


BALLUFF

 *innovating automation*

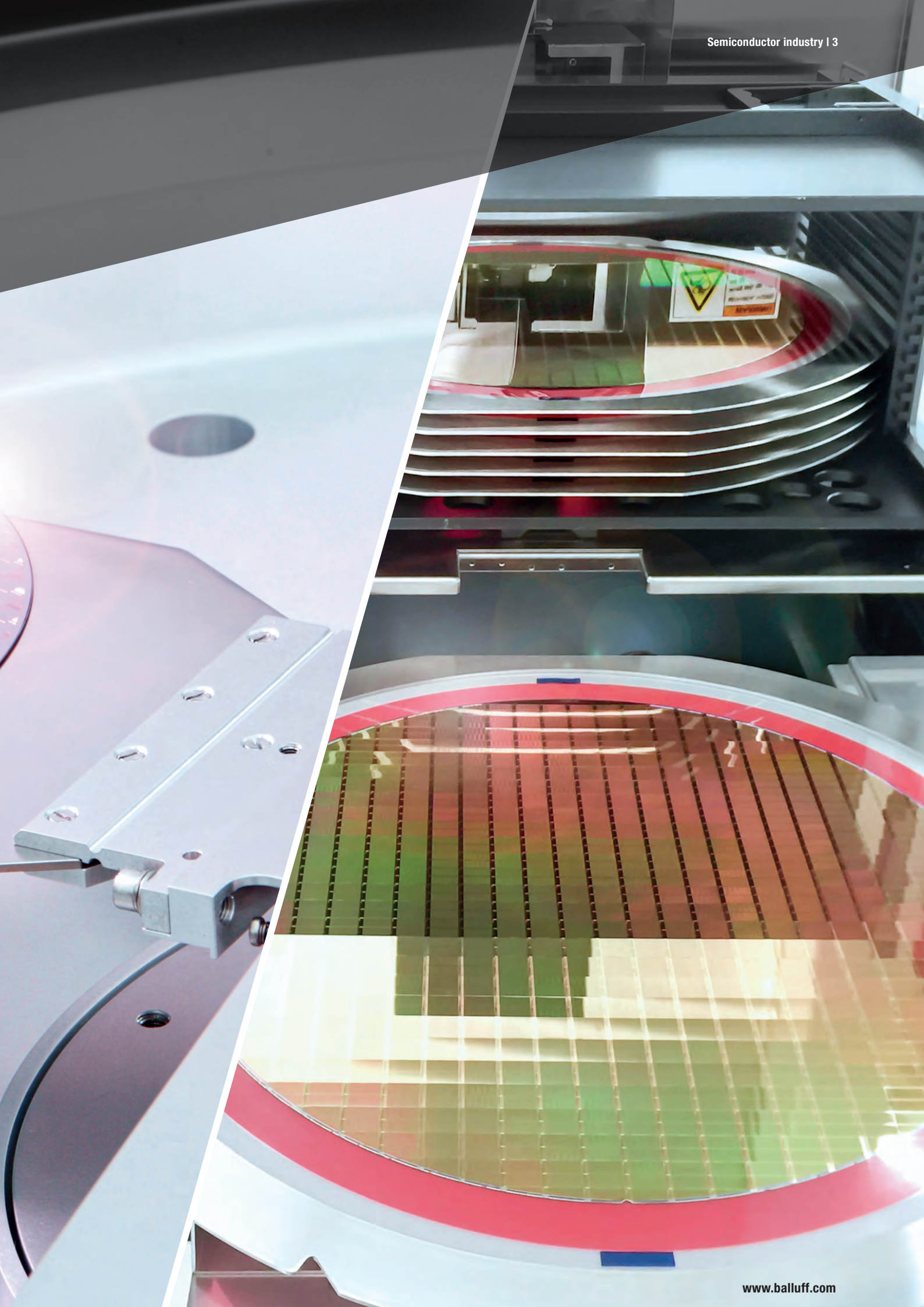
PRECISION FOR
SEMICONDUCTOR,
SOLAR AND DISPLAY
MANUFACTURING

Semiconductor
industry

Balluff in the semiconductor industry

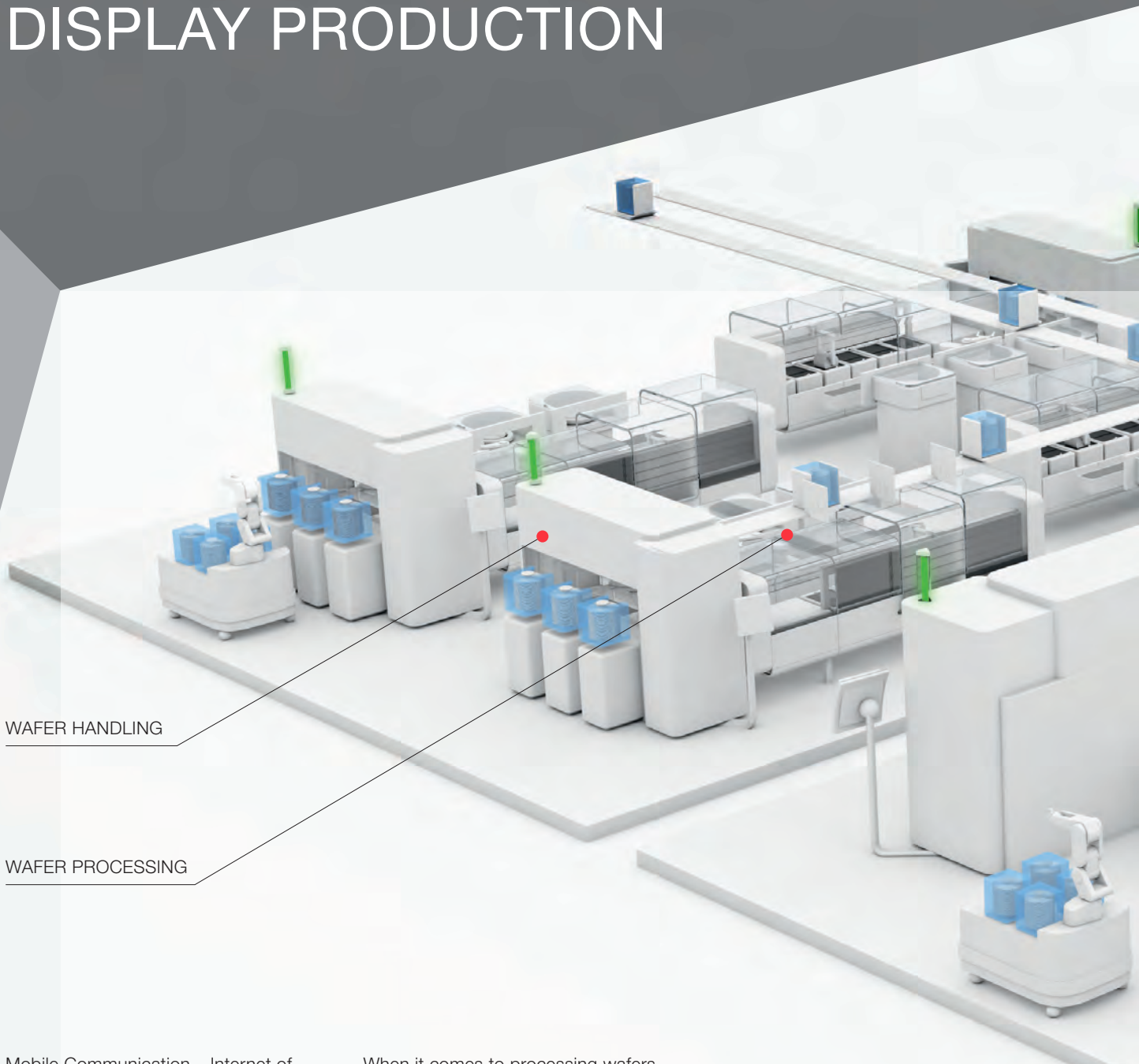
WE ARE AT HOME IN MANY
DIFFERENT SECTORS





Balluff in the semiconductor industry

WE SUPPORT YOUR WAFER PROCESSING AND DISPLAY PRODUCTION



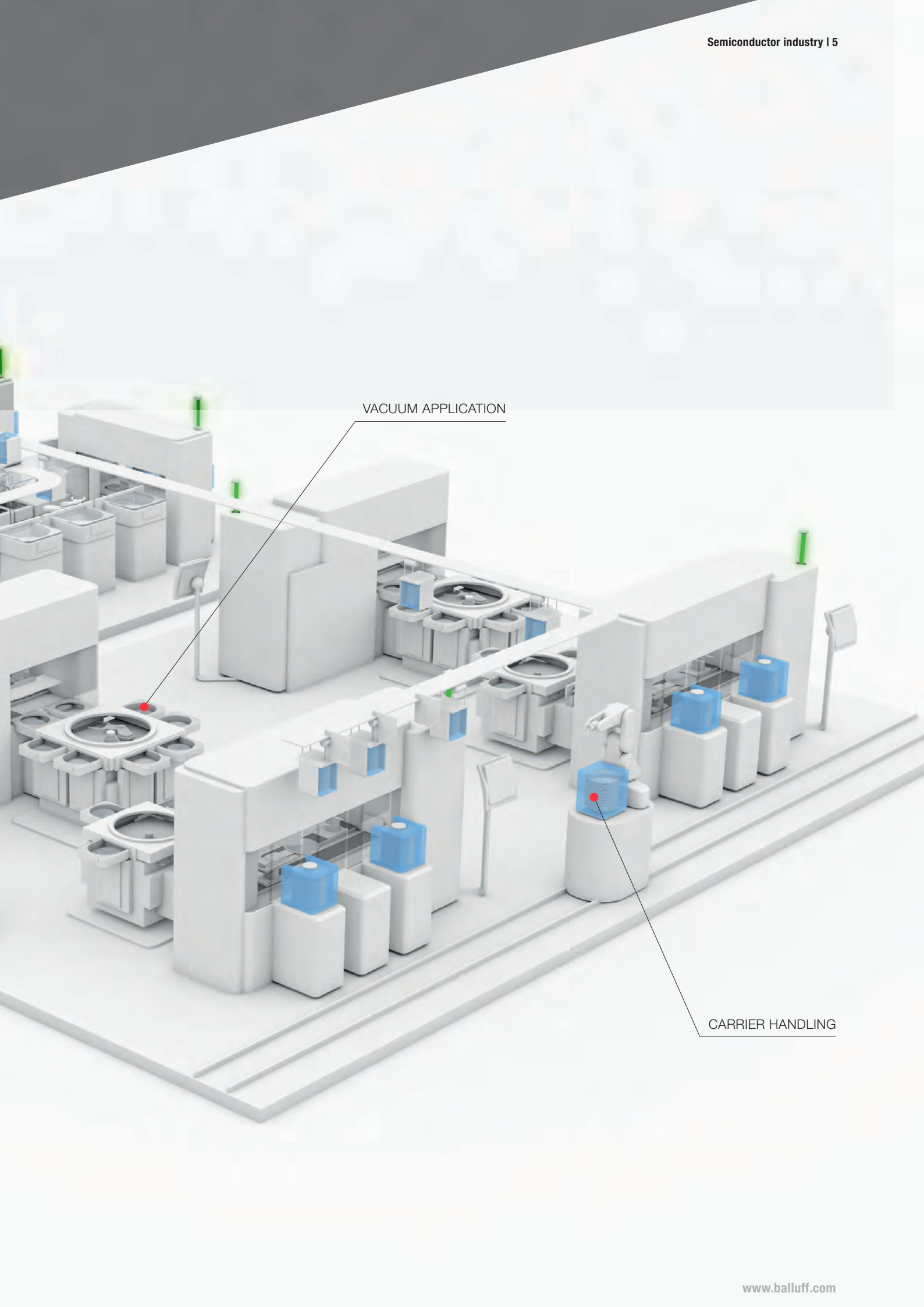
WAFFER HANDLING

WAFFER PROCESSING

Mobile Communication – Internet of Things – Smart Factory – Smart Home. What all these current developments have in common is digitization. With semiconductors as their heart. This makes the semiconductor industry a pathfinding one.

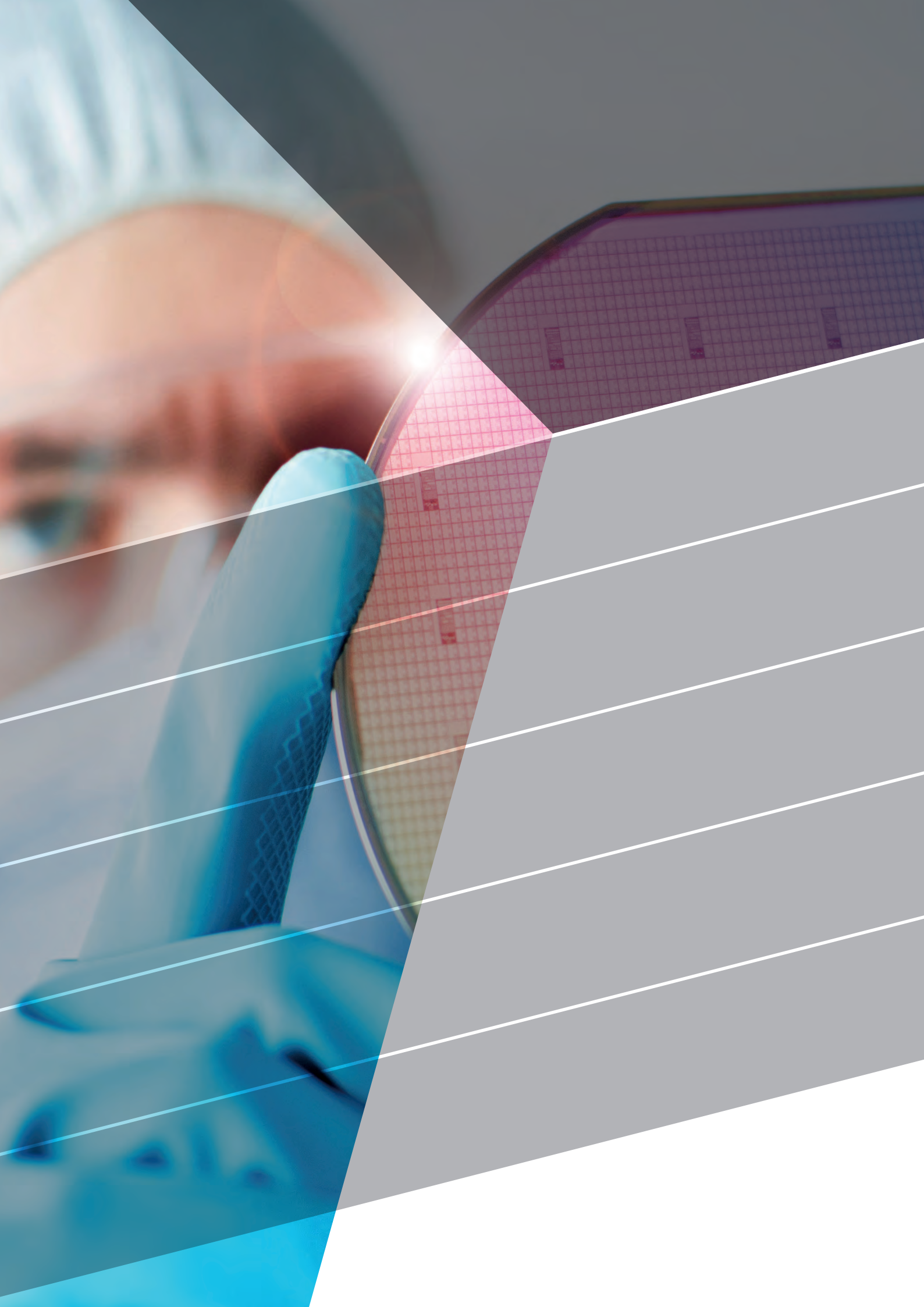
But the change to digital places demands on the industry at the same time. For example chips need to provide ever greater performance. Chip production itself is a highly complex, technologically extremely demanding process to master cost efficiently.

When it comes to processing wafers in the chip and solar industries as well as display production, Balluff offers you expert support and guidance. With reliable miniaturized solutions for cleanroom applications – like in wafer handling or in aggressive chemical environments. Our comprehensive, solid technical expertise lets us also solve your individual, application-specific challenges.



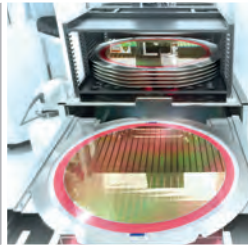
VACUUM APPLICATION

CARRIER HANDLING



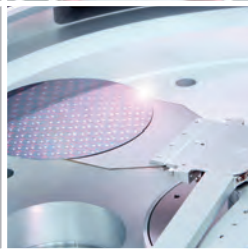
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High precision even between the process steps

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Carrier handling

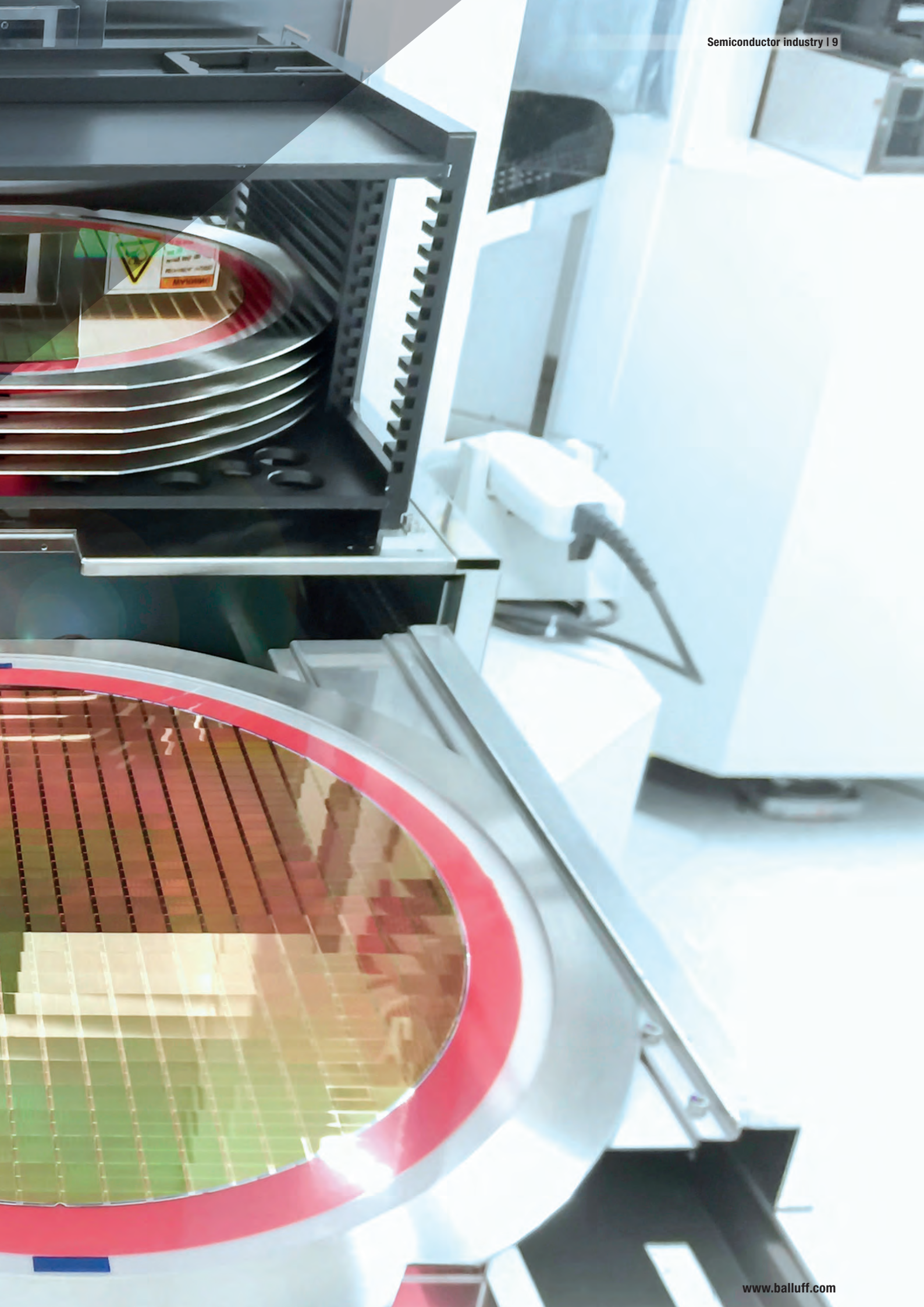
EXACT POSITIONING WITHOUT CONTACT.

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Balluff systems support precise and efficient carrier handling – whether it is an FOUP or SMIF pod. When the carrier is transported fully automatically our systems monitor the movements of the AMHS. With extreme reliability, both over short distances with RGVs or long distances with OHVs.

At the same time our non-contact systems provide exact positioning. Your wafers are reliably transported for each and every processing step. Abrasion and splitting are not a problem.

Balluff systems also provide consistent traceability. They ensure that the carrier position is documented in real time.



Solutions for carrier handling

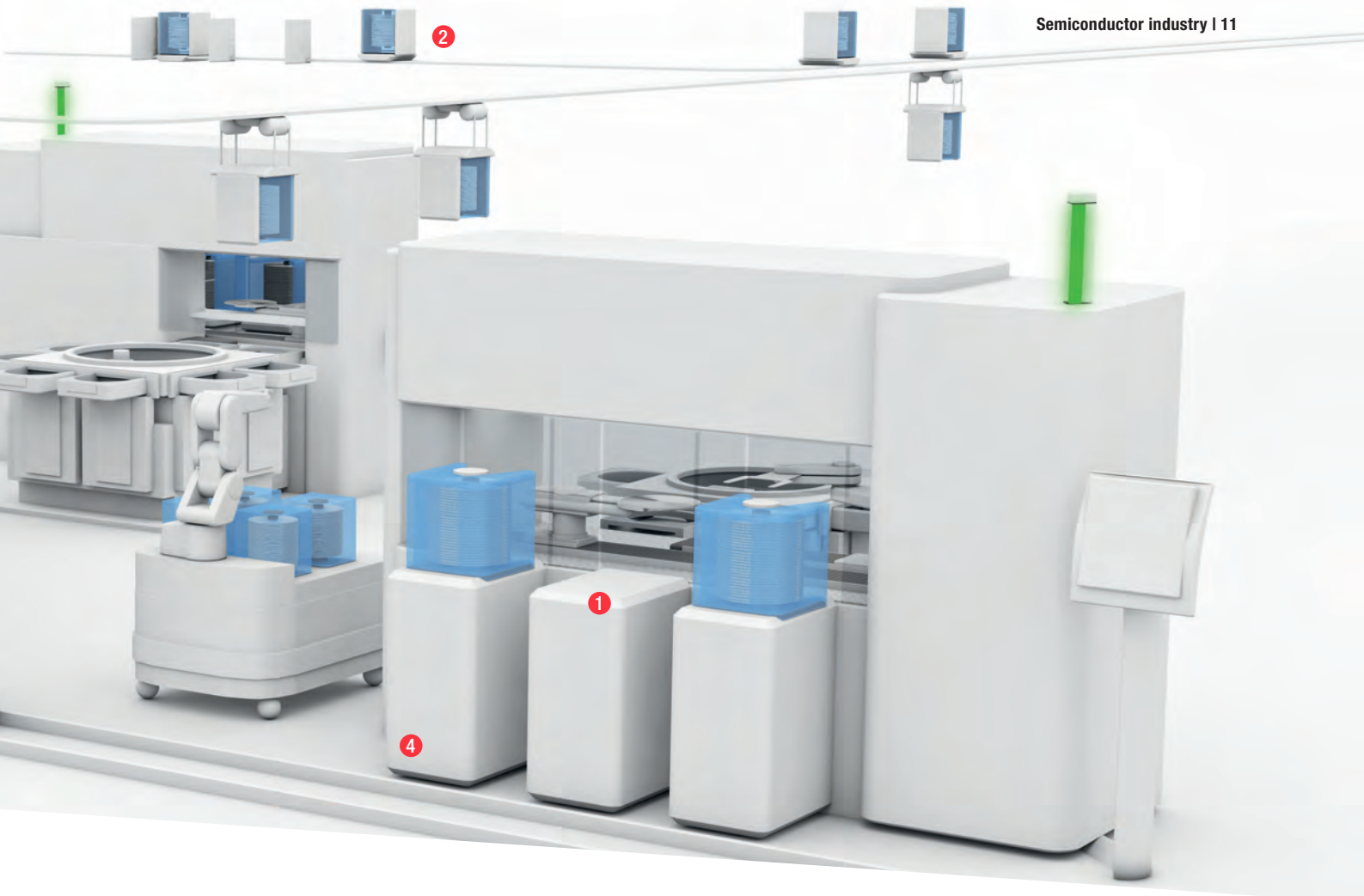


CHECKING FOR CARRIER PRESENCE With BOH photoelectric sensors

To detect the presence of a carrier on a load port, our space-saving through-beam and diffuse sensors are ideal. Their especially flat construction allows them to be ideally integrated. The minimal installation surface on the load port which is often no larger than the transport box, can then be simply maintained. This ensures that the machine only opens when a carrier has docked.

Features

- Very flat construction
- Space-saving
- Individual focus



RELIABLE CARRIER TRACKING With BVS vision sensors

To be able to track the carrier positions in an AMHS system, you equip the carrier with 2D codes for optical reading. Our cameras read data matrix, QR and barcodes, so that every movement of the transport carriers is checked. And you always know exactly where the carriers are located.

Features

- Easy to integrate, intuitive and simple to operate
- All the data are available at a central location
- Minimal data load, since mass data can be decoupled from the process network



CONTINUAL DETECTION OF THE AMHS POSITION With BML magnetic encoder systems

When continuous position detection of the transport vehicles is called for, our magnetic encoder systems keep you on the safe side. These can be individually configured for your measuring range. They are highly precise, so that your carriers are transferred to the load ports smoothly and accurately.

Features

- Non-contacting measuring principle, i.e. wear-free
- Extremely reliable and highly precise
- Versatile: Magnetic tape can be trimmed up to 48 m



CHECKING END POSITION OF THE AMHS With BES inductive sensors

We provide many options for you to monitor the end position of your vehicles that transport the carriers. Depending on the requirement we recommend inductive, capacitive or photoelectric sensors. These allow you to verify that the AMHS is correctly located and your carriers can be precisely positioned at the load port.

Features

- Non-contact, i.e. wear-free
- Efficiently handle any requirements with technical versatility

Wafer handling

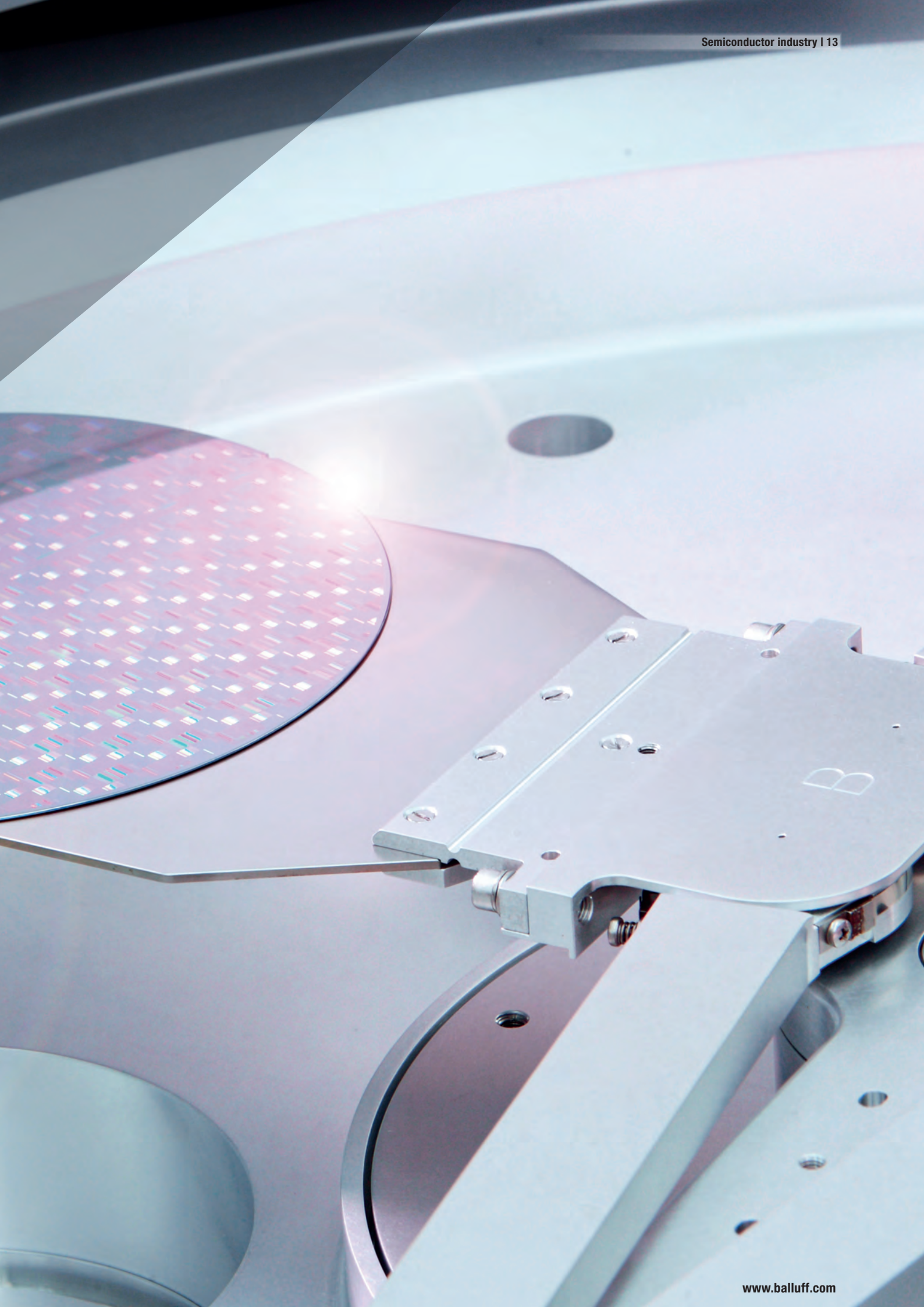
HIGH PRECISION EVEN BETWEEN THE PROCESS STEPS.

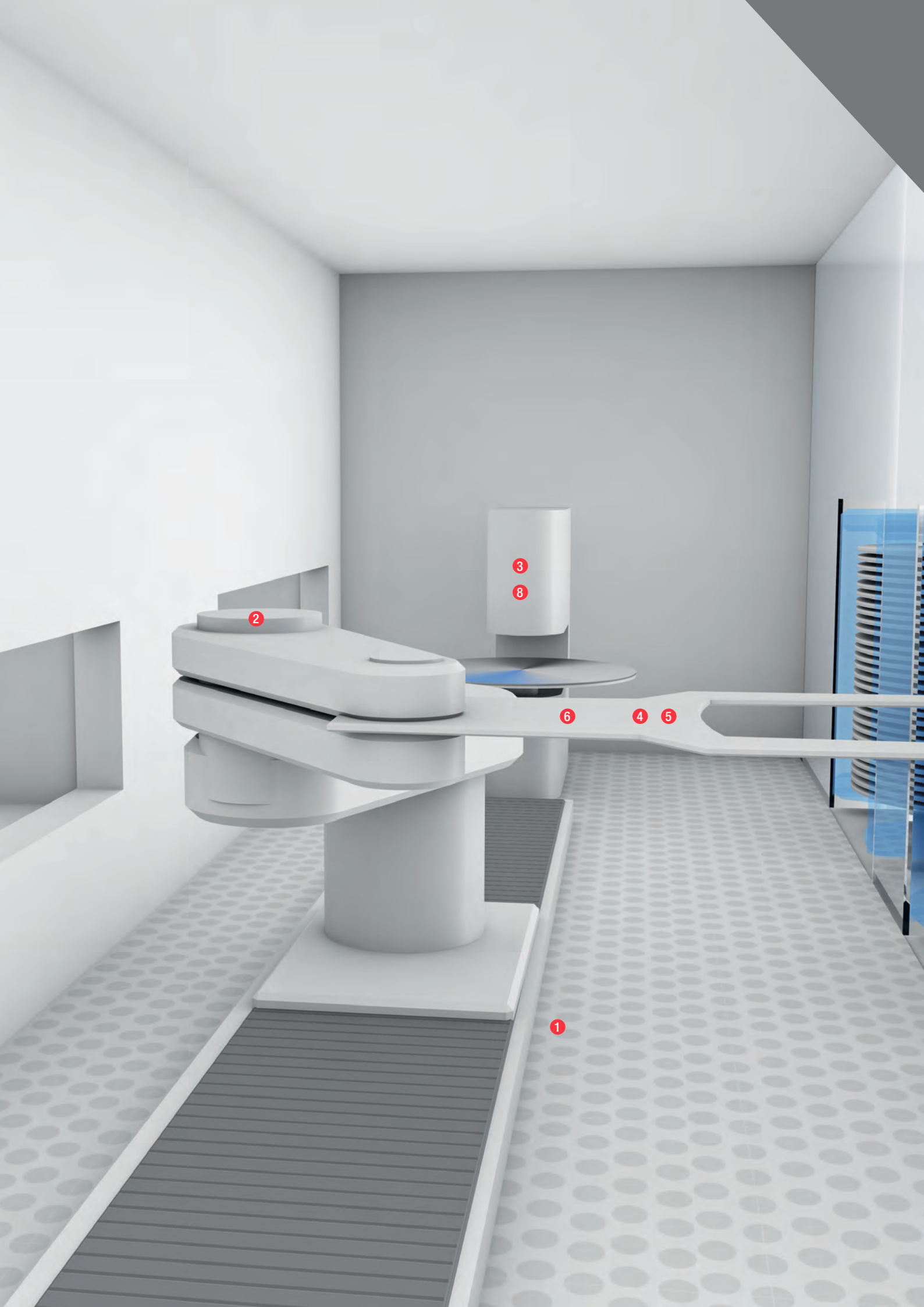
 *innovating automation*

When it comes to wafer handling in the EFEM module, such as on the end effector or the pre-aligner, Balluff gives you high precision. Only extreme accuracy allows wafers to be exactly positioned and reliably transported for each individual processing step.

Our sensors and systems are available in compact form factors to easily meet demanding requirements for machine integration. When conditions are especially challenging – after all, every end effector is different – we can also tailor our technology to your individual requirements.

The non-contact measuring principles prevent abrasion, so that the cleanroom class can be maintained throughout the entire process. Use reliable monitoring of wafer handling and secure your process.





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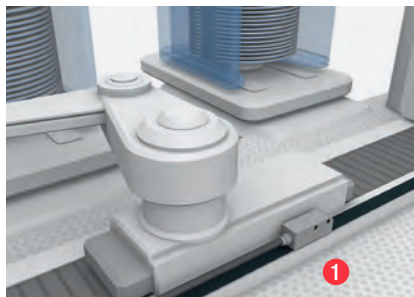
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Solutions for wafer handling



DETECTING ROBOT POSITION With BML magnetic encoder systems

Are you using multiple load ports?
Or multiple process chambers?
Then use our high-precision magnetic encoder systems to reliably monitor the movement of your robot units. These non-contact distance measuring systems continuously monitor the robot position. And the magnetic tape can be trimmed to exactly the length you need. This means you can use the system for modules with varying numbers of load ports.

Features

- Non-contact, i.e. no abrasion or splitting
- Flexible: Up to 48 m of magnetic tape can be trimmed to your requirements



MONITORING ROBOT ROTATION With BML magnetic encoder systems

To position the end effector of the robot with absolute precision, our magnetic coded angle measurement systems are ideal. These check the rotating movements of the robot joints which transport the end effector, bring it to its end position and finally place the wafer.

Features

- Simple to integrate, small sensor head
- Low weight makes it perfect for robotics
- Generous distance between sensor and ring: simple to install – high operating security

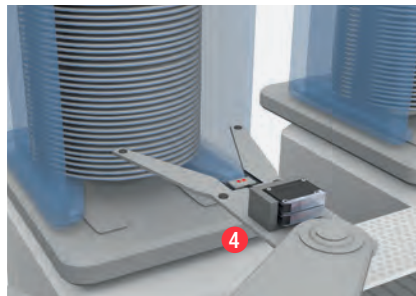


**WAFER PRE-ALIGNMENT
With BLA light arrays**

Bring your wafers to the process chamber perfectly aligned by exactly positioning them in pre-aligner. We offer an outstanding solution for optical pre-aligners: a high-resolution light array with extraordinary homogeneity. Additionally, it lets you detect either notch or flat for precisely centering the wafer. Our light array is also ideal for integrating into your pre-aligner.

Features

- Very precise red light laser: High-resolution and extremely homogeneous
- Different light lengths for individual requirements
- Intuitive operation

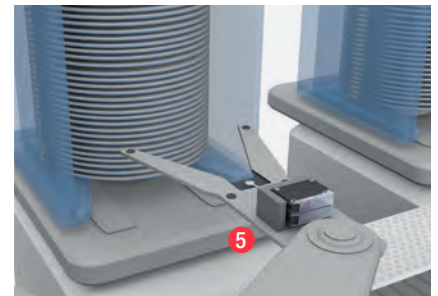


**CHECK FOR WAFER PRESENCE
ON END-EFFECTORS
With BOH photoelectric sensors**

Use our outgassing-optimized optical diffuse sensors to check the presence of the wafer on the end effector with absolute reliability, so that you no longer need to fear crashes. Our diffuse sensors can be perfectly integrated into the end effector, even if it is extremely thin. Because their installation height is just 1.7 mm.

Features

- Extremely flat, perfect for the end effector
- Outgassing optimized for the cleanroom!
- Simple remote adjustment



**CHECK FOR WAFER PRESENCE
ON END-EFFECTORS
With BCS capacitive sensors**

You can also check for the presence of the wafer on the end effector using our capacitive sensors with PTFE coating. These detect ultra-thin wafers with outstanding reliability, even if they are sagging. Their installation height is just 2.5 mm to ensure perfect integration into the end effectors. The external amplifier makes remote adjustment easy.

Features

- Extremely flat – just 2.5 mm
- PTFE housing, also suitable for various surfaces
- High precision in the smallest possible package

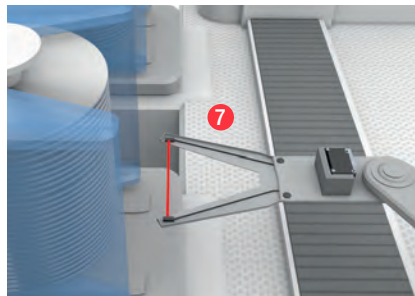


**CHECKING WAFER POSITION
ON THE END EFFECTOR
With BES inductive NAMUR sensors**

Our inductive sensors provide yet another way to determine the presence of the wafer on the end effector while at the same time detecting its exact position. Our short-circuit protected NAMUR sensors can be installed next to each other, so that you can even detect different positions. With form factors starting as small as Ø 4 mm they can also be integrated onto the end effector with no trouble.

Features

- Reliably detect cable breaks and short-circuits
- Various form factors available for individual requirements
- Can be integrated on the end effector

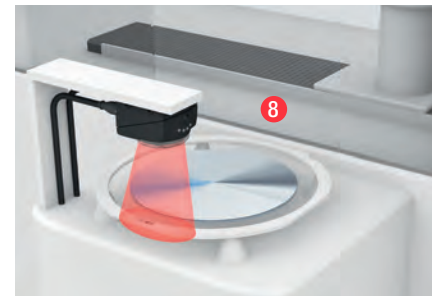


**RELIABLE WAFER MAPPING
With BOH photoelectric sensors**

Detect the edges – of just a few µm thick wafers – with absolute reliability. The extremely controlled and focused light spot from our Micromote sensors provide you with outstanding precision. Our Micromote sensors also ensure that full slots, double wafers or incorrectly positioned wafers are reliably detected at all times. Flexible cables and small form factors let you benefit from great freedom of design.

Features

- Outstanding precision in the smallest space – minimal opening angle
- Can be adapted to a wide variety of end effectors
- Modular kit system – perfect for specific mechanical installation situations



**TRACKING WAFER FRAMES
With the BVS vision sensors**


Ensure a transparent process by using our vision systems to track your wafer frames. You equip the frames with barcodes for reliably checking the systems. Now you know at all times whether a wafer has already been back-grinded and separated.

Features

- Reliable solution for tracking
- Simple, intuitive operation

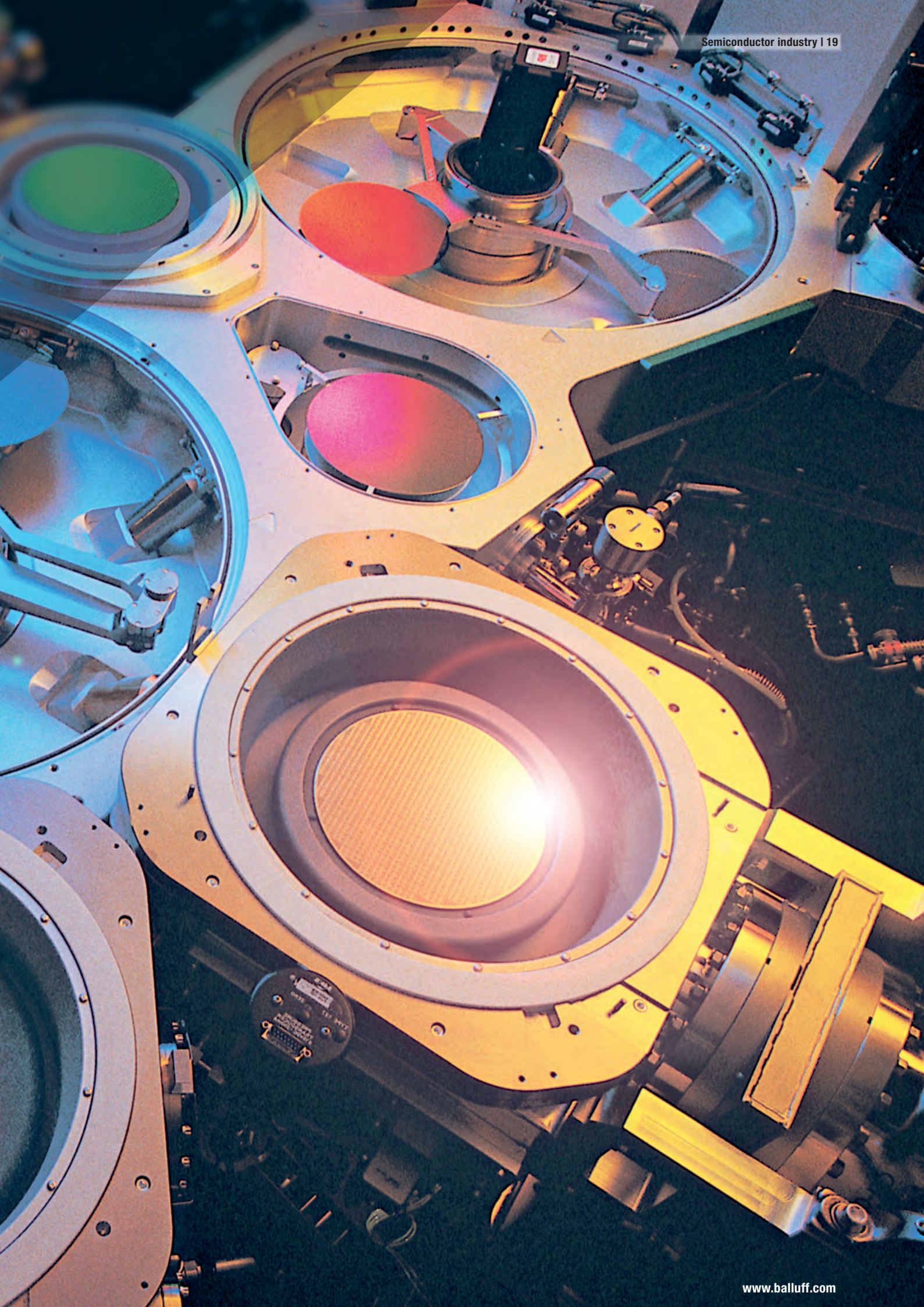
Vacuum application

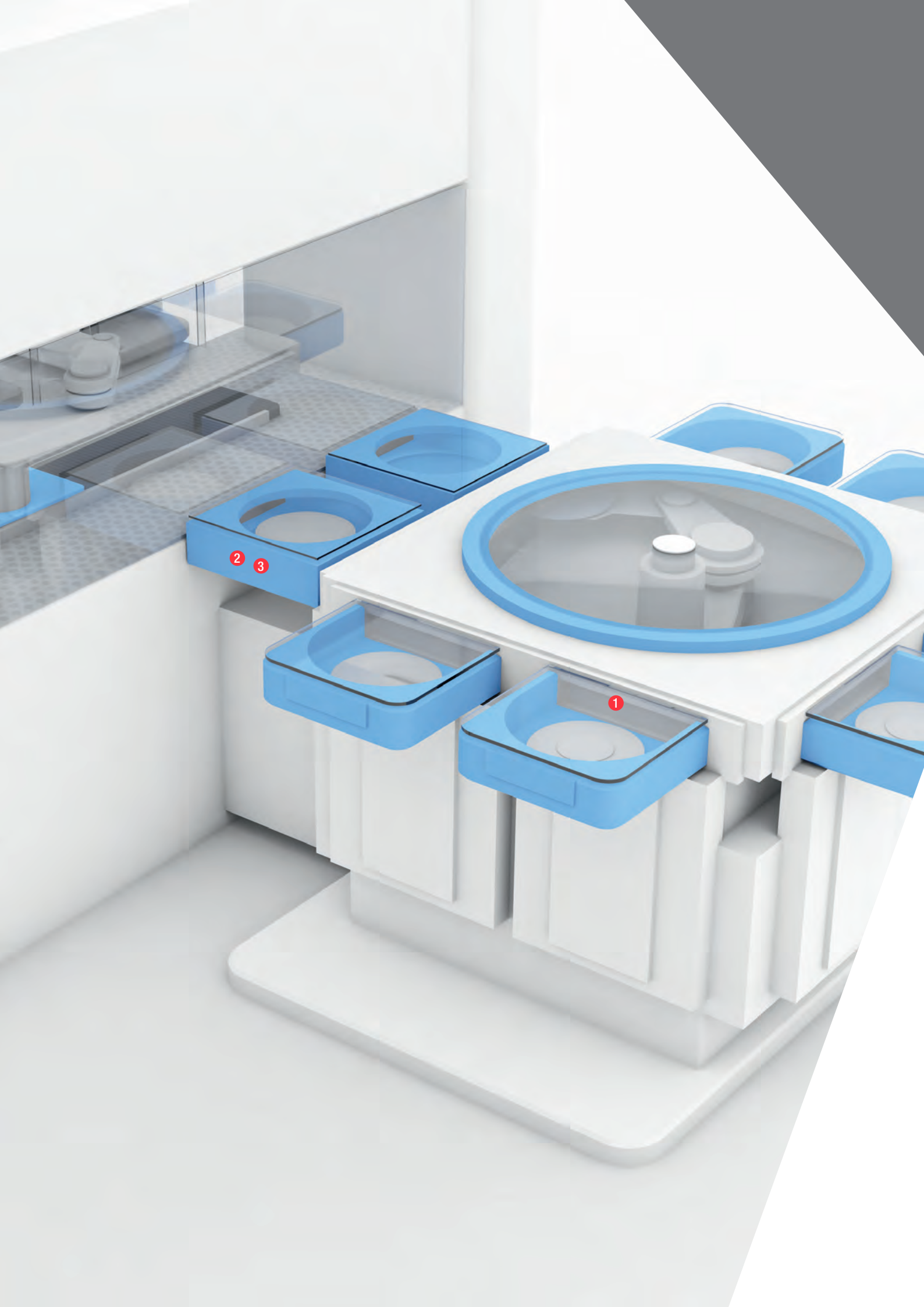
WE ASSIST IN PROCESS SECURITY

 *innovating automation*

Sensors from Balluff with their extraordinary design features let you use them directly in a vacuum. For example during alignment on the fly when the wafer is centered in the vacuum lock or when you need to check it for presence.

We offer thread-in versions with a sealing function as well as sensors for installation directly in high vacuum. Their signals are reliably brought out through electrical cables via a cable fitting. And take special note: Since we use outgassing-optimized materials for the sensor, your process remains secure. If requested we can also produce the sensors in materials you specify.



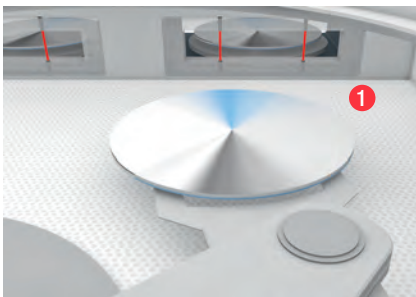


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Solutions for vacuum applications

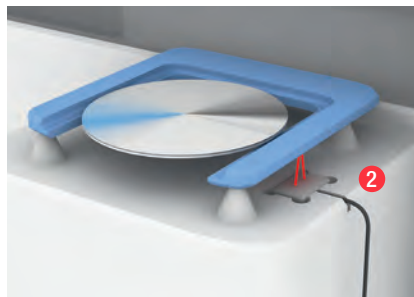


CENTERING WAFERS
With BOH photoelectric sensors

You can reliably ensure alignment of the wafer on-the-fly using two Micromote through-beam sensors. Their high-precision signals make it possible to calculate the offset for the ideal line when the switching for both through-beam sensors is not simultaneous. Due to our Microspot technology, you can correct the wafer, since it precisely detects the sharp wafer edges.

Features

- Extremely focused LED light spot with outstanding homogeneity
- Smallest, space-saving form factors

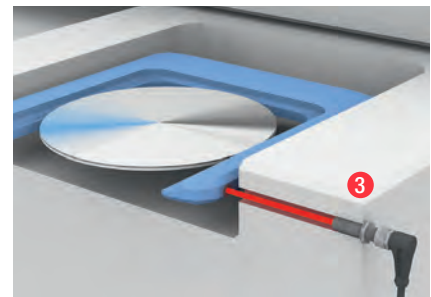


DETECTING WAFER PRESENCE
With BOH photoelectric sensors

To ensure a reliable process you monitor presence of a wafer or carrier using our outgassing-optimized diffuse sensors. The infrared sensors with external amplifier are suited for use in a vacuum. Their ultra-flat form factor just 1.7 mm high with small vulnerability area are perfect for the limited space in a vacuum chamber.

Features

- Ultra-flat installation height saves space
- No dead zone
- Highly rugged stainless steel housing



CHECKING WAFER PRESENCE
With BOH photoelectric sensors

Our photoelectric sensors with separate electronics use special optics with a small light spot to detect the presence of a wafer or carrier through a viewing aperture. Simply thread the vacuum compatible diffuse sensor with stainless steel housing into your process chamber. The chamber is then sealed and no cable feedthrough is needed.

Features

- Micro-optics with small light spot
- Rugged stainless steel housing with sealing function
- for vacuum applications up to 1×10^{-9} mbar

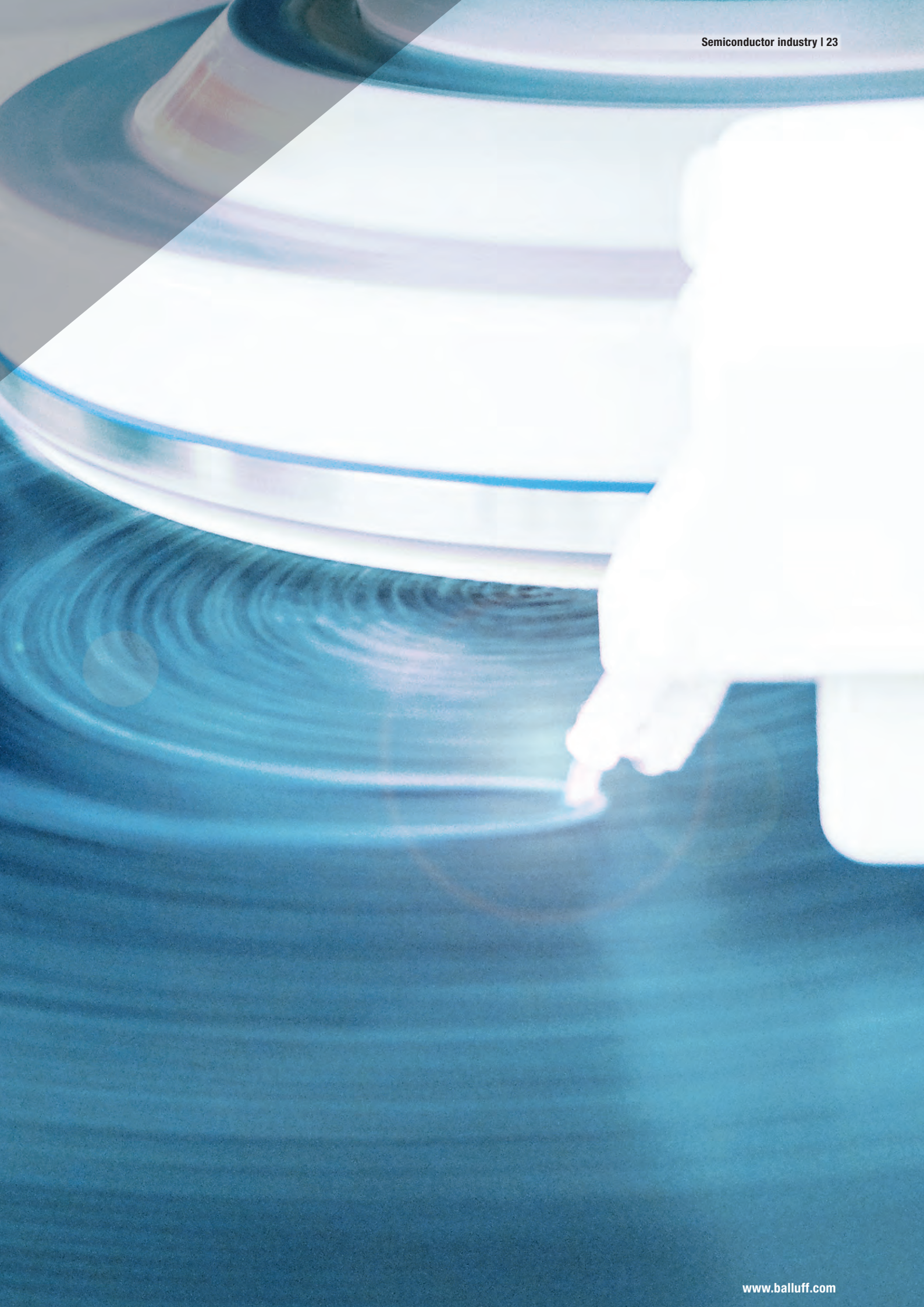
Wafer processing

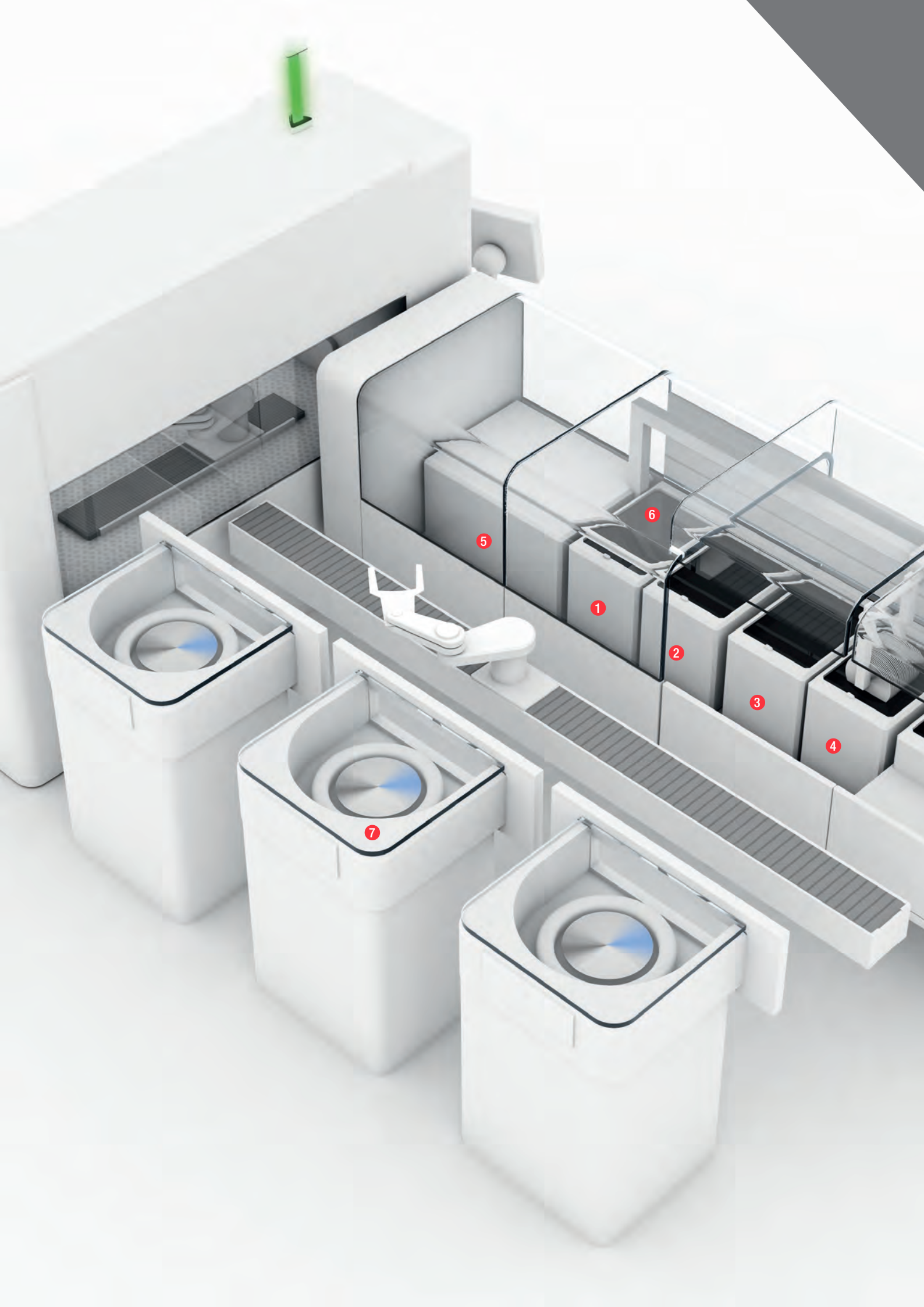
RELIABLE PROCESSING IN CHEMICAL SURROUNDINGS.

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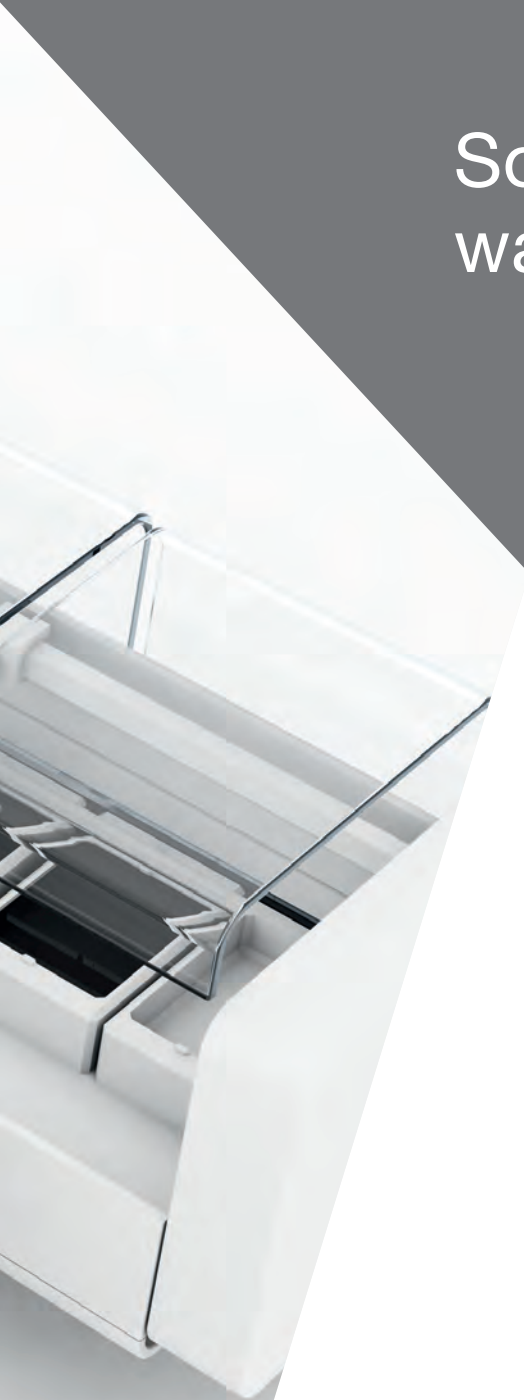
To meet the special challenges of semiconductor production, Balluff offers you optimal solutions for processes in wet chemistry. Special PTFE housings let you monitor levels – such as when etching, cleaning the wafers or coating and developing in lithography. Our temperature sensors then ensure that the process temperature is correct. Because these contacting sensors let you reliably monitor temperatures in wafer processing.

With our sensors you also control the valve stroke, so that you can produce homogeneous and ideal coats in deposition.





Solutions for wafer processing



NON-CONTACT DETECTION OF LEVELS THROUGH THE CONTAINER WALL

With BCS capacitive sensors

In wet chemistry you can ensure a frictionless process chain by using our capacitive sensors to verify the ideal level for acid, base and ultrapure water tanks. These reliably detect the level through up to 10 mm thick glass and plastic vessel walls. For highly conductive media such as acids, use our capacitive high-end sensors, which also mask out foam and build-up.

Features

- For acids, bases, ultrapure water and slurry
- Without by-passes



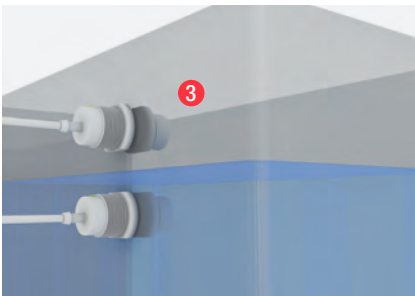
MONITOR LEVELS WITHOUT CONTACT ON BY-PASS TUBES

With BCS capacitive sensors

You can also prevent overflow of tanks with aggressive chemical contents or too low a level by monitoring levels with the help of by-pass tubes. Install our compact capacitive sensors on the by-pass tube using cable ties. This is simple and inexpensive. To compensate for foam and build-up there are high-end versions for you which reliably detect highly conductive media such as lyes.

Features

- For acids, bases, ultrapure water and slurry
- Smart Level technology for foam and build-up compensation



DETECT PROCESS FLUIDS WITH MEDIA CONTACT
With BCS capacitive sensors

When the container wall won't allow detection from the outside, our capacitive sensors in the PTFE housing are the right choice. These detect the level of highly conductive media such as acids and bases directly in the process fluid. This means for example that etching or application of a resist, developing after lithography, or chemical-mechanical polishing and cleaning of the wafer can begin as planned.

Features

- PTFE housing for high chemical resistance
- For acids, bases, ultrapure water and slurry
- Smart level technology for foam and build-up compensation



CONTINUOUSLY MONITOR THE LEVEL WITHOUT CONTACT
With BCS capacitive sensors

Do you need to know at all times what the liquid level is? No problem with our self-adhesive capacitive sensor heads with amplifier: Levels can be continuously monitored, so that you can detect a minimum or maximum value violation as well as levels over the entire range with just one sensor. Hugely practical: You can trim the flexible sensor head to the required shape and size and simply stick it on the container wall.

Features

- Handle both continuous measurement and min. and max. level detection
- Integrated adhesive surface
- Generous detection range from 108 up to 850 mm

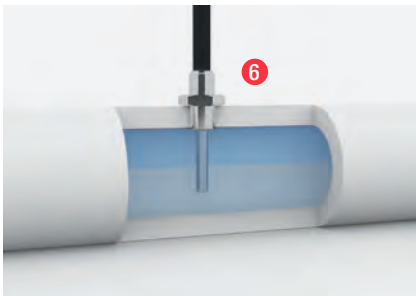


DIRECTLY MONITOR LEAKAGE
With BCS capacitive sensors

Our super-compact capacitive sensors ensure that even the slightest leak amount is reliably detected. Using the provided holder simply attach the sensor at a 2 mm distance on the base of a tool and then just set it. In the worst case, if for example aggressive chemicals such as liquid acids escape, appropriate measures can be immediately taken.

Features

- Mounting holder supplied
- Detect even the smallest amounts
- Reliable detection of various chemicals

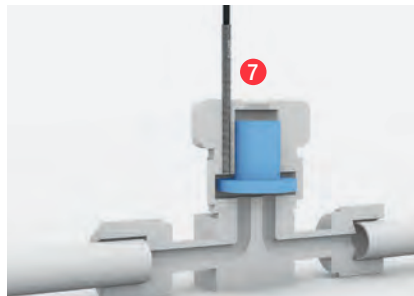


GET THE WAFER TEMPERATURE
AT EACH PROCESS STEP
With BFT temperature sensors

Our media-contacting temperature sensors help you maintain the heat level of your process media in temperature-controlled processes. And they can do it in liquid or gaseous media. You can continuously monitor critical process states such as temperature limits. However you choose to use them, these sensors will contribute greatly to your process security.

Features

- Threaded for simple installation
- Measure temperature directly or gaseous media
- Compact form factors



RELIABLY MONITOR FLOW VALVES
BES pressure-rated inductive sensors

When the regular flow of a medium into the process chamber is controlled by a valve, you should be able to truly rely on the valve. After all, the flow contributes to a high-quality process. Which is why you should monitor the valve using our inductive sensors. These are rugged and available in small form factors such as M5, so that they can be easily integrated into the valve. For great reliability.

Features

- Small form factors for easy integration
- LED visible after installation on the back end of the sensor
- No external amplifier necessary

Our special strengths

HIGH PRECISION AND COMMUNICATIONS EXPERTISE



With Balluff you are able to implement future-oriented, innovative concepts for meeting your individual challenges in wafer processing and display production. From our broad, high-quality range of solutions we offer you our Micromote technology and our communications expertise including IO-Link.

Micromote technology is top performance exclusively from Balluff: Micromote sensors mean high optical precision without equal, and a unique kit system that provides you with extraordinary flexibility. This high performance is available in the smallest possible package, so that you can handle every task with perfection.

The open standard IO-Link is the first globally standardized I/O technology that communicates down to the lowest automation level. Even more: In combination with intelligent network technology IO-Link provides for faster, more flexible and more efficient production. Using a high-performance infrastructure which reliably handles the growing data volume. This transports your data through the entire manufacturing process and enables seamless communication from the sensor into the Internet. That is why IO-Link is the interface for improved process quality.



The modular system for extraordinary flexibility

MICROMOTE HIGH OPTICAL PERFORMANCE IN THE SMALLEST SPACE.

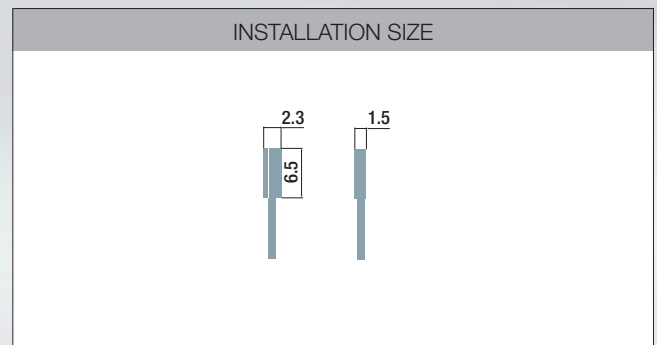
 *innovating automation*

Unique solution package for individual requirements

The interplay between optical and mechanical properties of the Micromote sensors offers you a unique solution package that you can adapt to your specific application. Especially in applications where design-in and miniaturization play an important role.

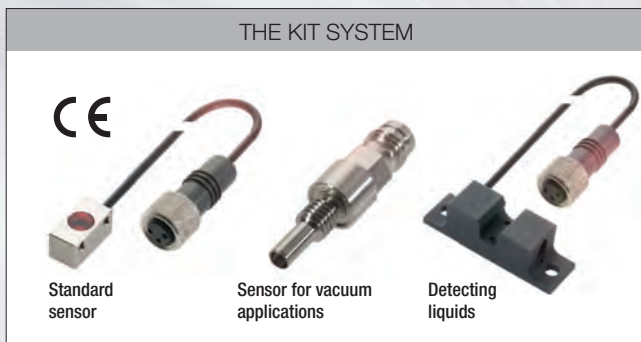
Features

- Great design freedom thanks to high degree of miniaturization and individual specification
- Highly flexible sensor cable for drag chain compatibility
- Can be adapted to a wide range of applications using various light types and wave lengths
- Greatest possible flexibility thanks to comprehensive modular system
- Beam sensors for wide monitoring range
- Cable with 90 kg tensile loading strength



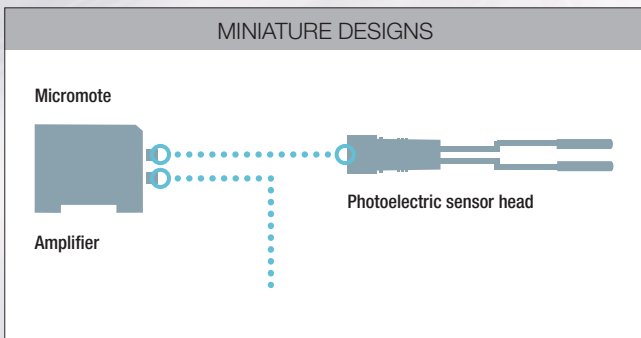
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THE KIT SYSTEM



The modular system of the Micromote sensors with innovative sensor elements conforms to individual requirements. Each sensor can be operated using each amplifier. Numerous housing form factors ensure especially great design freedom even when space is at a premium.

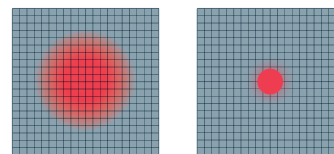
MINIATURE DESIGNS



Micromote sensors from Balluff are especially small for the most flexible possible use, so that they are an ideal alternative to fiber optics. They combine an external processor unit (amplifier) with an exceptionally small photoelectric sensor head. A highly flexible connection cable connects the amplifier to the sensor head.

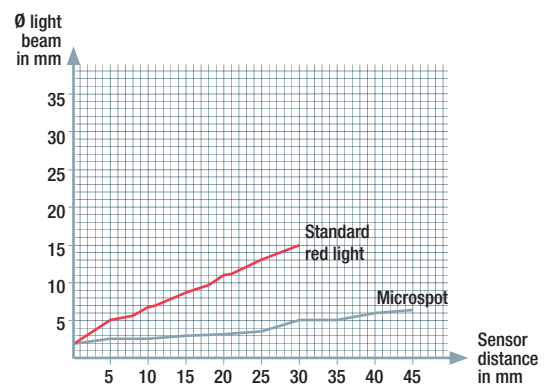
MICROSPOT

Test setup from 25 mm distance



Standard red light

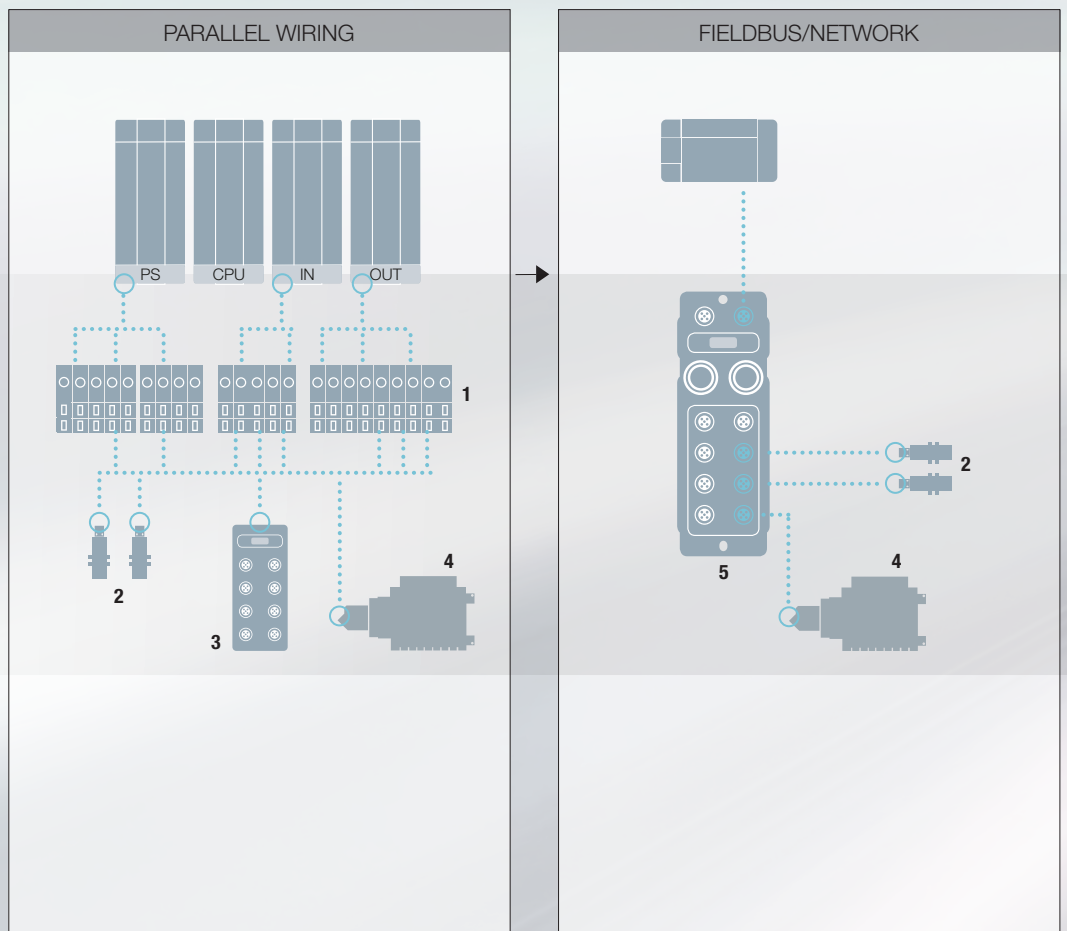
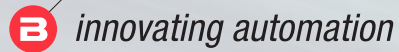
Microspot



Precise micro-photoelectric elements ensure high process accuracy in any application. In this series we can produce LEDs with 3° beam angles and circular light spots. And most importantly: the manufacturing tolerances are vanishingly small.

Modular control concepts

WHY IO-LINK IS IN THE PASSING LANE.



- | | | |
|----------------------|-----------------------------|---------------------------------------|
| 1 Terminal strip | 7 IO-Link pressure sensor | 13 IO-Link safety hubs |
| 2 Sensors | 8 Industrial RFID system | 14 Opto-electronic protective devices |
| 3 Junction blocks | 9 IO-Link master | 15 Emergency stop device |
| 4 Valve interfaces | 10 IO-Link analog converter | |
| 5 Fieldbus module | 11 IO-Link valve interfaces | |
| 6 IO-Link SmartLight | 12 IO-Link sensor hubs | |

From parallel wiring to the fieldbus protocol

Replacing parallel wiring with the use of fieldbuses was an enormous step. Because fieldbus protocol has successfully eliminated the immense installation effort associated with copper cables. And substantially reduced the costs. It is not just that the field bus reduces the working time because a bus cable replaces numerous parallel strands of wire. Because fewer conductors are needed, material and space are also conserved. Simultaneously, the bus cable connects the components of different levels. Now you can construct a system without a control cabinet.

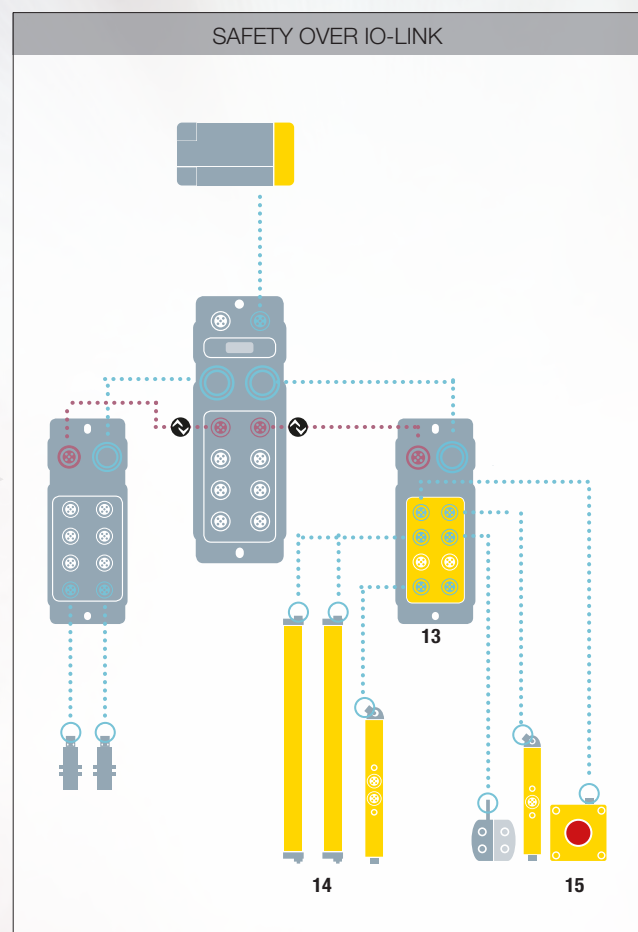
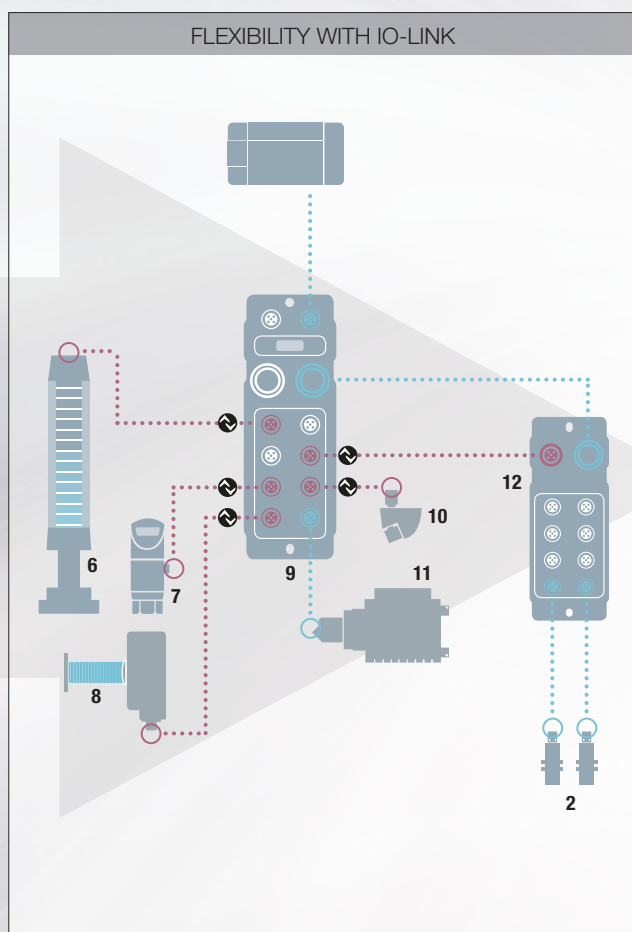
Pitfalls of the fieldbus protocol

But even fieldbus cables are not without problems, notwithstanding that their protocol is no longer electrical and the cabling expense goes down by orders of magnitude. Because fieldbus cables have a low signal level, are noise-susceptible, don't like to be bent and because of the shield are expensive.

Universal, simple and flexible: IO-Link!

The weaknesses of the fieldbus protocol are now a thing of the past thanks to IO-Link. Because the unshielded, 3- or 4-conductor standard industrial cables are highly flexible and suitable for many bending cycles. They are easy to connect, highly economical, and are standardized with M5, M8 or M12 connectors. Therefore, with IO-Link you can rely on an established standard for connecting the widest possible variety of devices. IO-Link ensures extremely flexible control concepts. This versatility, simplicity and performance capability mean IO link can be considered a universal interface – like USB – in automation.

But with IO-Link the flexibility is even much greater. Because with Safety over IO-Link Balluff offers you the first safety solution to be integrated with IO-Link for combining safety and automation technology in one system. Safety over IO-Link provides both sensor/actuator details as well as safety information, so that you can benefit from the best of both worlds with our safety concept.



More efficiency, lower costs

IO-LINK SAVES TIME AND MONEY.

 *innovating automation*

Easy to install

To install this universal interface all you need is the IO-Link master and an industry standard three- or four-wire standard cable. You can then quickly integrate this intelligent communication standard into the fieldbus world. And easily incorporate even complex devices. One special feature: the digital communication ensures noise immunity even without the use of expensive shielded cabling. Analog signals are digitized with no conversion losses.

Highest machine availability

IO-Link enables quick, error-free sensor replacement and prompt commissioning. You can significantly reduce downtimes since the parameters of a replaced IO-Link sensor are automatically written from the IO-Link master to the new sensor. Commissioning processes, format changes or recipe changes are handled centrally via the controller's function modules. This saves time and reduces the potential for mistakes to a minimum. Another advantage to you: IO-Link devices cannot be mixed up, since they are automatically identifiable via IO-Link.

Requirements-based maintenance

Continuous diagnostic data for the entire process extends your service intervals, since automatic readjustment via IO-Link means you need to maintain equipment and machines much less often. And now predictive error detection is even possible. Because the complete process parameters are consistently displayed in the controller.

More efficient operation

With IO-Link you can position sensors in the machine just as the process requires, since accessibility of the sensors is no longer a factor. Process monitoring, configuration and error analysis of the IO-Link devices now takes place in the controller. Machine sequences are now time-optimized. Signal delays and distortions are reliably eliminated. Because digital transmission of data also ensures high signal quality.

A wide range of application requirements can be easily met with IO-Link. Because you can use both binary and analog standard devices at the same time along with IO-Link sensors/actuators.

STANDARD
SENSORS/
ACTUATORS

STANDARD PLC

SAFETY PLC

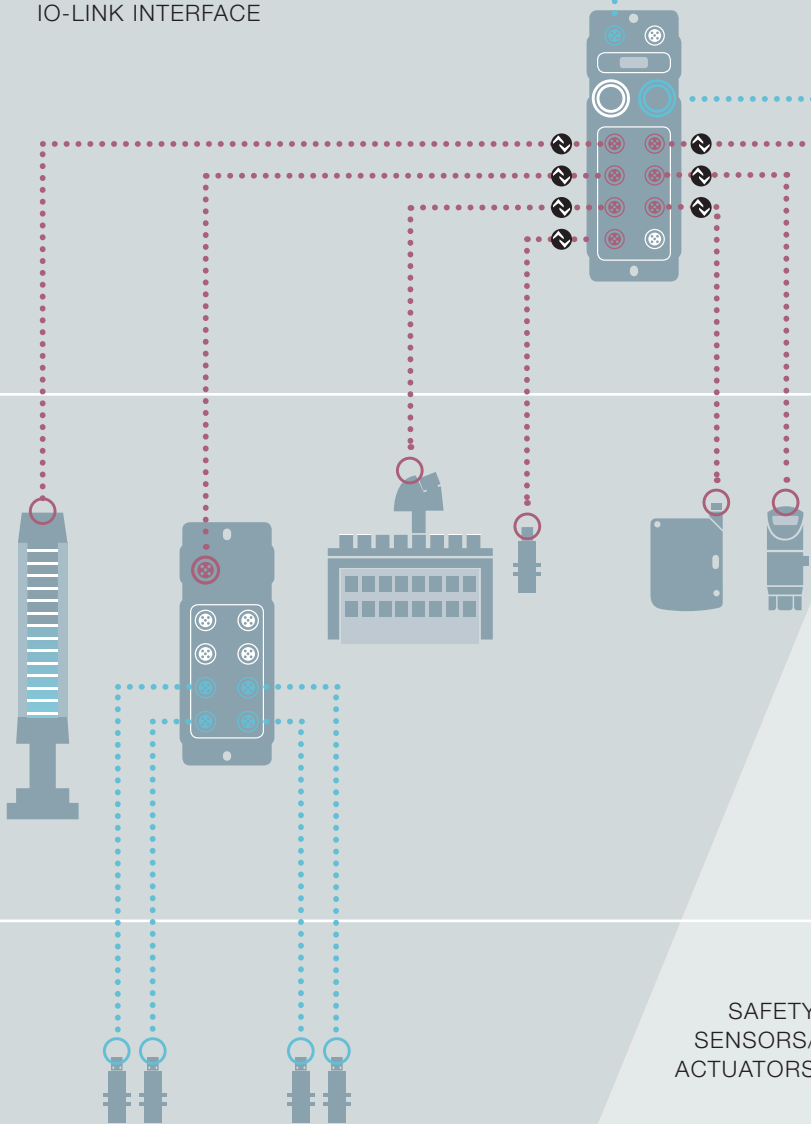


DeviceNet
EtherNet/IP
EtherCAT



FIELD BUS
MASTER WITH
IO-LINK INTERFACE

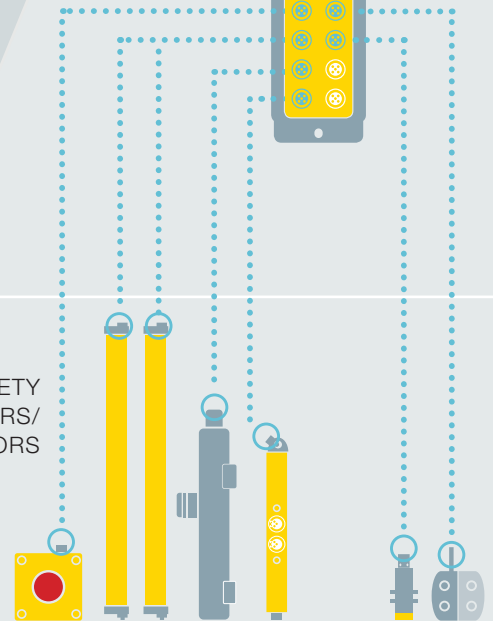
IO-LINK
DEVICES



SAFETY-OVER-
IO-LINK DEVICE*



SAFETY
SENSORS/
ACTUATORS



*for use only with Profinet

INNOVATIVE SOLUTIONS FOR ALL REQUIREMENTS





CP -
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PRODUCT OVERVIEW



Application	Product group	Example	Functions, interfaces and properties
CARRIER HANDLING			
Checking for carrier presence	BOH optical sensor heads Micromote	BOH002H	18 × 4.8 × 15 mm, through-beam sensor, range 0...2 m, Microspot-LED red light, housing material brass, for switching amplifier
		BOH002L	16 × 4 × 8.5 mm, diffuse sensor, range 3...15 mm, Microspot-LED red light, housing material brass, for switching amplifier
	BAE amplifiers for optical sensor heads	BAE00R6	Switching frequency 10 kHz, 4-position slide switch, M8 connector, teach mode
		BAE00Y7	Switching frequency 3 kHz, auto-synchronisation, alarm threshold, M8 connector, teach mode
	BOS photoelectric sensors, through-beam	BOS021P (receiver), BOS021T (emitter)	20 × 32 × 9 mm, through-beam sensor, range 0...2.2 m, LED red light, housing material 1.4404 stainless steel, connection 2 m PUR cable
Reliable carrier tracking	BVS-E code reader identification	BVS001R	Focal length 6 mm, LED red light, 3 × PNP NO, range 50...1000 mm, reads various codes, interface RS232
		BVS0019	Focal length 8 mm, LED infrared, 3 × PNP NO, range 50...1000 mm, reads various codes, interface Ethernet 10/100 Base T
Continual detection of the AMHS position	BML absolute linear magnetic encoder system	BML041H	16 × 18.5 × 80.3 mm, interface SSI/Analog Sin/Cos (1 V _{pp}), resolution 1 μm, up to 48 m
	BAM measuring tapes for magnetic encoders	BML-M02/03-A55-AX-M...-E*	Compatible tape up to 48 m
Checking end position of the AMHS	BES inductive standard sensors, preferred types	BES01TH	59 × 8 × 8 mm, range 3 mm, PNP NO, housing material zinc die-cast, connection M8 connector, 3-pin
	BCS capacitive sensors for object detection	BCS00PU	M12 × 1, range 1...4 mm, PNP NO, housing material PBT, connection 2 m PUR cable
	BOS photoelectric sensors, through-beam sensors	BOS0228 (receiver), BOS021R (emitter)	20 × 32 × 9 mm, through-beam sensor, range 0...2.2 m, NPN NO, LED red light, light exit Ø 3 mm, housing material 1.4404 stainless steel, connection 0.2 m PUR cable with M8 connector, 3-pin

* Please contact our sales department to configure your product.

Application	Product group	Example	Functions, interfaces and properties
WAFER HANDLING			
Detecting robot position	BML absolute linear magnetic encoder system	BML05WT	16 × 18.5 × 80.3 mm, interface SSI/Analog Sin/Cos (1 V _{pp}), resolution ≤ 1 μm, up to 8 m
	BAM measuring tapes for magnetic encoders	BML-M02/03-A55-AX-M...-E*	Compatible tape up to 48 m
Reliably monitoring robot rotation	BML incremental linear magnetic encoder system	BML07PY	12 × 13.1 × 35 mm, interface digital A/B (RS422), resolution 1 μm, for rotary applications
	BML measuring rings for magnetic encoders	BML002K	Compatible measuring ring, 228 poles, pole width 1 mm, no reference mark, housing material hard ferrite
Wafer pre-alignment	BLA light arrays	BLA0001	Light array, CCD technology, range 0...2 m, laser red light, analog output 2 × analog voltage 0...10 V/analog current 4...20 mA, switching outputs 3 × PNP NO
Check for wafer presence on end-effectors	BOH optical sensor heads Micromote	BOH00A0	1.7 mm installation height for perfect integration in the end-effector, LED technology, requires separate amplifier
		BAE00R6	Switching frequency 10 kHz, 4-position slide switch, M8 connector, teach mode
	BAE00Y7	Switching frequency 3 kHz, auto-synchronisation, alarm threshold, M8 connector, Teach mode	
Check for wafer presence on end-effectors	BCS capacitive sensor heads for switching amplifiers	BCS001A	2.5 mm installation height for perfect integration in the end-effector, PTFE coating, requires separate amplifier
	BAE amplifiers for capacitive sensor heads	BAE00LA	0.3 m PUR cable with M12 connector, analog output, teachable, various programmings possible
Checking wafer position	BES inductive NAMUR sensors	BES050N	Ø 4 × 27 mm, range 0.8 mm, switching frequency 2.5 kHz, housing material stainless steel, connection 2 m PUR cable
Reliable wafer mapping	BOH optical sensor heads Micromote	BOH000C	Ø 2 × 8.6 mm, through-beam sensor, range 0...500 mm, Microspot-LED red light, housing material stainless steel, for switching amplifier
		BAE00R6	Switching frequency 10 kHz, 4-position slide switch, M8 connector, teach mode
	BAE00Y7	Switching frequency 3 kHz, auto-synchronisation, alarm threshold, M8 connector, teach mode	
Tracking wafer frames	BVS-E code reader identification	BVS001R	Focal length 6 mm, LED red light, 3 × PNP NO, range 50...1000 mm, reads various codes, interface RS232
		BVS0019	Focal length 8 mm, LED infrared, 3 × PNP NO, range 50...1000 mm, reads various codes, interface Ethernet 10/100 Base T

* Please contact our sales department to configure your product.

PRODUCT OVERVIEW



Application	Product group	Example	Functions, interfaces and properties
VACUUM APPLICATIONS			
Centering wafers	BOH optical sensor heads Micromote	BOH009U	Ø 9.5 × 55.5 mm, through-beam sensor, range 0...300 mm, LED red light, housing material stainless steel, threaded design for chamber sealing, for switching amplifier
		BOH000C	Ø 2 × 8.6 mm, through-beam sensor, range 0...500 mm, Microspot-LED red light, housing material stainless steel, for installation behind sight glass, for switching amplifier
Detecting wafer presence	BOH optical sensor heads Micromote	BOH00CM	9 × 7 × 1.7 mm (for perfect integration in the end-effector), diffuse sensor energetic, range 0...10 mm, infrared, housing material stainless steel, vacuum compatible, 2 m PTFE leads, for switching amplifier
Checking wafer presence	BOH optical sensor heads Micromote	BOH009R	Ø 9.5 × 35.5 mm, diffuse sensor energetic, range 0...12 mm, infrared, housing material stainless steel, threaded design for chamber sealing, for switching amplifier
For all vacuum applications	BAE amplifiers for optical sensor heads	BAE00R6	Switching frequency 10 kHz, 4-position slide switch, M8 connector, teach mode
		BAE00Y7	Switching frequency 3 kHz, auto-synchronisation, alarm threshold, M8 connector, teach mode

Application	Product group	Example	Functions, interfaces and properties
WAFER PROCESSING			
Non-contact detection of levels through the container wall	BCS capacitive level sensors without media contact	BCS0080	Ø 50 × 10 mm, flush mountable, adjustable for medium, PNP NO, smart level technology compensates for foam and build-up, housing material PTFE, connection 2 m PTFE cable
Monitor levels without contact on by-pass tubes	BCS capacitive sensors for object detection	BCS013J	40 × 40 × 10 mm, flush mountable, range 1...20 mm, PNP NO, ambient temperature -5...+85 °C, housing material PBT, attach to by-pass tube with cable ties, connection 1.7 m PUR cable with M8 connector, 3-pin
Detect process fluids with media contact	BCS capacitive level sensors with media contact	BCS007A	M30 × 1.5 mm, non-flush mountable, adjustable for medium, PNP NC, smart level technology compensates for foam and build-up, housing material PTFE, connection 2 m PTFE cable
Continuously monitor the level without contact	BCW self-adhesive capacitive sensor head	BCW0004	33 × 2 × 850 mm, can be vertically mounted, teachable for level applications, adheres to container wall, trim to desired length, up to 6 mm vessel thickness, for switching amplifier
	BAE amplifiers for capacitive sensor heads	BAE00KJ	2 m PUR cable, analog output, teachable, various programmings possible
Directly monitor leakage	BCS capacitive level sensors without media contact	BCS012L	34 × 16 × 8 mm, adjustable for medium, detects highly conductive materials using smart level technology, spacer for easier installation, NPN NC, housing material PP, connection 2 m PUR cable
Get the wafer temperature at each process step	BFT media-contacting temperature sensors	BFT0001	Temperature probe, process connection G¼", pressure rated to max. 50 bar, installation length 25 mm, connection M12 connector, 4-pin
		BFT0005	Transmitter, M12 connector, process connection G¼", pressure rated to max. 270 bar, installation length 25 mm, connection M12 connector, 4-pin
Reliably monitor flow valves	BES pressure-rated inductive sensors	BES05K2	M5 × 0.5, flush mountable, range 0.8 mm, PNP NC, housing material stainless steel/ceramic, pressure-rated up to 10 bar, connection 0.05 m PUR cable with M5 connector, 4-pin



 *innovating automation*

The Balluff logo consists of the word "Balluff" in a bold, sans-serif font. The background of the page features a dark grey geometric shape on the right and a photograph of an industrial facility with a body of water on the left.

OPENING UP NEW PERSPECTIVES

Balluff is one of the leading providers of high-quality sensor, identification and network solutions as well as software for integrated system solutions for your automation requirements. Family-run for more than 90 years, the company now employs around 3600 employees in 37 subsidiaries with distribution, production and development sites worldwide, all working towards your success. Together with our branches, we guarantee the highest quality standards worldwide. This is how we empower you to always receive the best.

We give our all to provide top services for innovative solutions that increase your competitive edge. Through years of experience we bring the competence of a manufacturer and high personal engagement.

We live our motto 'innovating automation': we are automation pacesetters, developers and technological pioneers. In open interactions with associations, universities and research facilities, and in close contact with our customers, we create new industry solutions for automation. Innovative Balluff solutions prepare you for a successful future. We keep the future firmly in sight. In everything we do. With sophisticated environmental management, we protect the environment and handle our resources carefully. This creates the best conditions for sustainable action, also for you.

You can always count on us, our products and our scheduling and delivery reliability. In the spirit of a good partnership.

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