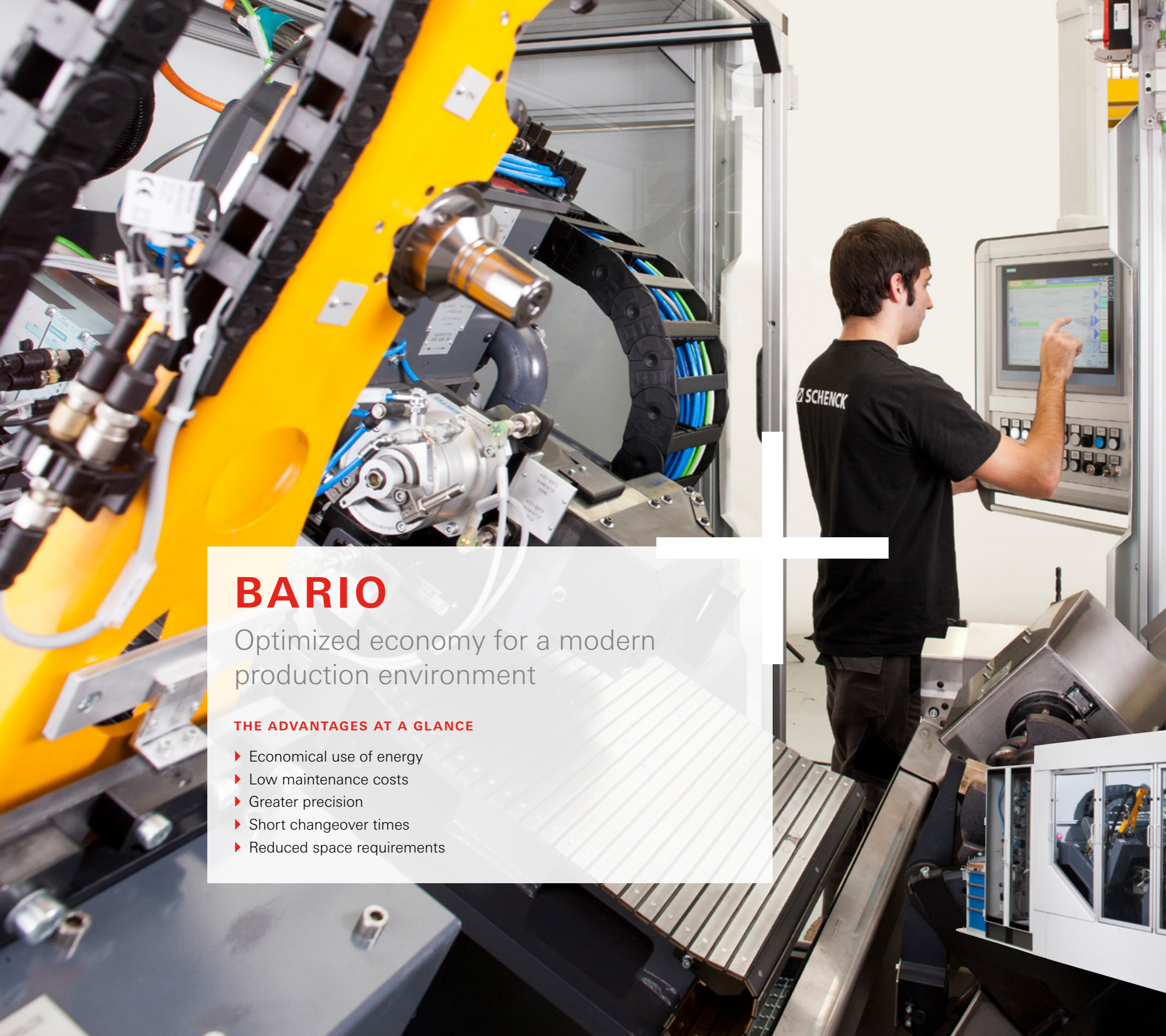




# **BARIO**

Efficient crankshaft balancing





## Frontrunner in the area of cost reduction

Production conditions in the automotive industry are changing rapidly. Every single process step has to satisfy continuously escalating demands for efficiency, operating ergonomics and precision. In order to face up to these challenges at lowest cost, we have completely redesigned our fully automated crankshaft balancing system to produce our new BARIO machine.

We have however remained true to its former high performance: as a two-station solution for measuring and drilling, the new BARIO builds seamlessly on the successes of predecessor models with its innovative performance characteristics. Low space requirements, low energy consumption, optimised process, simplified maintenance and maximum flexibility make the new BARIO into a balancing system that sets new low cost standards.

# BARIO

Optimized economy for a modern production environment

### THE ADVANTAGES AT A GLANCE

- ▶ Economical use of energy
- ▶ Low maintenance costs
- ▶ Greater precision
- ▶ Short changeover times
- ▶ Reduced space requirements



# BARIO

Efficiency times five

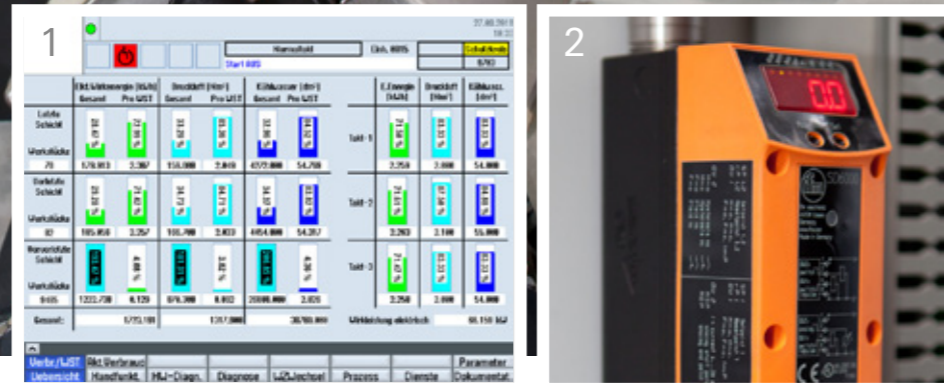


Fig.: 1,2 Always in view – permanent monitoring and display of the BARIO's current energy consumption.

## 1 EFFICIENCY Energy consumption

In comparison to its predecessor models, which were already low in energy consumption, with the new BARIO we have reduced energy consumption once again by a good 15 %. The inefficient and expensive consumption of compressed air by itself was reduced to a minimum through the substitution of electromechanical for pneumatic clamping. The further reduction of electrical energy use was additionally caused by weight

reduction, the use of energy efficient drives and doing without inefficient hydraulic and cooling systems.

And the use of a powerful, energy-optimized drill unit, and minimum quantity lubrication, reduce your operating costs and improve the return on investment.

## 2 EFFICIENCY Resetting and maintenance

The production process is becoming more and more flexible and batch sizes are smaller. If you want to stay competitive, you can't afford to lose time during part change. The new BARIO makes it easy for you: all the machine's components are easily accessible; set-up operations are possible with the doors open, and you can change components almost without tools. In addition, changeover is facilitated through standardized change kits. Thanks to the optional tool changer, a second tool with an additional drill diameter, can be used quickly.

Maintenance is also designed to be as simple as changeover: all subassemblies that are required for maintenance in daily operations, such as the drill unit, clamping station, or operating fluids, can be reached from a comfortable standing position. This makes itself noticeable in the system's service life.

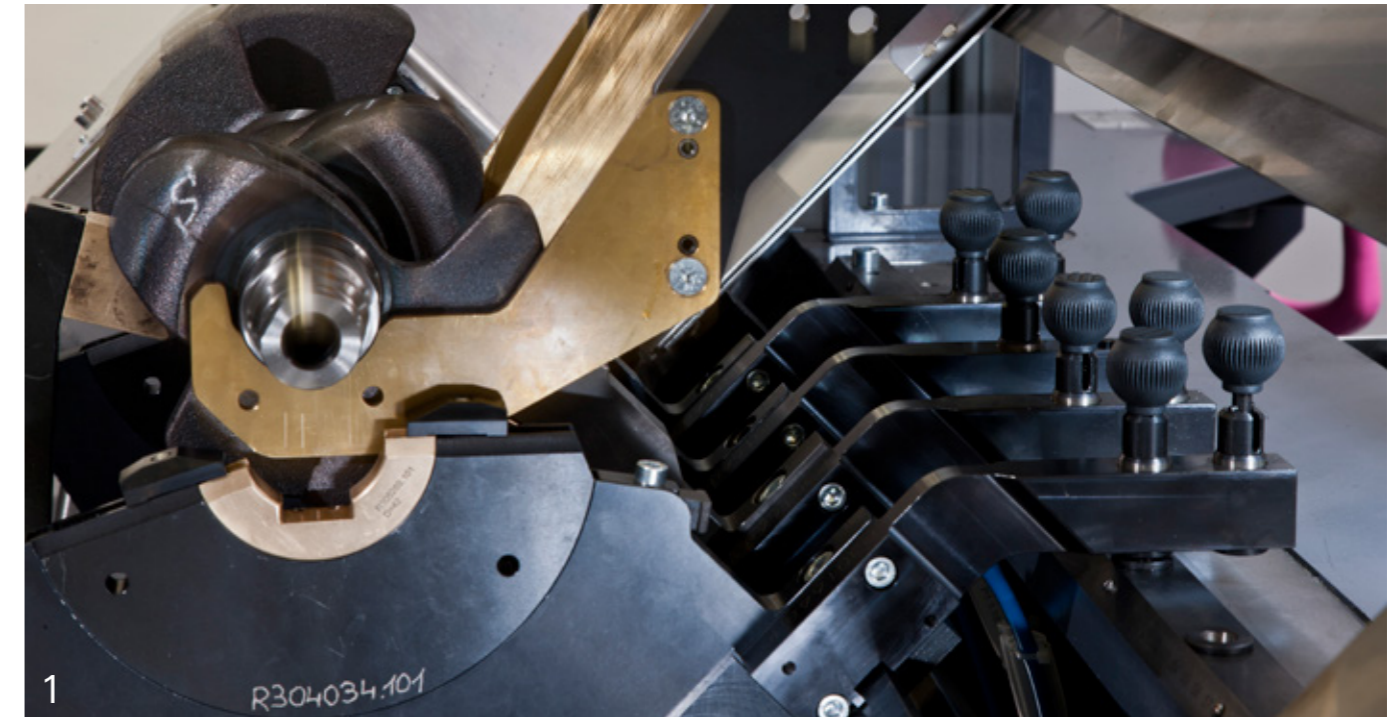


Fig.: 1 Optimized changeover concept with exchange fingers and shell inserts.

Fig.: 2 Additional reduced costs: a changeover kit consists of very few parts.

Fig.: 3 The parts and tools for resetting are stored in the tool container at the machine.

# 20'

The BARIO space miracle – fits into a standard 20 foot container



### 3 EFFICIENCY

Space requirement

When dimensioning the new BARIO we changed the width/depth ratio so that the machine is now around 15 per cent narrower. This not only means that it needs much less space in your production line, but also that it fits – completely – into a standard 20 foot container. Load, relocate, unload, start work again! Relocating has never been this easy and cost-effective. With its crane hook machine design, the BARIO can be installed quickly and put into operation.

Space efficiency also means that due to the narrow construction and easy accessibility of all components, the maintenance space was also clearly reduced. In other words, the space requirement around the machine is considerably reduced in comparison with its predecessor machine.

### 4 EFFICIENCY

Chips management

The BARIO's chips management system is new as well: whichever way you install the system, it offers maximum freedom – the accumulating chips can be discharged to the right, the left and behind the machine. And adjustment is easy.

Thanks to the concentrated chip removal, chips do not get caught and clumps do not form either. After-treatment is not necessary, because the chips are dry and not contaminated with drilling fluids.



Fig.: 1 Flexible chip transport simplifies the installation of the machine.

Fig.: 2 Optimized chip removal ensures a clean work area inside the BARIO.

# 5 EFFICIENCY Operating

## Well-conceived operation – efficient processes

Well-conceived operation down to the last detail – we committed the new BARIO to this above all. The idea of simple handling runs like a common thread through the complete operating concept. For example, to set up for a new crankshaft you need only three different types of tools. You use linear rails with marked positions to find locations again quickly and precisely, for, in example the part clamp. With a whole series of such detailed solutions the BARIO ensures efficient production process.



## Precision that pays off

We have increased the BARIO's precision still further so that you can now comply with and document even the lowest tolerance specifications. Your whole process will profit from this: together with the improved balanced calculation of the CAB 950, you minimize the number of correction drill holes and reduce the cycle time even with difficult correction scenarios. Usually, a single correction step is enough for a perfectly balanced crankshaft. This extends the life of the tools and in the end will substantially reduce your unit costs.

Fig.: 1 Highly precise and flexible, the balancing unit with its end drive.

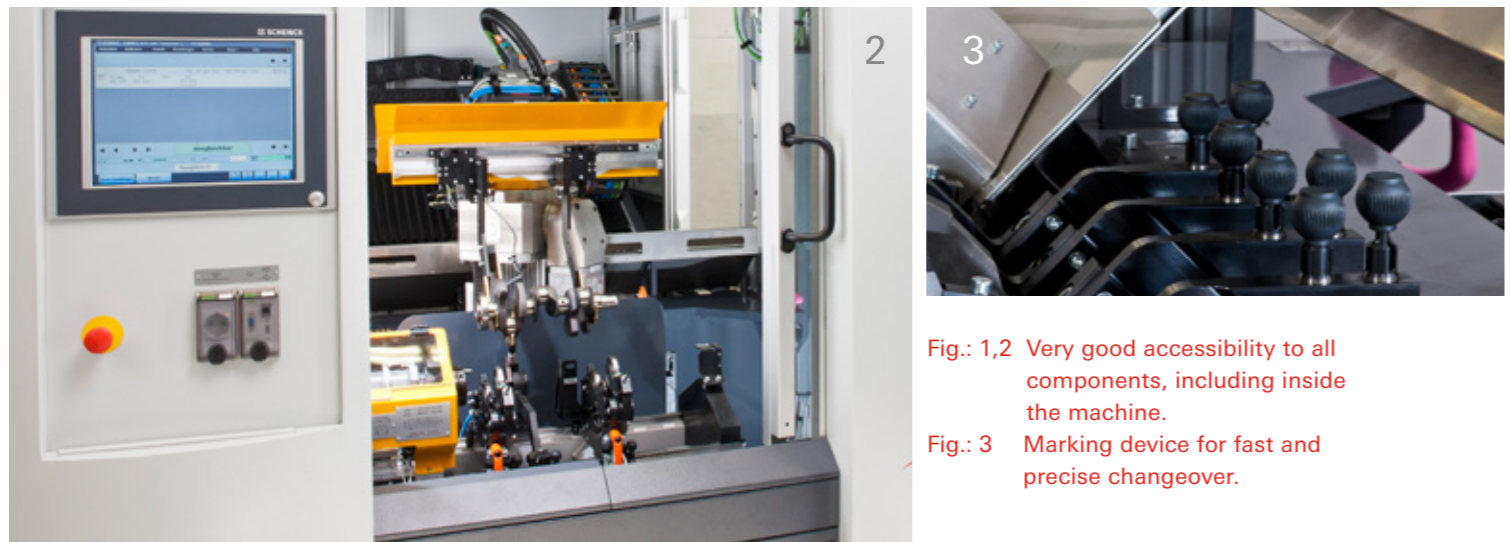
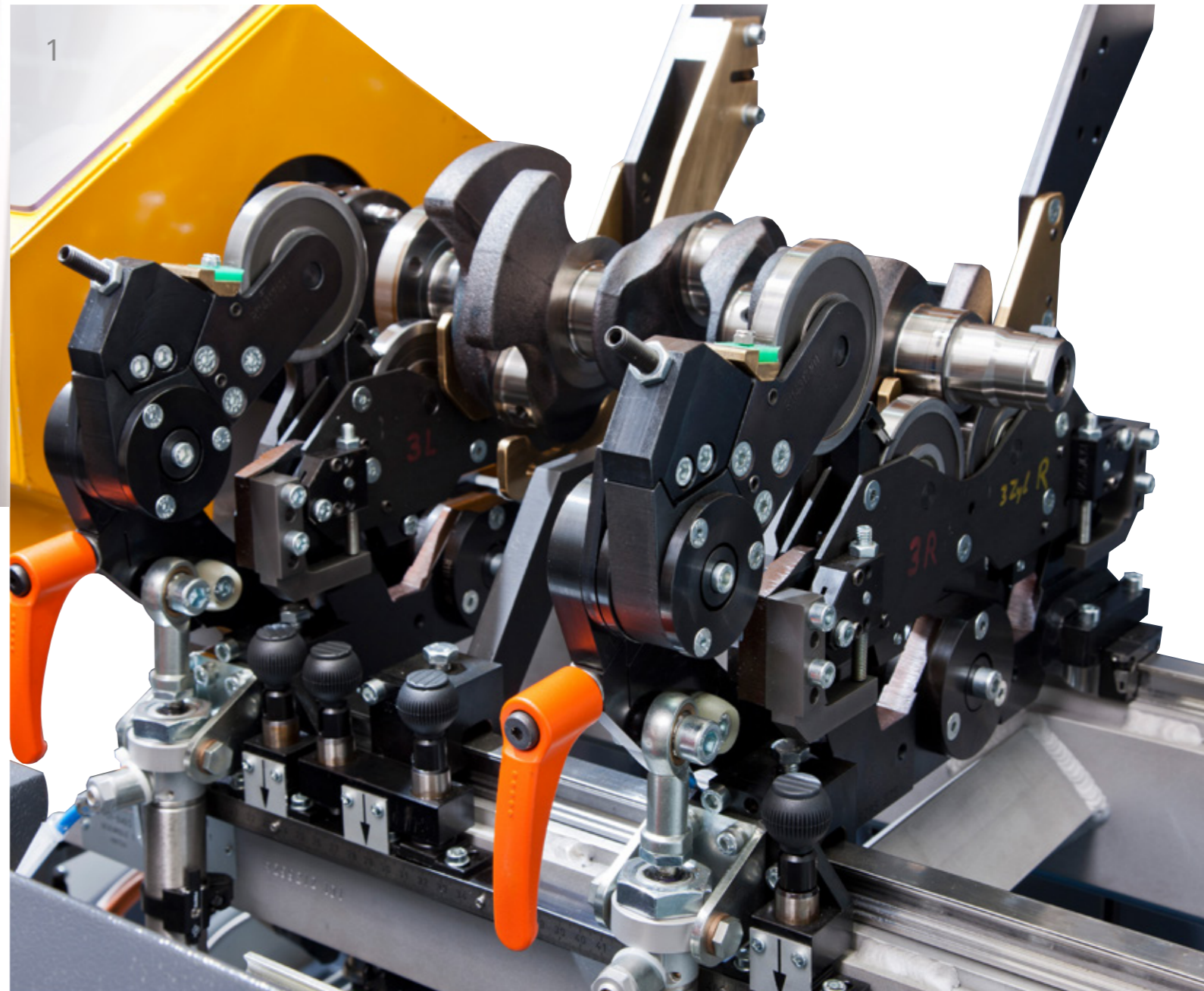


Fig.: 1,2 Very good accessibility to all components, including inside the machine.

Fig.: 3 Marking device for fast and precise changeover.



# State of the art measuring and controlling

## CAB 950 measuring and control technology

In the current version 6, our latest measuring and control unit "CAB 950" is designed as an intuitive and self-explanatory human-machine interface (HMI). It enables ergonomic and transparent access to all the machine's functions.

Along with the precision mechanics, the CAB measuring technology is the guarantee for the greatest precision during unbalance correction. Many standard functions optimize accuracy still further, for balancing crankshafts in particular. These include statistical

calibration, polar optimised correction, difference angle measuring with asymmetric crankshafts or measuring environmental interference.

CAB 950 offers online statistics with initial unbalance and process analysis and a certified Q-DAS interface (AQDEF) for your quality management system.



Fig.: 1, 2 CAB 950 – the measuring instrument for series production - simple operation, highly accurate measured value recording, precise correction calculations.

## Fingerprint – the standard analysis tool

Our Fingerprinting analysis tool is integrated in the measuring instrument for fault analysis and machine condition monitoring. It analyses the signals from the existing measuring technology and evaluates the machine's current vibration pattern. This is compared with previously recorded measured values, in order to determine the machine's current condition. In this way, wear, faults and damage can be detected very precisely. Potential problems are detected at an early stage, so that you can plan repairs or maintenance.



# Technical data

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## ROTOR DIMENSIONS

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- ▶ Crankshaft weight,max.: 30 kg\*
  - ▶ Overall length, max.: 650 mm\*
  - ▶ Clearance crankshaft center to drive end: 100...240 mm\*
  - ▶ Main bearing clearance, max.: (120) 170...500 mm\*
  - ▶ Correction planes clearance, max.: 600 mm
  - ▶ Main bearing diameter: 40...70 mm\*
  - ▶ Counterweight diameter, max.: 200 mm\*
  - ▶ Correction drill diameter, max.: 20 mm (with carbide drill)
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## MACHINE

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- ▶ Width, depth, height: 2060 mm, 5500 mm, 2200 mm
  - ▶ Total weight: 9000 kg
  - ▶ Mains connection (standard): 400 V / 3Ph / 50 Hz
  - ▶ Balancing speed, typical: 400...450 min<sup>-1</sup>
  - ▶ Measuring uncertainty<sup>1)</sup> : 5...25 gmm
  - ▶ Drive type: End drive / other designs optional
  - ▶ Paintwork: RAL 7035 (light grey), RAL 7024 (graphite grey)
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## MEASURING INSTRUMENTS

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- ▶ CAB 950 with touch-screen operation
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## OPTIONS

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- ▶ Automatic tool changer
  - ▶ Certified working standard
  - ▶ Flexible design transport
  - ▶ Automatic loading hatch
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<sup>1)</sup> Depends on the particular crankshaft, determined using a working standard, evaluated in accordance with DIN 1319 Part 3, with 95 % of the probability distribution, statistically two-dimensional  
\* Deviating data on request



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