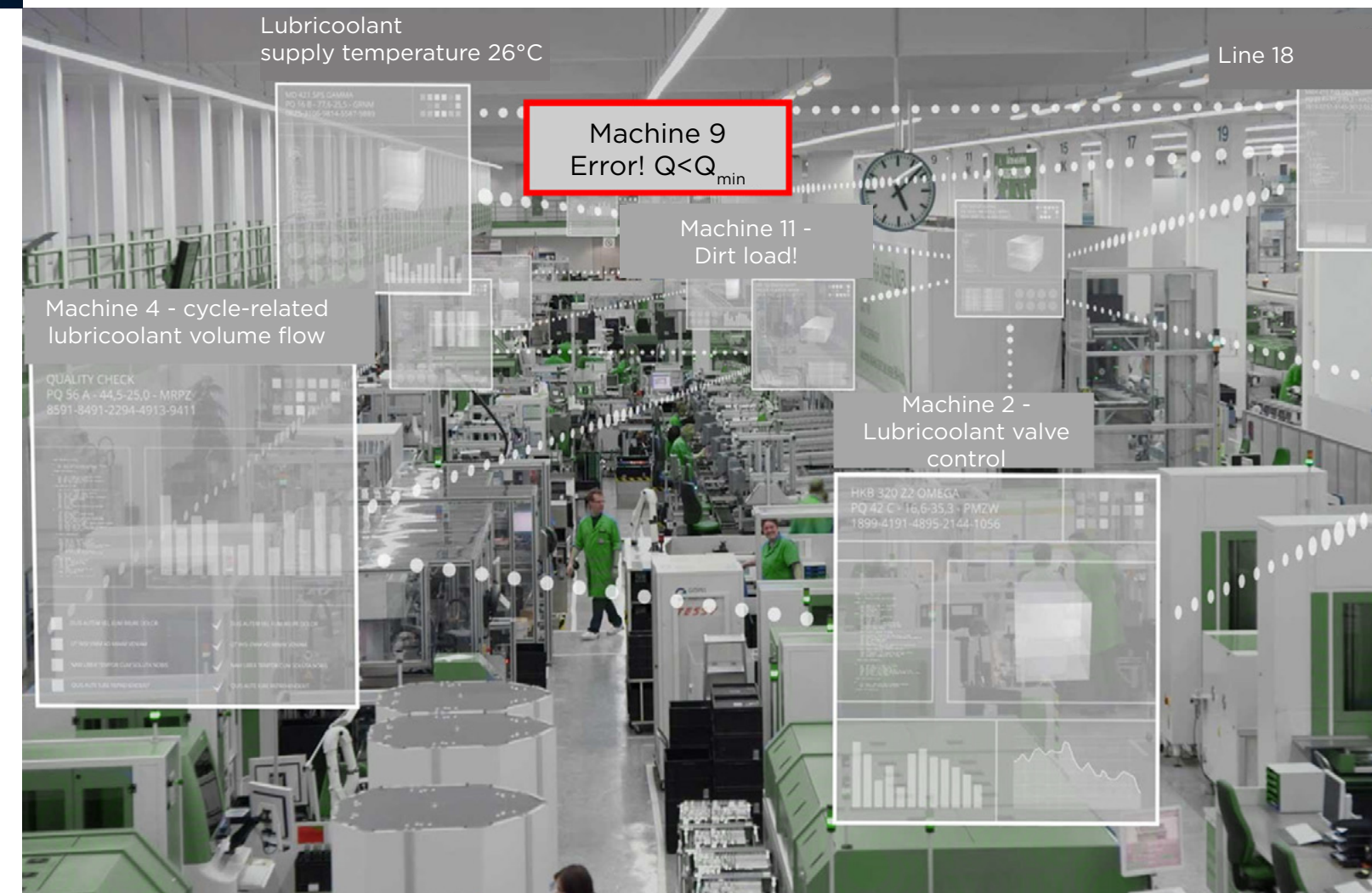
BE READY TO CONNECT!

PREDICTIVE MAINTENANCE

The Grindaix team offers you a continuously scalable, modular digitalisation system for industrial condition monitoring. Our complete digitalisation solution for your condition monitoring does not require any additional hardware or software components. The system is delivered ready for installation. The sensor-based industrial monitoring of your production machines - be they existing or new - is our daily business. As a professional supplier in the market (spin-off from RWTH Aachen University) with 20 years of industrial experience, we can provide you with process monitoring at the highest level using state-of-the-art technology. Together with our partner companies and RWTH Aachen University, we would also be happy to provide comprehensive consulting services regarding the connection of AI-based optimisation tools.

USE OF ARTIFICIAL INTELLIGENCE

for higher productivity
with CO_2 neutrality!

Lubricoolant
supply temperature 26°C

Line 18

Machine 9
Error! $Q<Q_{min}$

Machine 11 -
Dirt load!

Machine 4 - cycle-related
lubricoolant volume flow

Machine 2 -
Lubricoolant valve
control

START NOW... BEFORE IT'S TOO LATE!

YOUR GOALS !

DIGITAL MONITORING OF YOUR RESOURCE CONSUMPTION

When carrying out a digital retrofit of the existing machines in your production environment, a significant savings can be achieved by monitoring resource consumption.

This requires modular and standardised monitoring technology in the form of an easy-to-install infrastructure for existing machines. The production and supply of such data acquisition technology is where Grindaix GmbH comes in.

We can supply you with a condition monitoring complete package (ready to connect) for simple but accurate and reproducible data acquisition in the context of your entire resource consumption. The digitalisation technology is industry-neutral, completely independent of machine and sensor manufacturers, and is suitable for all machine types and standard industrial sensors.

REDUCING CO_2 EMISSIONS
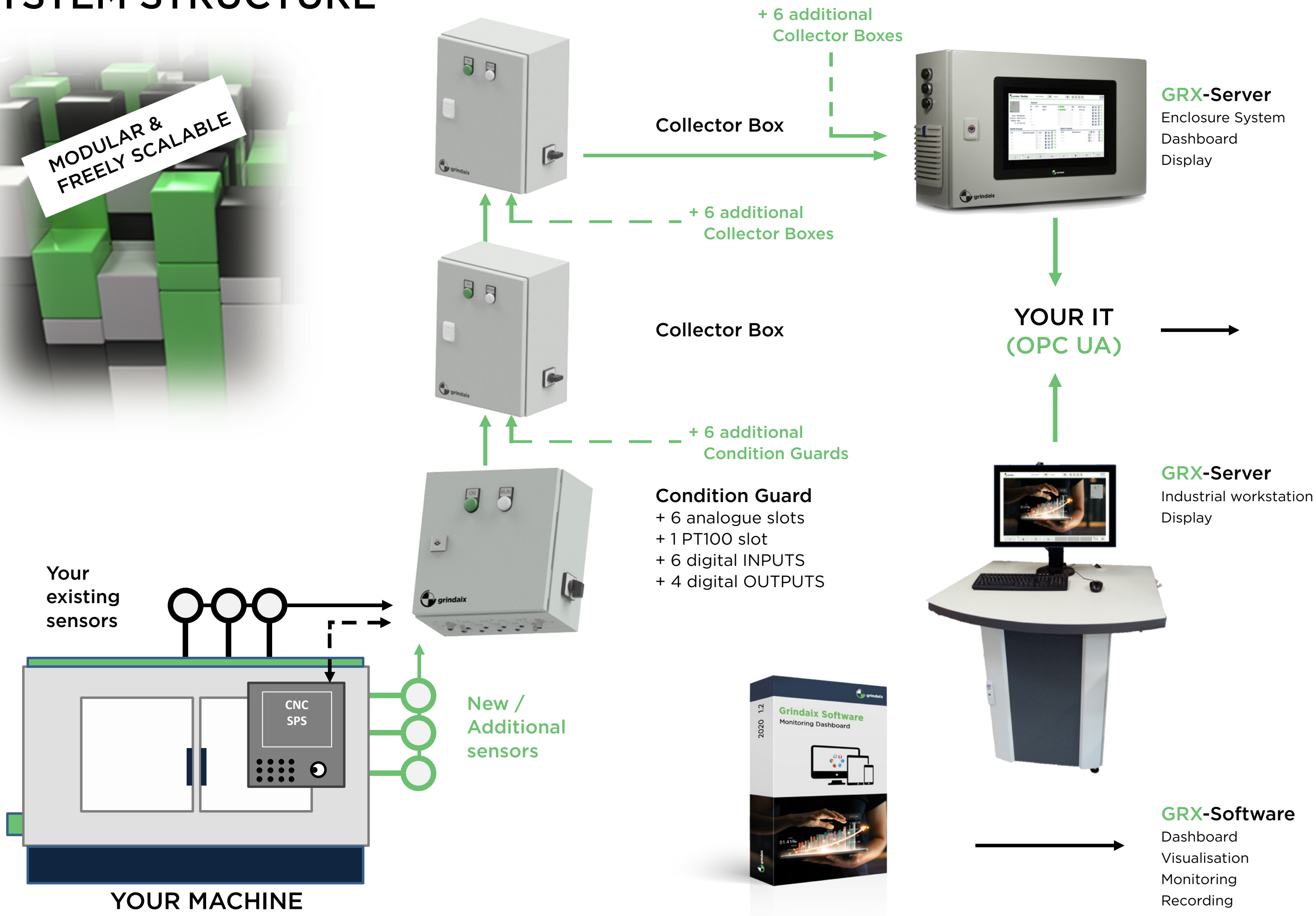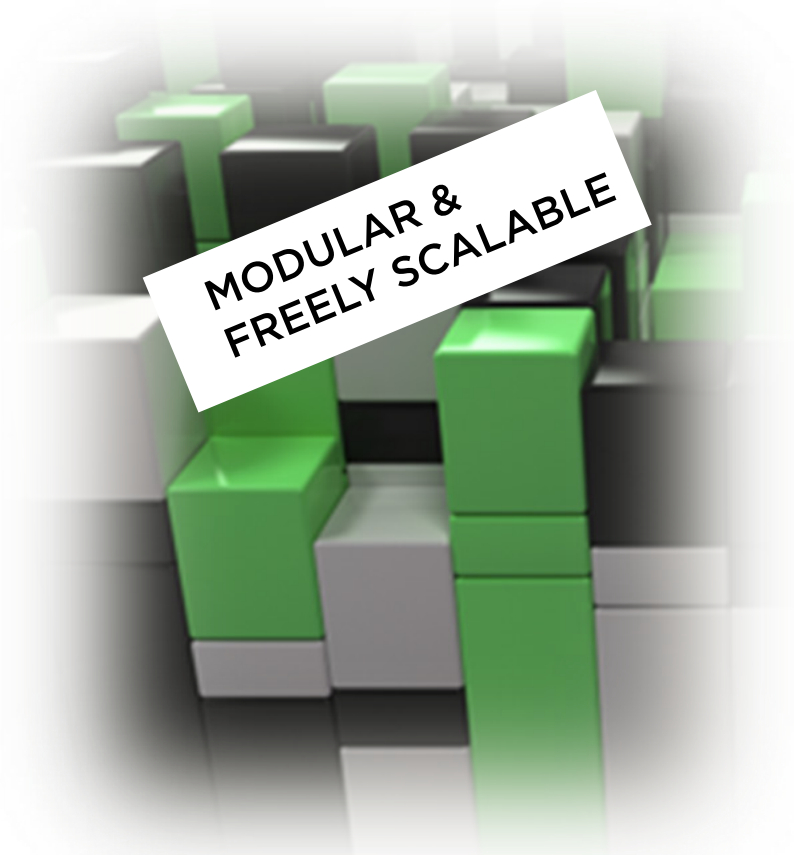
PRICE EXAMPLE

for all production machines, including hardware & software, on-site analysis, commissioning

€0.15 / machine hour & machine *

*Calculation basis: €40,000 investment costs, 10 years useful life, 220 working days/year, 3-shift operation = 24h/working day

SYSTEM STRUCTURE

MODULAR & FREELY SCALABLE

+ 6 additional
Collector Boxes

Collector Box

GRX-Server
Enclosure System
Dashboard
Display

+ 6 additional
Collector Boxes

Collector Box

**YOUR IT
(OPC UA)**

+ 6 additional
Condition Guards

Condition Guard
+ 6 analogue slots
+ 1 PT100 slot
+ 6 digital INPUTS
+ 4 digital OUTPUTS

GRX-Server
Industrial workstation
Display

Your
existing
sensors

CNC
SPS

New /
Additional
sensors

Grindaix Software
Monitoring Dashboard

2020   1.2

GRX-Software
Dashboard
Visualisation
Monitoring
Recording

YOUR MACHINE

ITEM NO.: GRX-CG

THE CONDITION GUARD

The Grindaix Condition Guard is used to record and digitalise analogue sensor signals for condition monitoring. In addition, the Condition Guard provides digital inputs for the transfer of defined states (e.g. cycles or process ON/OFF) between the monitoring system and the processes to be monitored. Digital outputs can be used to display warnings and error messages via a signal lamp or to issue them to a machine. The configuration is achieved using the monitoring software package.

- Enclosure with IP54 protection class
- Sensor connections (M12 plug connection)
  - 4 x 0(4) - 20 mA
  - 2 x 0(2) - 10 V
  - 1 x PT100 temperature sensor
- 4 x digital output 0/24V, electrically isolated
- 6 x digital input 0/24V, electrically isolated
- 1 x network connection

" Suitable for all standard industrial sensors !"

" Your data preparation at the machine !"

from €0.05/h *

*Calculation basis: 10 years useful life, 220 working days/year, 3-shift operation = 24h/working day

ITEM NO.: GRX-CB

THE COLLECTOR BOX

The Collector Box collects the digitalised data of the connected Grindaix Condition Guards and forwards it on in bundled form via an OPC UA interface. The Collector Box thus serves as an OPC UA server for a GRX-Server, for instance, or for OPC UA systems on the customer side.

- OPC UA server
- Enclosure with IP54 protection class
- Power supply 230VAC (to be provided by customer)
- Supply of up to seven Grindaix Condition Guards (24VDC)
- Star point in a network with seven network connections for the GRX-Server, Condition Guards or, optionally, for the existing IT infrastructure
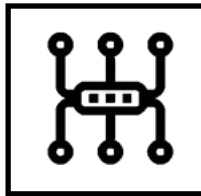
from €0.09/h *

" Up to seven Condition Guards per Collector Box ."

" Clear and complete assignment of the connected sensors ."

*Calculation basis: 10 years useful life, 220 working days/year, 3-shift operation = 24h/working day

ITEM NO.: GRX-SERVER

AS ENCLOSURE SYSTEM

When combined with the monitoring software package, the GRX-Server as an enclosure system is used for data storage and status monitoring of all types of processes. The GRX-server can be operated either as an OPC UA client in a stand-alone system or as an OPC UA server in an existing IT infrastructure.

- ✔ Switch cabinet with IP54 protection class
- ✔ Industrial PC with Windows 10 Professional 64 bit
- ✔ 2 x UBS 3.0 / 1x USB 2.0 externally accessible
- ✔ 15.5" Full-HD touch display
- ✔ Power supply 230VAC (to be provided by customer)
- ✔ Supply of up to seven Grindaix Condition Guards (24VDC)

" Star point with seven network connections for Grindaix Condition Guards & Collector Boxes ."

" 15.5" Full HD Touch Display ."

from €0.15/h *

ITEM NO.: GRX-SERVER

AS INDUSTRIAL WORKSTATION

When combined with the monitoring software package, the GRX-Server as an industrial workstation system is used for data storage and status monitoring of all types of processes. The GRX-server can be operated either as an OPC UA client in a stand-alone system or as an OPC UA server in an existing IT infrastructure.

- ✔ Industrial workstation system
- ✔ Industrial PC with Windows 10 Professional 64 bit
  - Connection of up to 2 monitors
  - 2 x UBS 3.0 / 2 x USB 2.0
- ✔ Power connection 230VAC via Schuko plug
- ✔ One network connection for a Grindaix Collector Box and one network connection for existing IT infrastructure

from €0.07/h *

" Industrial workstation system !"

" Data storage and status monitoring of all types of processes !"

ITEM NO.: GRX-SOFTWARE

THE MONITORING DASHBOARD

When combined with Grindaix hardware, the Grindaix monitoring software package provides the foundation for making processes digital. While data acquisition is achieved with Grindaix hardware, the software takes care of data storage, data display and process monitoring. The data recorded by the hardware is stored in the software in an SQLite database with time stamp. To visualise the data, the Dashboard, which is completely compatible with all devices and operating systems, is called up via a web client (browser). In the Dashboard, the measurement data is assigned to the individual processes and thus displayed in a structured way. Based on current and historical data, trends or deviations can be detected by the customer at an early stage and optimization potential derived.

The Grindaix monitoring software package offers the possibility of storing process variables from the production environment in a database and displaying the data graphically on the Grindaix Dashboard. Furthermore, limit values (warning, alarm) can be defined for process monitoring, and a limit value violation can be signalled.

- Grindaix Dashboard
  - Historisation of process variables
  - Historisation of limit value violations
  - Process value display
  - Process monitoring
  - User administration & access security
  - Complete device and operating system compatibility
  - Access via web client (HTML5, SVG)
- SQLite database
- OPC UA client-server architecture (multiclient)
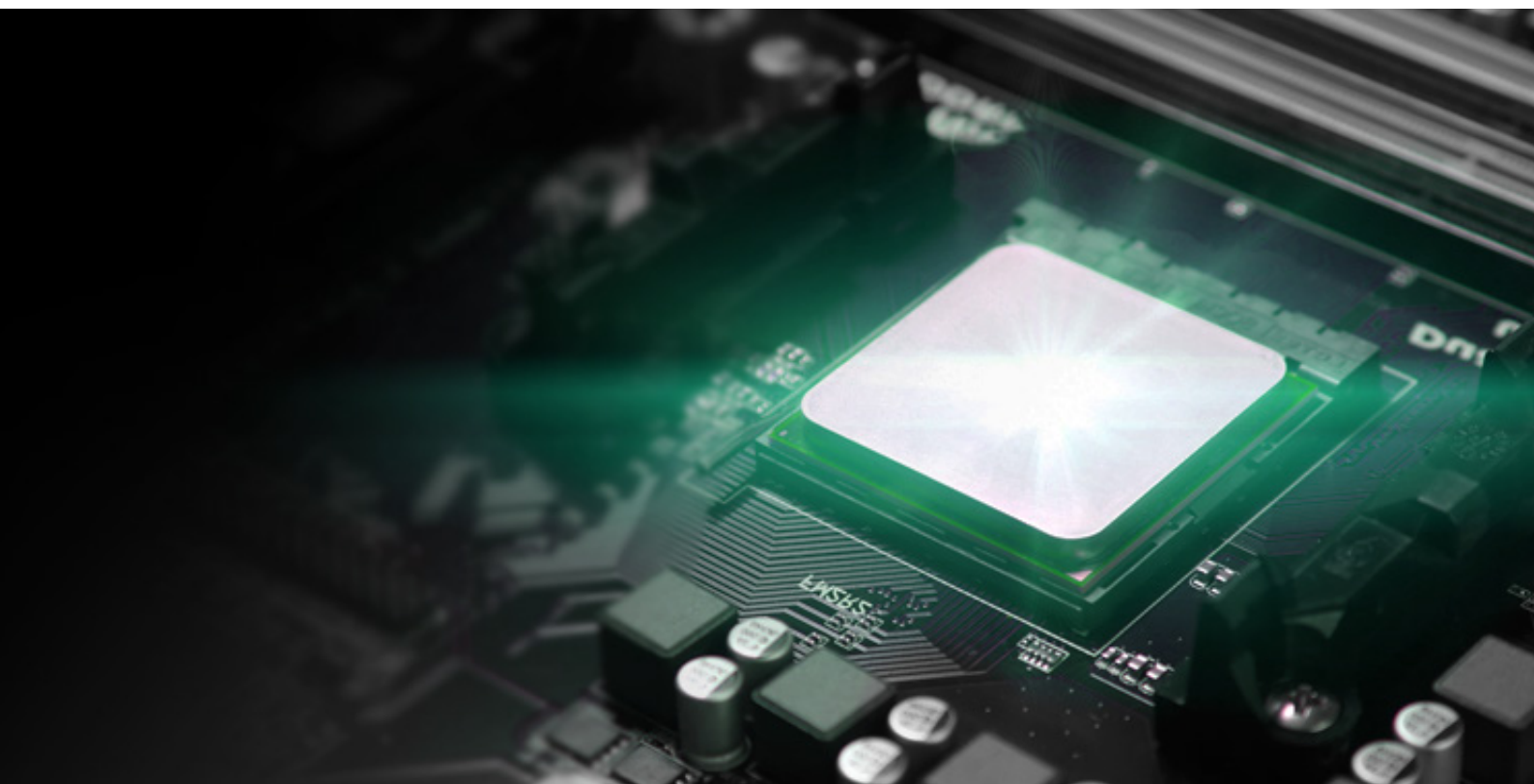
" Data storage, data display and process monitoring !"

from €0.24/h *

Grindaix Software
Monitoring Dashboard

2020 1.2

" Recognise trends or deviations at an early stage and derive optimization potential !"

*Calculation basis: 10 years useful life, 220 working days/year, 3-shift operation = 24h/working day
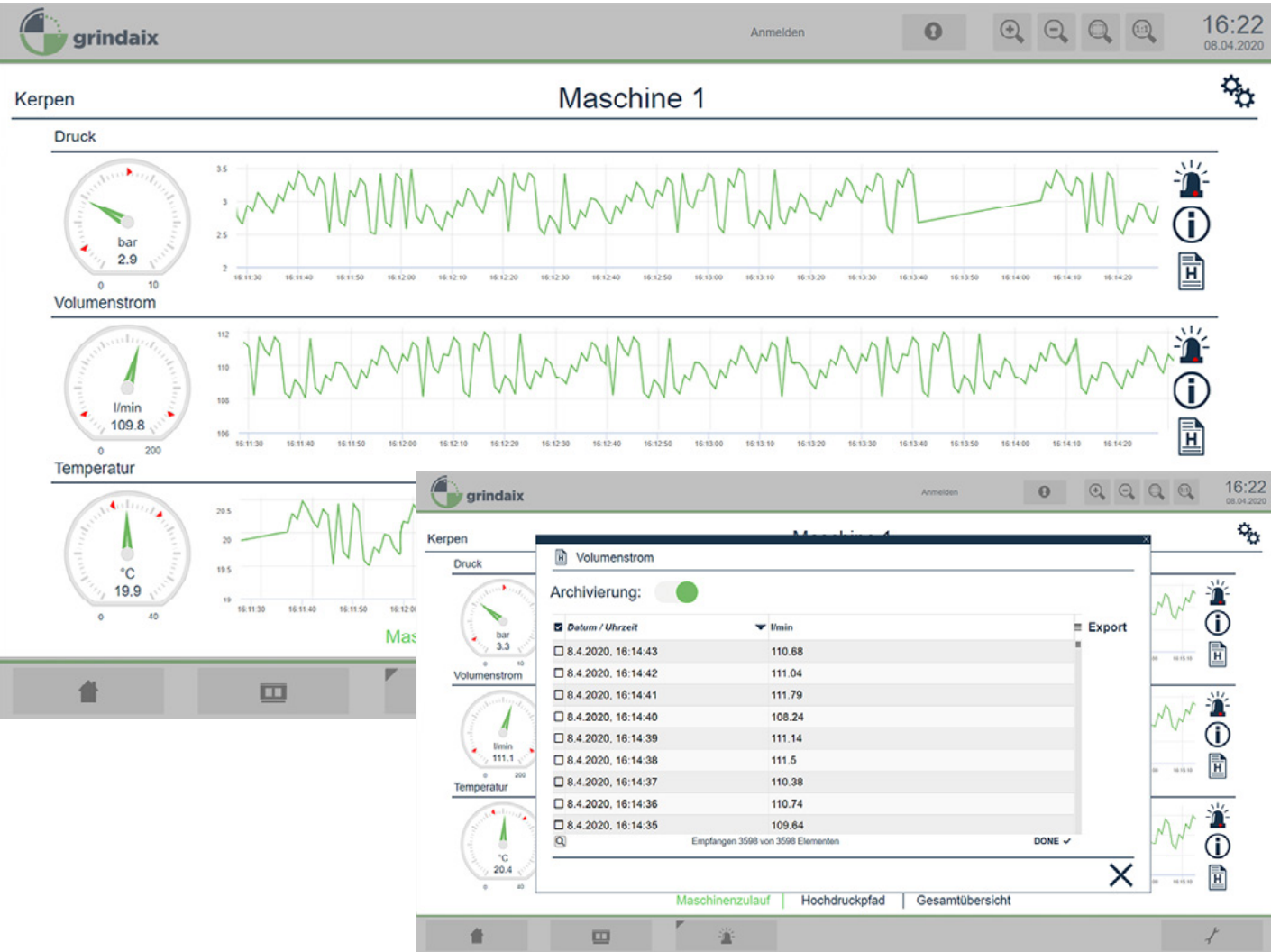
ITEM NO.: GRX-SOFTWARE

THE MONITORING DASHBOARD

1. REAL-TIME MONITORING

In the Dashboard, the measurement data is assigned to the individual processes and thus displayed in a structured way in one place. Based on current and historical data, trends or deviations can be detected by the customer at an early stage and optimization potential derived.

3. LIMIT VALUE-DEPENDENT MONITORING

In addition to the well-structured data display, limit values for warnings and alarms can be set via the Dashboard. The digital inputs of the Grindaix hardware can be used to record different process states and to individually define limit values for each sensor/measurement value and for each process state. A response to a limit value violation can be sent via the digital outputs of the hardware, e.g. to a signal lamp or to the control system of the monitored process. In this way, automatic monitoring with low latency is achieved, offering the possibility to perform fast data analysis, to proactively derive measures, and to avoid errors.

2. DATA HISTORY

The data recorded by the hardware is stored in an SQLite database with time stamp. The archive data can either be accessed directly on the Dashboard or retrieved from the SQLite database by external access.

4. VIRTUAL REPRESENTATION OF THE PRODUCTION ENVIRONMENT

The customer-specific Dashboard provides a virtual representation of your production environment, ensuring that the process data is displayed in an intuitive and transparent way.

PROJECT PROCEDURE

1. ON-SITE ANALYSIS

We visit you at your company, record your current digitalisation status as well as the requirements regarding your desired digitalisation technology. During an on-site appointment, we will examine potential locations for installing both your chosen sensor technology as well as hardware components. In addition, we will determine cabling options together with you, and we will analyse accessibility and implementation possibilities for the installation of the entire Grindaix digitalisation package. Together with your colleagues, we will discuss IT connection options as well as the possibility of using of an IT-independent pilot system. The preliminary visit is initially free of charge and will only be invoiced upon placement of an order at a later date.

2. ELECTRICAL INSTALLATION

Upon request, we can take on the installation and cabling of all hardware components as well as the associated connection of previously installed sensors and the digital signals provided on the customer side. To carry this out, we use your electrical infrastructure, such as cable ducts and cable shafts, and document the electrical installation according to your specifications. We would be happy to coordinate our efforts with your on-site maintenance department.

3. INSTALLATION OF SENSORS

Working in close collaboration with your maintenance department, we can take on the installation of all new sensors as well as the connection of existing ones. In so doing, we check for feasibility and determine appropriate courses of action. Additionally, we advise you regarding the implementation of mechanical work. The digital signals from your machine control systems, such as machine ON/OFF/in production/cycle type, component number, are provided on the customer side in liaison with our technicians.

4. COMMISSIONING

During commissioning, all the sensors you require are reproducibly addressed in the Grindaix server for each machine. This addressing process is documented in an address protocol. Afterwards, sensor parameterisation is carried out. This involves determining the limit values for each individual sensor, defining corresponding error signals via the evaluation software included in the supplied and pre-installed Grindaix software package (Dashboard), and checking the connection of your additional digital input and output signals per machine. Finally, we carry out a plausibility check to monitor the data output values and display of all installed sensors.

5. TRAINING YOUR EMPLOYEES

Our system is designed in such a way that our customers, as experienced professionals, can intuitively understand and immediately operate Grindaix hardware and software solutions. Detailed documentation as well as installation videos accompany and support you by addressing any installation questions that may arise before, during and after installation. Upon request, we can also offer comprehensive on-site training to your employees. Alternatively, your employees are welcome to participate in our in-house training courses to receive instruction on handling this digitalisation technology. Should you have any remaining questions, a Grindaix Monitoring Hotline is available to you.

SYSTEM ARCHITECTURE

CONNECTION POSSIBILITIES TO YOUR IT ENVIRONMENT

YOUR ERP (SAP), ASSISTANCE SYSTEMS, ...

YOUR MACHINES / SYSTEMS
with OPC UA

GRX-OPC UA - SERVER & DATABASE
- OPC UA server
- OPC client for additional systems
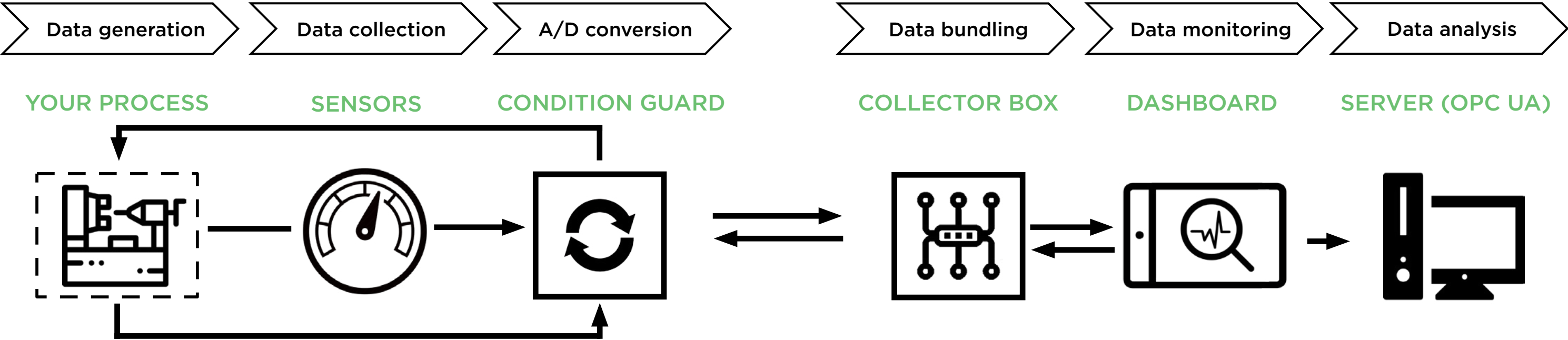 (e.g. ERP)
- optional hot standby redundancy
- user administration & access
  security
- historisation
- limit value monitoring per
- secure database machine and
  cycle

GRINDAIX (GRX) PRODUCTS

GRX-DASHBOARD
- web client
- (customised) dashboard
- limit value monitoring
- no installation
- device independence

YOUR MACHINES / SYSTEMS
without OPC UA

GRX-

CONDITION GUARD
- 6 analog M12 slots
- 1 PT 100 slot
- 6 digital inputs
- 4 digital outputs

COLLECTOR BOX
- 7 inputs for max. 7
  Condition Guards

OTHER OPC UA SYSTEMS
(I/O LINK MASTER, QUALITY SYSTEMS, ...)

Operating status feedback

Communication via switching signals

Acquisition of the sensor signals

Grindaix Sensor
GRX-Q

all commercially
available analogue sensors

GRX-CONDITION MONITORING SYSTEM
- OPC UA Interface
- A/D conversion of the measurement data
- connection of manufacturer-independent
  sensor technology
- connection of existing analogue sensors
- freely expandable
- feedback of the operating status to
  machines or signal lamps

OVERVIEW

| Data generation | Data collection | A/D conversion | Data bundling | Data monitoring | Data analysis |

YOUR PROCESS   SENSORS   CONDITION GUARD   COLLECTOR BOX   DASHBOARD   SERVER (OPC UA)

YOUR PROCESS
- for all processes and machines
- feedback of the process status to the machine
- safe and robust signal transmission through cable connection

SENSORS
- power supply via Condition Guard
- all standard industrial sensors can be connected
- secure cable connection
- no additional data cables necessary

CONDITION GUARD
- suitable for all standard industrial sensors - M12 connector
- up to 7 analogue sensors per Condition Guard
- digital inputs and outputs for cycle and status
- signal lamp (plug&play)
- power supply of the sensor technology
- IP 54 protection class
- unique IP address

COLLECTOR BOX
- data node as standard component with system compatibility
- connection of up to 7 Condition Guards or additional Collector Boxes
- clear assignment of the connected sensors
- data transfer via OPC UA interface to Grindaix OPC UA server
- 230V power supply
- IP 54 protection class
- low installation and maintenance effort

DASHBOARD
- process-specific grouping and display of the sensor technology
- signal-specific limit value monitoring
  - static
  - cycle-related
  - component-related
- data storage with time stamp
- event logging
- clearly structured and intuitive user interface
  - measurement data display
  - progression chart
  - 15.5" TFT touch display
- desktop access

SERVER (OPC UA)
- pre-configured hardware environment
- data backup (database)
- OPC client for the Grindaix monitoring system
- OPC UA server for structured data connection to higher-level IT systems (ERS, SAP, …)

TECHNICAL SPECIFICATIONS

analogue connections	
0 (4) - 20 mA	4
0 (2) - 10 V	2
PT100 - Temperature sensor	1
digital connections	
0 / 24 V (INPUTS)	6
0 / 24 V (OUTPUTS)	4

" Prepare for using
ARTIFICIAL INTELLIGENCE
in your production !"

grindaix