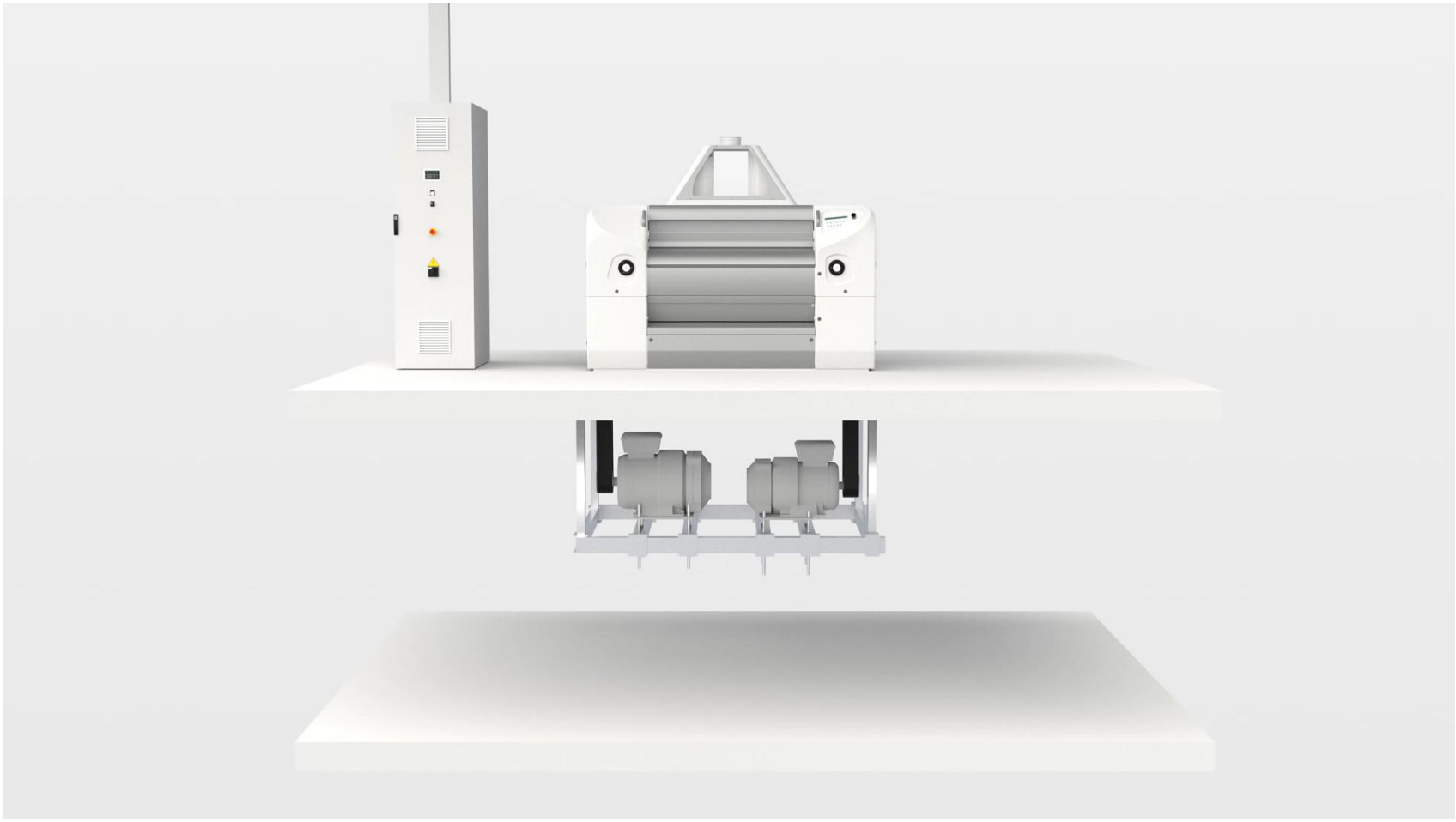
Integrated Grinding System Arrius.

MRRA.

Innovations for a **better world**.

Arrius. Roller Mill becomes Integrated Grinding System.



Arrius pilot plant since September 2018 in operation.

Project

- Hard and soft wheat swing mill with ~ 100 TPD capacity
- Retrofit of existing roller mill floor (equal footprint)
- Less than one month for installation and start-up

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Benefits

Arrius. The first fully integrated grinding system.

Benefits

- Saves up to 10% energy
- Reduces building investment costs and installation time
- Improves grinding performance
- Simplifies interactions – on different devices

Bühler’s Arrius MRRA is the first fully integrated grinding system (IGS). It is applied for grinding wheat, durum, rye, barley, corn and spelt where it sets the benchmark in terms of grinding performance. Its plug-and-play design with integrated drive unit significantly reduces installation time and energy consumption.

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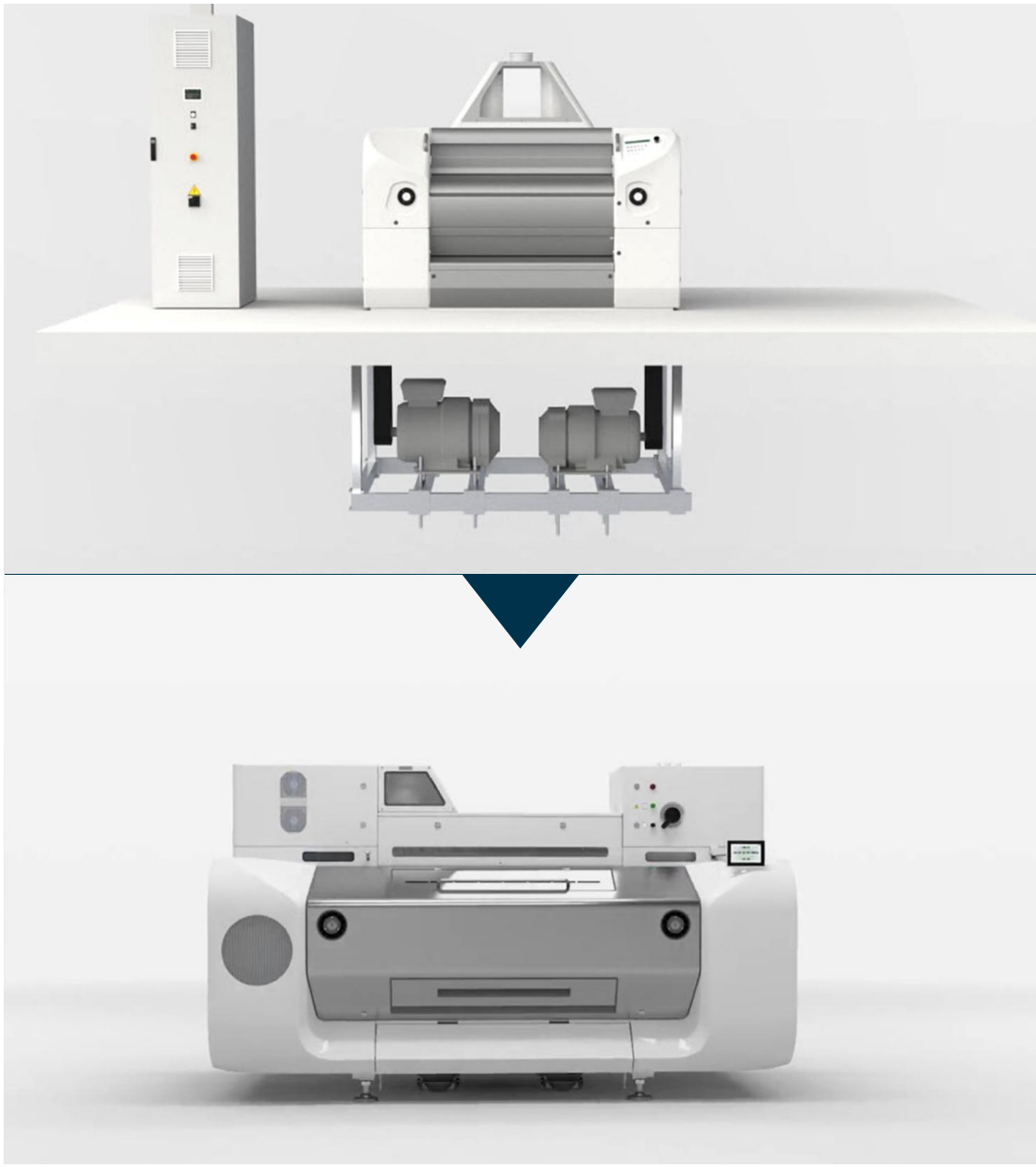
Energy efficiency.

- The integrated drive unit consisting of motor and gearbox enables mechanical energy recovery.
- Compared to a conventional belt drive, Arrius saves up to 10 % energy.

Building investments savings.

- Thanks to the direct suction and the integrated drive unit, one building floor can be saved.
- In addition to the direct suction, Arrius is also available in a version with outlet hopper.



Fast installation.

- The Plug-and-Play design with the integrated switch cabinet and power busbar leads to a massive reduction of the installation time.
- Only 3 cables (power supply, emergency stop, communication), compressed air and product inlet/outlet need to be connected.
- The mechanical and electrical onsite installation is 3 times faster compared to a conventional roller mill.

Installation time savings for a 800 tpd flour mill:

	Antares Roller Mill **28 x** 	Arrius IGS with power busbar **28 x** 
Mechanical Installation	3’100 hrs	1’000 hrs
Electrical Installation	7’600 hrs	2’500 hrs
TOTAL:	**-7’200 hrs**	

Improved grinding efficiency.

- The feed module with asymmetrical inlet and distribution screw ensures uniform mixing and distribution of the grain over the entire grinding gap.
- Thanks to the completely newly developed roller pack with pre-stressed rollers, an up to 10% higher starch damage can be achieved compared to conventional roller mills.
- The pre-stressing of the rollers also ensures an absolutely precise grinding gap that remains stable over time.

Maximum food safety.

- All product contacting surfaces of the Arrius are made of stainless steel or other food grade materials.
- The complete inlet area of the feeding module is accessible for cleaning by opening the inlet door.
- A greatly simplified grinding chamber design and improved aspiration reduce product deposits, which further increases food safety.
- The machine stand with hygienic leveling feet allows cleaning under the machine, ensuring highest cleanliness.

Highest operational safety.

- The product chamber covers with an electronic lock enables complete closure of the grinding chamber and protects against unauthorized access.
- Continuous monitoring of the roller and bearing temperatures as well as alarm activation and stop function of the drives ensure safe operation.
- The grinding chamber doors are equipped with hand guards guarantees, which guarantees a safe product sampling.

Best-in class usability.

- The intuitive user interface simplifies the operation of the Arrius.
- All main operating parameters of the grinding system are displayed on the main screen. Operating parameters can be easily monitored and changed.
- A touchscreen on each side of the Arrius is part of the standard equipment.
- The touch screen is mounted on a swivelling arm and allows the operator a direct view of the user interface even during product sampling.

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Improved flexibility.

- Thanks to the integrated web server, Arrius can be operated by smartphone, tablet or PC within the mill.
- The Bühler remote app enables accessing the machines on mobile devices (smartphone, tablet).
- The app connects to the control system and the user interface is displayed. All functionalities of the Arrius control system are also available on the app.
- In addition, the Arrius control system can be integrated into the Mercury MES (Manufacturing Execution System).

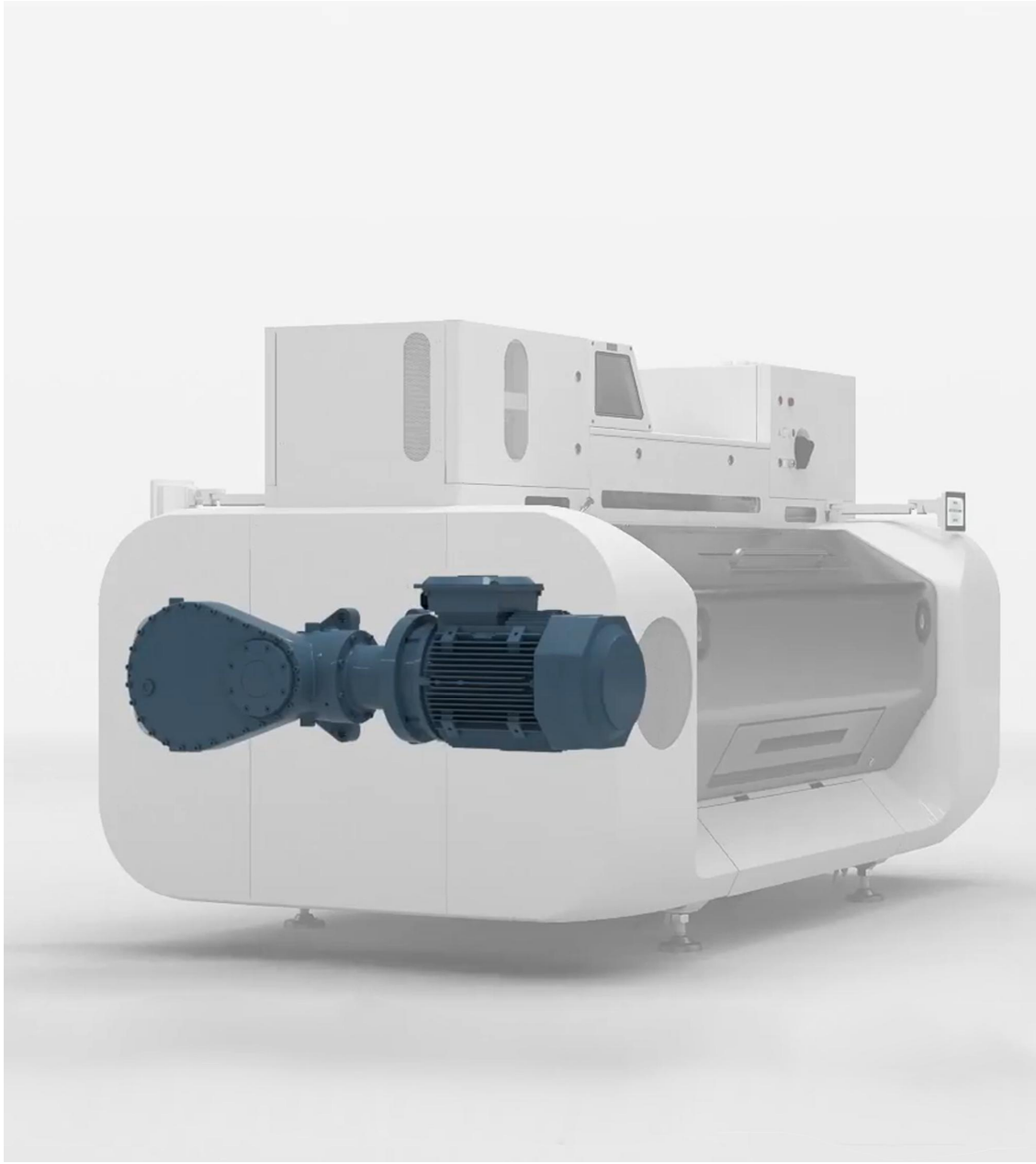
Functions

Feed module.

- The patented feeding module with lateral inlet, twofold level measurement and product distribution control enables uniform distribution of the product across the entire grinding gap.
- Product fluctuations are corrected immediately by the automatic feed regulation. The product teaching (leaning mode) is no longer necessary.
- The feeding module's emptying function and the easy accessibility for cleaning ensure the best possible sanitation.

Drive unit.

- The integrated drive consists of a standard motor and a gearbox specially developed for the Arrius.
- The motors (7.5 kW to 37 kW) are mounted on the gearbox, which drives both rollers and contains the differential. The roller transmission is integrated in the drive unit.
- The motor suspension required for conventional roller mills is no longer necessary. This allows the Arrius to be flexibly positioned in the plant.

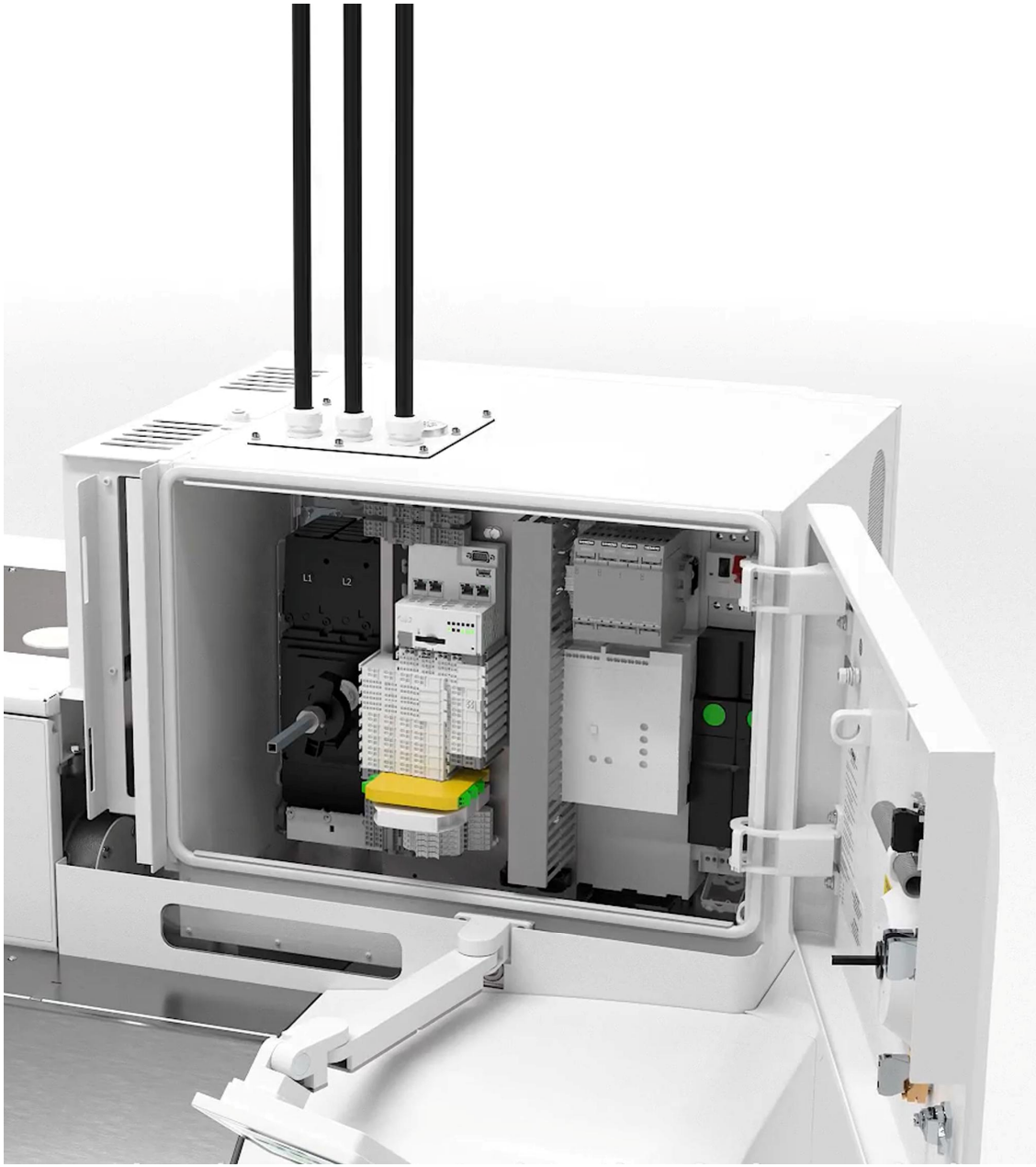


Roller package.

- The heart of the Arrius is the newly developed roller package with pre-stressed rollers and integrated foreign object protection.
- The pre-tensioning of the rollers ensures an absolutely precise grinding gap that remains stable over time. The grinding result can thus be adjusted easily and very directly.
- The direct drive has changed the position of the rollers. The rear roller is the fast rotating roller. The slow rotating roller is the front.
- Brushless scrapers for fluted rollers and self-adjusting scraper knifes for smooth rollers help to ensure impeccable grinding.

Switch cabinet.

- Two integrated control cabinets on both sides of the feed module contain the power electronics, the control unit and cooling modules.
- Arrius is connected with three cables (power supply, emergency stop and communication) from the power busbar.
- Two additional control cabinets with electronic modules for sensors and pneumatics are installed in the lower part of the machine.
- All electronic components are designed for a maximum ambient temperature of 60 degrees Celsius.



Sensors.

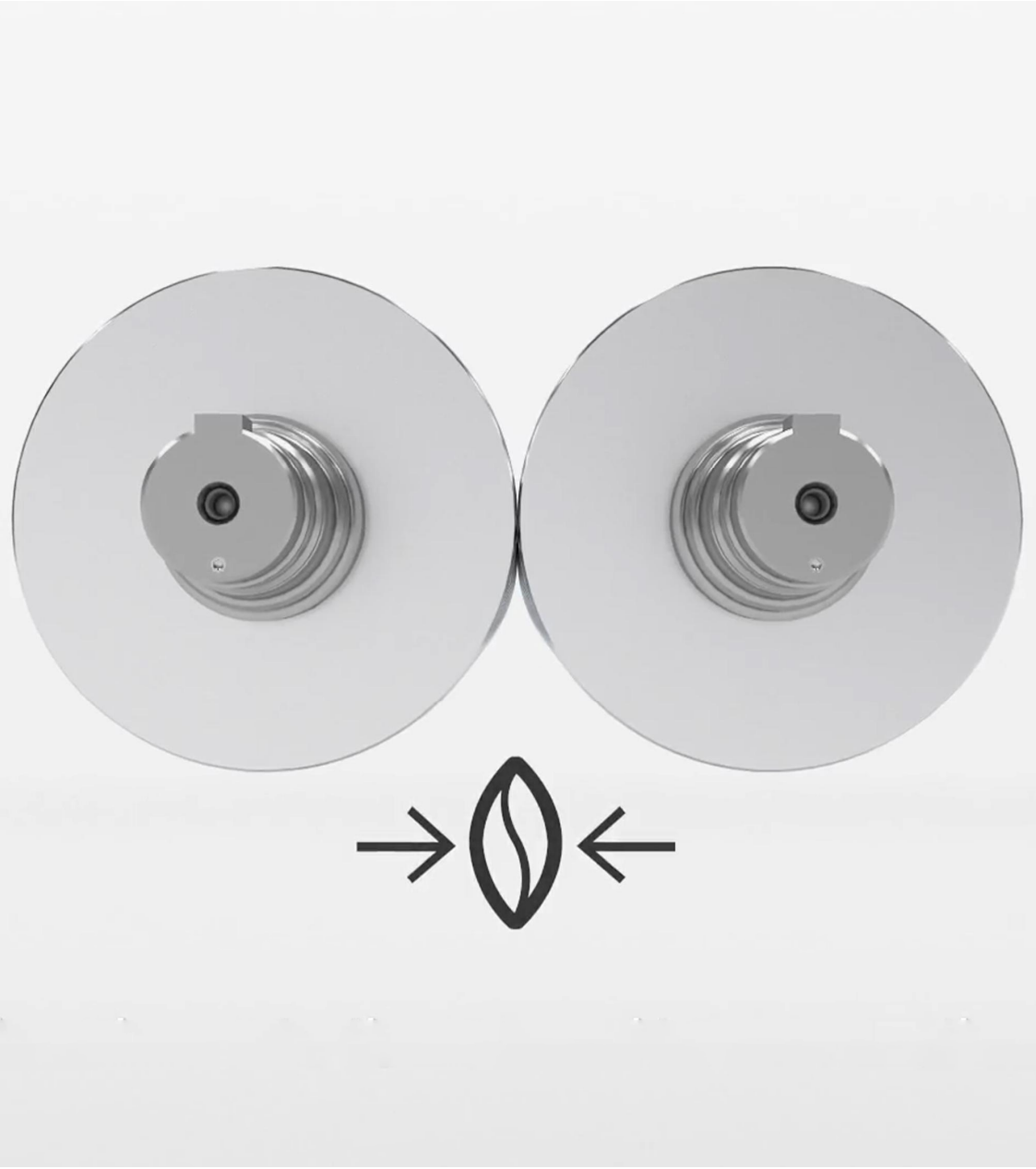
- The operating status of the Arrius is continuously monitored by sensors.
- Temperature sensors check the motors, the gearbox and the integrated control cabinet.
- In addition, compressed air and roller disengagement functions are continuously monitored.
- Blockage sensors monitor the grinding chamber as well as the outlet hopper and trigger error messages or lead to a machine shutdown in case of a product jam.
- The optional monitoring package includes additional sensors for monitoring the operating status.

Covers.

- The insulated product chamber cover are equipped with grinding chamber doors with hand protection for safe product sampling before and after the grinding.
- The innovative locking system of the product chamber covers guarantees safe operation. The product chamber covers can only be opened after the rollers have come to a complete standstill.
- By swinging open the product chamber cover, the entire grinding chamber is open. This simplifies cleaning and maintenance work.

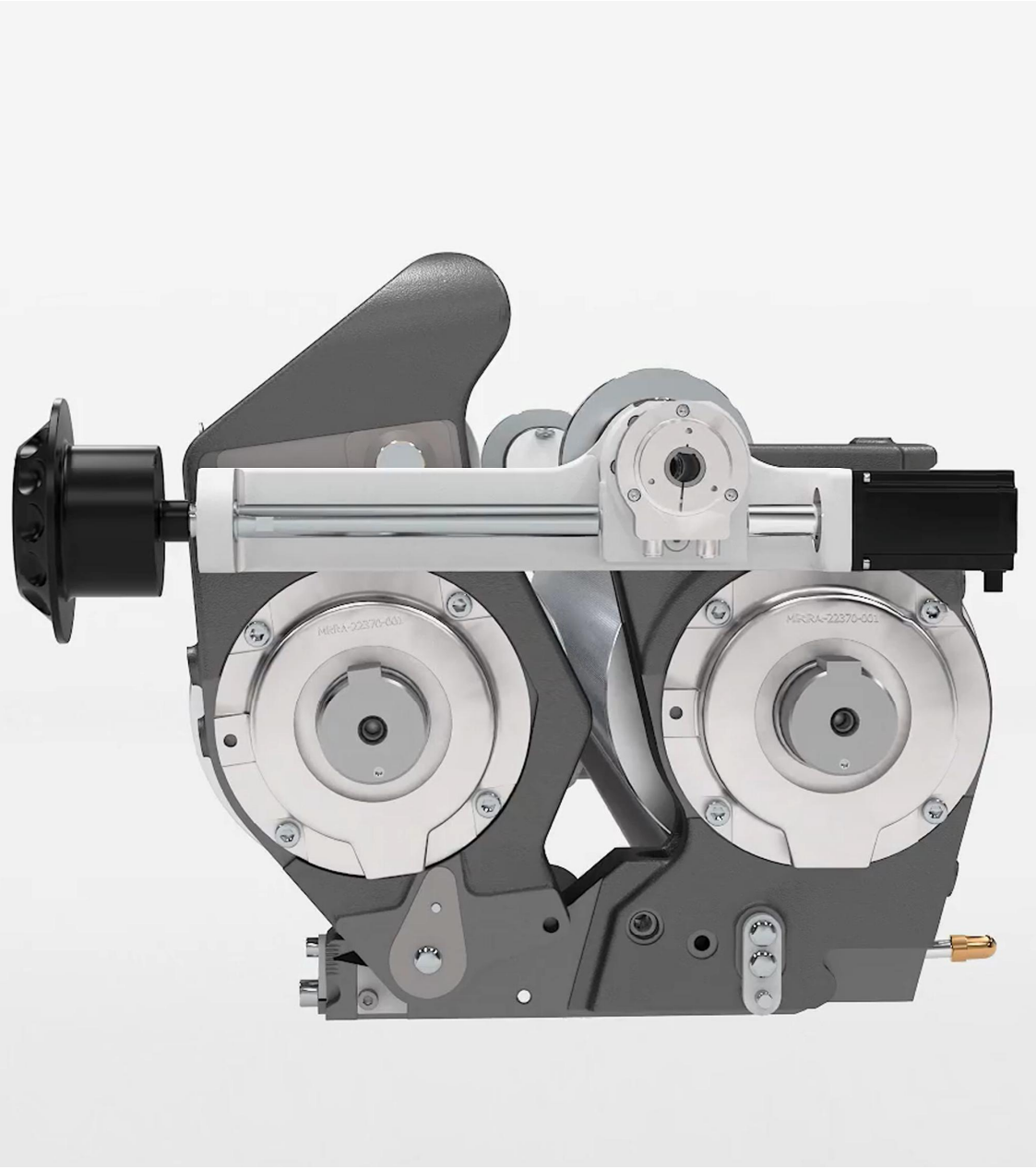
Grinding force measurement.
Option.

- The grinding force measurement provides a novel solution for monitoring of the grinding pressure force.
- Double-sided sensors in the roller pack continuously measure the grinding force of the roller pack.
- The grinding force is displayed on the control system. In case of a large deviation in the grinding force, an error message is displayed on the control.
- This provides the operator with an additional measurement value for best setting of the rollers.



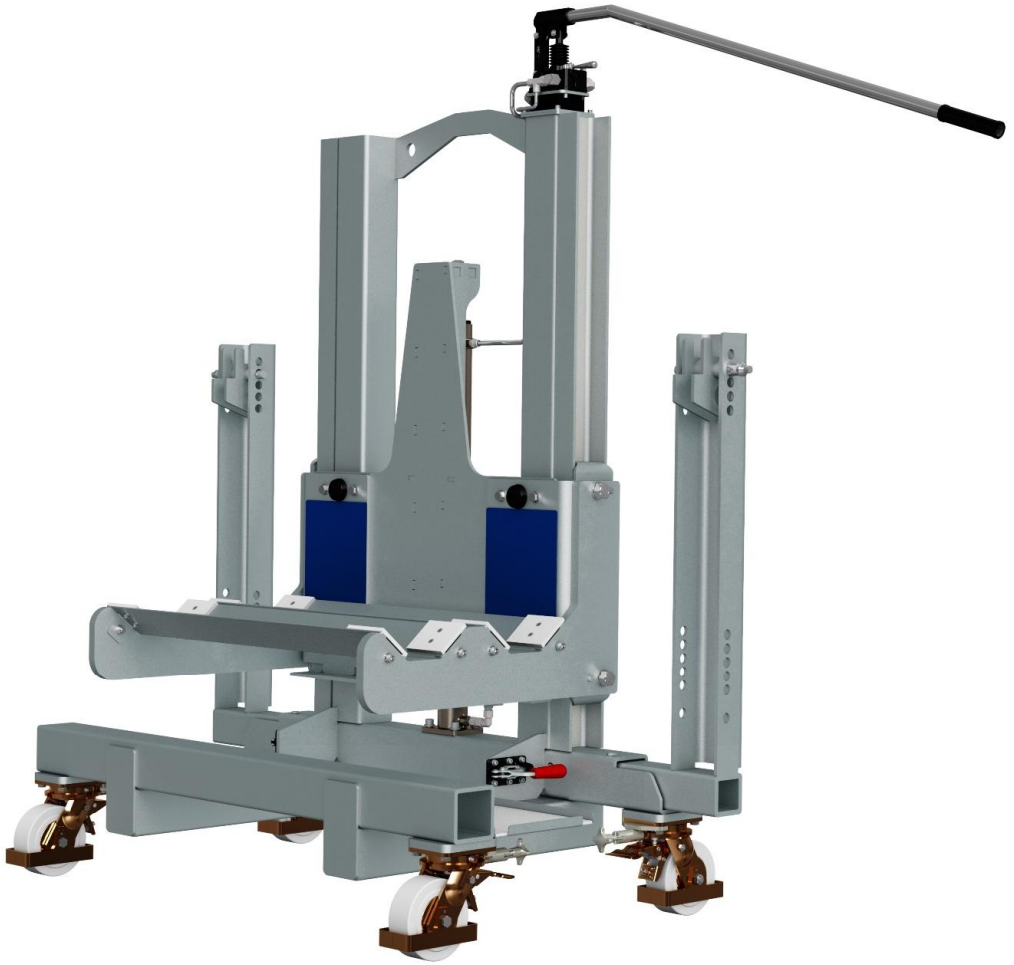
Temperature monitoring.
Option.

- The optional temperature monitoring package includes additional sensors for monitoring the operating status.
- Temperature sensors continuously monitor the rolls (temperature bar) and the roll bearings (PT100).
- All monitoring parameters are displayed in the control system. Error messages and alarms are also logged.



Roller removing device.
Option.

- The roller removing device with hydraulic lifting device and quick plug-in connections allows easy roller exchange.
- The roller pack mounted on rollers ensures easy removing and inserting of the entire roller pack.
- During the roller exchange, grinding can continue in the opposite passage.



Technical specification

Technical specification.

Available certifications:
CE, UL and ATEX

Product types	Four-roller IGS	Eight-roller IGS
		
Diameter (mm):	250	250
Length (mm):	1000, 1250, 1500	1000, 1250, 1500

Technical specification.
Dimensions.

	MRRA 4-1000/250	MRRA 4-1250/250	MRRA 4-1500/250
Length mm	2678	2928	3178
Width mm		1676	
Height mm		1736	
Weight kg	5000	5300	5600

	MRRA 8-1000/250	MRRA 8-1250/250	MRRA 8-1500/250
Length mm	2678	2928	3178
Width mm		1676	
Height mm		2276	
Weight kg	9600	10100	10600

Arrius Options and Certificates.

Version	Options	Certificates
First Version – Sales Release November 2020	• Motorized grinding gap adjustment • Grinding force measurement • Roller temperature, bearing temperature, inlet monitoring, grinding gap monitoring • Roller Removing device	• CE • UL • ATEX
Second Version – Future Sales Release (premature sales request)	• Direct suction/Active collection • Motorized feed gap control	• Others

Not available
- Water cooling
- Roller diameter 300 mm
- Split version
- Motorized grinding gap adjustment based on particle size (PSM)

Overview monitor and additional functions.

Function	Standard Version	Option

Monitoring and sensor	• Temperature monitoring of motors, gearbox, control cabinet
	• Compressed air monitoring
	• Roller disengagement function
	• Blockage sensor in grinding chamber and outlet hopper A)
		• Grinding force measurement
		• Temperature Monitoring:
		  • Roller temperature
		  • Roller bearing temperature
		• Inlet monitoring B)
		• Grinding gap monitoring C)

Grinding gap adjustment	• Manual grinding gap adjustment	• Motorized grinding gap adjustment
Safety	• Product chamber covers with electronic lock	

A) Cable with plug wired to the machine (sensor to be supplied separately)
B) Installation of blockage sensor in inlet spouting, cable with plug wired to the machine (sensor to be supplied separately)
C) The grinding gap monitoring logs all grinding gap changes. In addition, all changes can be evaluated.